BayWa r.e.
r.e.think energy

Bullawah Wind Farm

Scoping Report

Proponent: BayWa r.e. Projects Australia

Author: Umwelt (Australia) Pty Ltd

Date: October 2022

umwelt
Environmental & Social Consultants

BULLAWAH WIND FARM

Scoping Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
BayWa r.e. Projects Australia Pty Limited

Project Director:	Nathan Baker
Project Manager:	Lauren Evans
Report No.	22110/R04
Date:	October 2022

Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Abbreviations

Abbreviation	Definition
ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
AEMO	Australian Energy Market Operator
AIA	Aviation Impact Assessment
Associated dwelling	A dwelling owned by an associated landholder
Associated landholder	A landholder who has reached an agreement with BayWa r.e. in relation to the Project but will not host WTGs on their land
BAM	Biodiversity Assessment Method
BayWa r.e.	BayWa r.e. Projects Australia Pty Limited
BBUS	Bird and Bat Utilisation Survey
BC Act	Biodiversity Conservation Act 2016
BCD	Biodiversity and Conservation Division
BDAR	Biodiversity Development Assessment Report
BOM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
CASA	Civil Aviation Safety Authority
CCC	Community Consultative Committee
CEEC	Critically Endangered Ecological Community
CIV	Capital Investment Value
CLM Act	Contaminated Land Management Act 1997
Crown Land Act	Crown Land Management Act 2016
CSEP	Communications and Stakeholder Engagement Plan
dB(A)	A-weighted noise or sound power level in decibels
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment [current]
DPIE	NSW Department of Planning, Industry and Environment [former]
EEAP	NSW Energy Efficiency Action Plan
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EL	Exploration License
EMF	Electromagnetic Field
EMI	Electromagnetic Interference
EnergyCo NSW	Energy Corporation of NSW

Abbreviation	Definition
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
GHG	Greenhouse Gas
GIS	Geographic Information System
GW	Gigawatts
Ha	Hectares
Host dwelling	A dwelling owned by a host landholder
Host landholder	A landholder who will (subject to finalisation of an agreement with BayWa r.e.) host WTGs on their land, also referred to as 'involved' landholders
HHA	Historical Heritage Assessment
IAIA	International Association for Impact Assessment
KV	Kilovolt
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LVIA	Landscape and Visual Impact Assessment
MNES	Matter of National Environmental Significance
MP	Member of Parliament
MW	Megawatt
MWh	Megawatt Hour
MWTT	Multiple Wind Turbine Tool
NDC	Nationally Determined Contributions
NEM	National Electricity Market
Non-associated dwelling	A dwelling owned by a non-associated landholder
Non-associated landholder	A landholder who has not reached an agreement with BayWa r.e. in relation to the Project, also referred to as 'non-involved' landholders
NPfI	Noise Policy for Industry 2017
NSW	New South Wales
NSW EPA	NSW Environment Protection Authority
NSW REAP	NSW Renewable Energy Action Plan
OSOM	Over-size, over-mass vehicle
PA	Planning Agreement
PCT	Plant Community Type
POEO Act	Protection of the Environment Operations Act 1997
RAAF	Royal Australian Air Force

Abbreviation	Definition
REZ	Renewable Energy Zone
RFS	NSW Rural Fire Service
RMRP	Riverina Murray Regional Plan 2036
Roads Act	Roads Act 1993
SAT	Spot Assessment Technique
SEARs	Secretary's Environmental Assessment Requirements
SIA	Social Impact Assessment
SISR	Social Impact Scoping Report
South-West REZ	South-West Renewable Energy Zone
SSD	State Significant Development
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
TfNSW	Transport for NSW
TTIA	Traffic and Transport Impact Assessment
Umwelt	Umwelt (Australia) Pty Ltd
WM Act	Water Management Act 2000
WRIA	Water Resources Impact Assessment
WSP	Water Sharing Plan
WTG	Wind Turbine Generator

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1.0 Introduction

1.1 Project Overview

BayWa r.e. Projects Australia Pty Ltd (BayWa r.e.) propose to develop the Bullawah Wind Farm (the Project) to provide a reliable and affordable source of energy for the people of NSW and contribute to reducing greenhouse gas (GHG) emissions associated with energy generation. The Project is located approximately 28 kilometres (km) south east of Hay and in the Riverina region of south western NSW, within the Hay Shire, Murrumbidgee and Edward River Local Government Areas (LGAs).

The Project is State Significant Development (SSD) as defined under *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) and will require development consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposed Project includes the installation, operation, maintenance and decommissioning of up to 170 wind turbines, Battery Energy Storage System (BESS) facilities, ancillary infrastructure and temporary facilities associated with the construction of the Project. The current BayWa r.e. development design incorporates approximately 170 wind turbines, with a maximum blade-tip height of 300 metres (m) above ground level, and an installed capacity of up to 1,000 megawatts (MW) (i.e. 1 gigawatt (GW)), with the potential to power approximately 500,000 homes once fully operational. The inclusion of the BESS will allow for the Project to store and dispatch scheduled and reliable energy to and from the Project and the National Electricity Market (NEM) at the times it is needed.

The Project was created with early consideration of environmental and social matters and revised during the Scoping Report stage to incorporate community and stakeholder feedback towards maximising positive social, economic and environmental outcomes and minimising adverse impacts. BayWa r.e. has established a community and stakeholder engagement plan (CSEP) for the Project and has undertaken extensive engagement with the local community and other valued stakeholders. This community and stakeholder engagement will continue throughout the Project planning and approvals process.

1.2 Project Objectives

The objectives of the Project are to:

- establish a reliable and affordable source of energy for the people of NSW and contribute to reducing GHG emissions associated with energy generation
- positively contribute to State and Commonwealth renewable energy goals
- align with the NSW Government's emissions reduction targets and Electricity Strategy
- contribute to achieving the target of 2.5 GW of renewable energy generation from the South-West REZ
- create employment opportunities during Project construction, operations and decommissioning

- in addition to community benefit sharing, assist to diversify the local economy; create training and employment opportunities for the local community; create an economic multiplier effect for local economy; create business opportunities for local suppliers; and provide a significant investment in local infrastructure

- maintain partnerships with stakeholders and the community to minimise environmental, social and economic impacts (including potential cumulative impacts) and maximise benefits

- ensure that the highest safety and environmental standards are met during construction, operation and decommissioning of the Project.

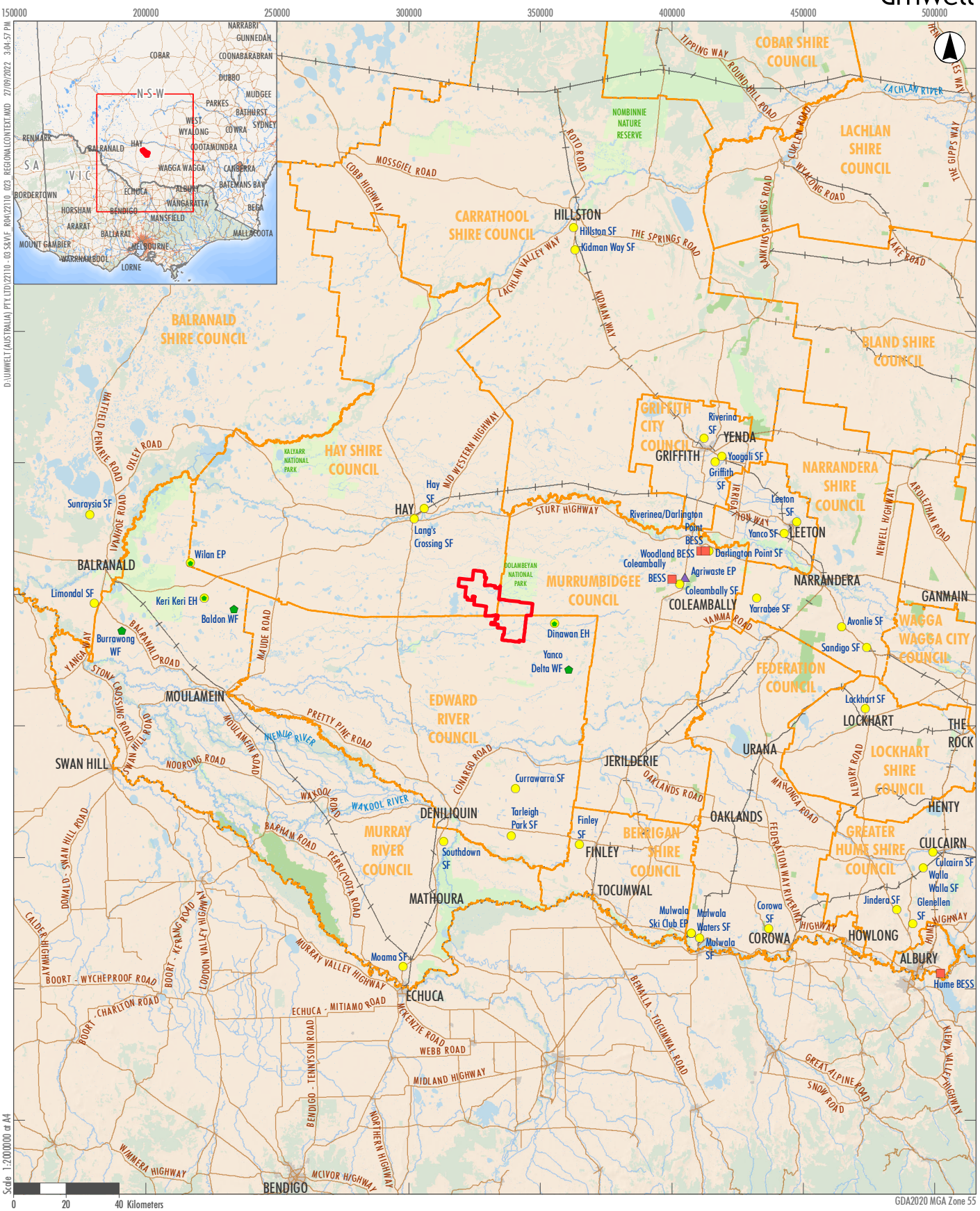
1.3 Project Background

The NSW Government's Electricity Strategy and Electricity Infrastructure Roadmap (NSW Government, 2020a) set out a plan to deliver the state's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions. These REZs will play a vital role in delivering affordable, reliable energy generation to help replace the State's existing power stations as they come to their scheduled end of operational life. This builds on the NSW Transmission Infrastructure Strategy and supports the implementation of the Australian Energy Market Operator's (AEMO's) Integrated System Plan.

The South-West Renewable Energy Zone (South-West REZ) was chosen due to an abundance of high-quality solar resources, relative land-use compatibility, and a strong pipeline of proposed renewable energy projects. The South-West REZ declaration process has begun, which is the first step in formalising the REZ under the *Electricity Infrastructure Investment Act 2020*. The Energy Corporation of NSW (EnergyCo NSW) is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping, the proposed Project is located within the boundaries of the South-West REZ.

A target of up to 2.5 GW of renewable energy generation has been assigned to the South-West REZ (NSW Government, 2020b). BayWa r.e. registered the proposed Project under the Developer Registration of Interest application to EnergyCo NSW during the South-West REZ Registration of Interest process in October 2021. At the time this Scoping Report was prepared (September 2022), 49 registrations were received, totalling over 34 GW from potential generation and storage projects. The Project, if approved, will make a significant contribution to achieving the 2.5 GW South-West REZ generation target.

The Project is within the South-West REZ and therefore strategically located in an area identified as suitable for renewable energy projects and will assist the NSW Government in delivering on the objectives for the South-West REZ. The Project's regional and local context is presented in **Figure 1.1** and **Figure 1.2** below.



Legend

- Project Boundary
- Local Government Areas
- Major Roads
- Railway
- Hydro Areas
- Watercourses
- State Forest
- NPWS Estate

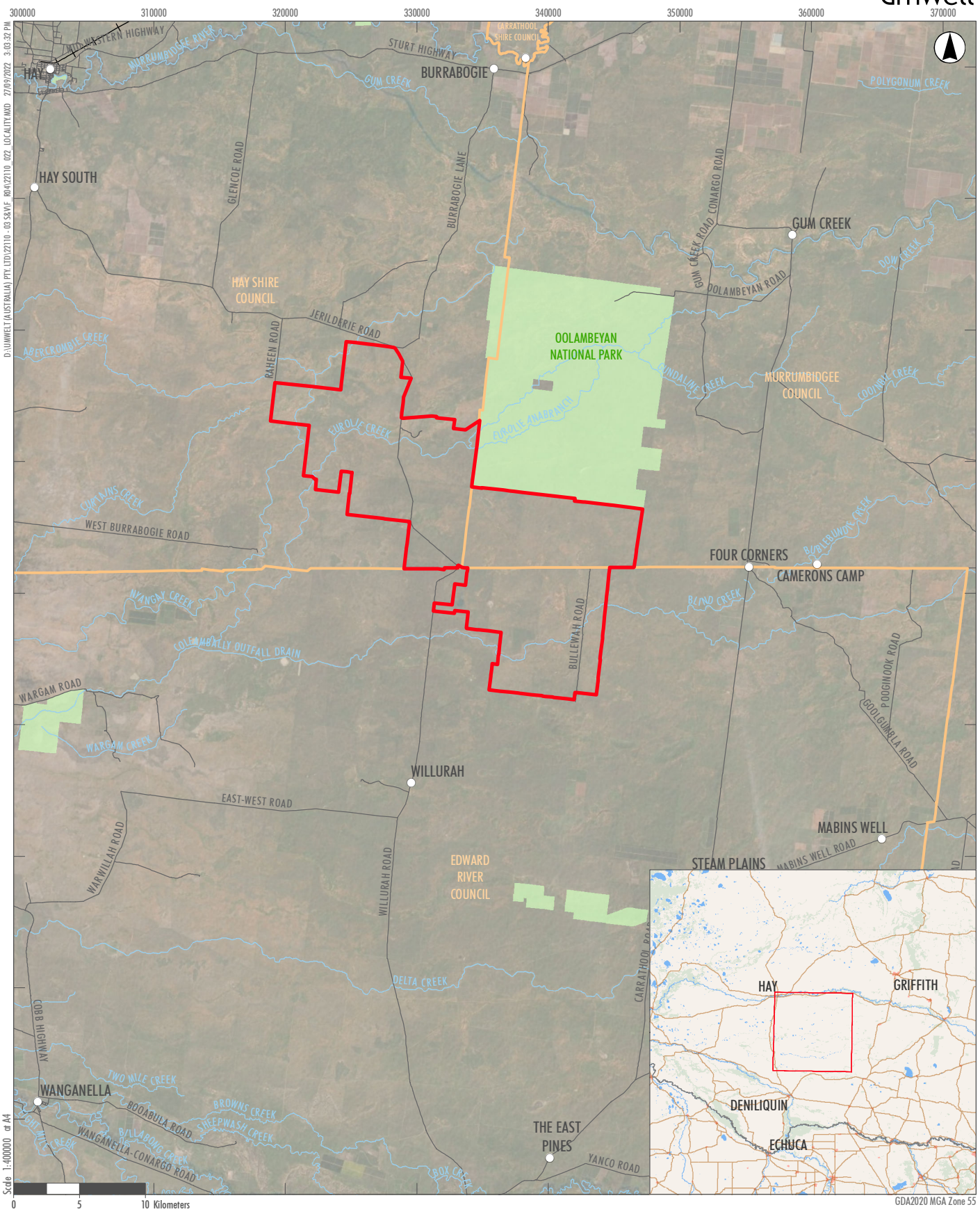
South-West REZ Renewable Projects

- Battery Energy Storage System (BESS)
- Bioenergy
- Renewable Energy Hub (EH)/Energy Park (EP)
- Solar Farm (SF)
- Wind Farm (WF)

FIGURE 1.1

Regional Context

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- National Parks (NPWS Estate)
- Local Government Boundary
- Road
- Drainage Line
- Railway Line

FIGURE 1.2

Locality Plan

Image Source: ESRI Basemap (2021) Data source: Geoscience Australia; Forestry Corporation of NSW (2019); DSFI (2017); NPWS Estate (2019)

1.4 Related Development

Related development, as outlined in the NSW Government State Significant Development Guidelines (DPIE, 2021), refers to any existing or approved development that would be incorporated into, or operated in conjunction with the Project. Related development can also include development by a Proponent that is required for a Project; but is subject to a separate development approval process.

At this stage, there are no existing or approved developments that would need to be incorporated into the assessment of the Project.

1.5 The Proponent

The Proponent for the Project is BayWa r.e. Projects Australia Pty Limited, a wholly owned subsidiary of BayWa r.e. which forms part of the BayWa Group, a global agriculture, energy and building materials company with more than 3,000 locations in more than 50 counties.

Based in 29 countries, with revenues of almost USD 4.2 billion, BayWa r.e. is a leading global renewable energy developer, service provider, distributor and energy solutions provider, and is actively shaping the future of energy. BayWa r.e. delivers end to end project solutions, ongoing operations management and is an Independent Power Producer with an expanding energy trading business. BayWa r.e. has successfully brought over 4.5 GW of renewable energy online, while managing over 10 GW of renewable energy assets.

BayWa r.e. Projects Australia Pty Limited has hubs in Brisbane, Melbourne, Sydney and Hobart, focussing on delivering wind, solar, battery storage and hydrogen projects within Australia and New Zealand, and offering services such as asset and operations management across the Asia Pacific region, as well as turnkey construction, internal financing and investment opportunities and Power Purchase Agreements (PPAs). BayWa r.e. Projects Australia has commissioned over 270 MW of solar and wind projects, and our project pipeline reports more than 4GW under development**.** Key details of the Proponent are provided in **Table 1.1**.

For brevity, BayWa r.e. Projects Australia Pty Limited will be referred to as 'BayWa r.e.' throughout this report.

Table 1.1 Proponent Details

Requirement	Details
Full Name/s	BayWa r.e. Projects Australia Pty Limited
Postal Address	Level 1/79-81 Coppin St, Richmond VIC 3121
Street Address (Project Site)	4549 Jerilderie Road, Hay South, NSW 2711
ABN	51 606 343 757
Nominated Contact	Aidan O'Mahony

1.6 Purpose of this Scoping Report

This Scoping Report has been prepared as part of the scoping process associated with the standard SSD approvals pathway. It aims to:

- describe the Project in simple terms
- include an analysis of feasible alternatives considered having regard to the objectives of the development, and identify the alternatives that will be investigated further in the EIS
- give an early indication of community views on the Project and provide an overview of the community engagement that will be carried out during the preparation of the EIS
- identify the key matters requiring further assessment in the EIS and the proposed approach to assessing each of these matters, having regard to any relevant Government legislation, plans, policies or guidelines.

This Scoping Report also aims to provide a description of the Project to key regulatory agencies and to identify the key environmental, social and economic matters of relevance to the Project to inform the preparation of the Secretary's Environmental Assessment Requirements (SEARs). Under the provisions of Clause 4.12(8) of the EP&A Act, an EIS is required (and will be prepared) to accompany the SSD application for the Project, to be lodged with the NSW Department of Planning and Environment (DPE) on behalf of the Planning Secretary. The SEARs will identify specific assessment considerations relevant to the Project that must be addressed in the EIS.

1.6.1 Wind Energy and SSD Guidelines

This Scoping Report has been prepared in consideration of the NSW Government – DPE – Wind Energy Guideline (the Wind Energy Guideline), dated December 2016 (DPE, 2016a), including:

- NSW Government – DPE – Wind Energy: Visual Assessment Bulletin (the Visual Bulletin), dated December 2016 (DPE, 2016b).
- NSW Government – DPE – Wind Energy: Noise Assessment Bulletin (the Noise Bulletin), dated December 2016 (DPE, 2016c).

It has also been prepared with due regard to the NSW Government – Department of Planning, Industry and Environment (DPIE, now DPE) – State Significant Development Guidelines (SSD Guideline), dated November 2021 (DPIE, 2021), including where relevant:

- NSW Government – DPIE – State Significant Development Guidelines – Preparing a Scoping Report – Appendix A (SSD Guideline: Appendix A), dated November 2021 (DPIE, 2021a), referred to hereafter as the SSD Scoping Report Guideline.
- NSW Government – DPIE – State Significant Development Guidelines – Preparing an Environmental Impact Statement – Appendix B (SSD Guideline: Appendix B), dated December 2021 (DPIE, 2021b).
- NSW Government – DPIE – State Significant Development Guidelines – Preparing a Submissions Report – Appendix C (SSD Guideline: Appendix C), dated November 2021 (DPIE, 2021c).

- NSW Government – DPIE – State Significant Development Guidelines – Preparing an Amendment Report – Appendix D (SSD Guideline: Appendix D), dated November 2021 (DPIE, 2021d).
- NSW Government – DPIE – Social Impact Assessment Guideline for State Significant Projects (the SIA Guideline), dated November 2021 (DPIE, 2021e).
- NSW Government – DPIE – Undertaking Engagement Guidelines for State Significant Projects (the Engagement guidelines), dated November 2021 (DPIE, 2021f).
- NSW Government – DPIE – Cumulative Impact Assessment Guidelines for State Significant Projects (the CIA Guidelines), dated November 2021 (DPIE, 2021g).

Additionally, BayWa r.e. will have regard to any relevant Electricity Infrastructure Roadmap guidelines published by EnergyCo NSW during the development of the Project. Including but not limited to the NSW Government – Office of Energy and Climate Change – First Nations Guidelines (dated August 2022) and any subsequent region-specific guideline for the South-West REZ.

1.7 Structure of this Report

As per the SSD Scoping Report Guideline, this report has the following sections:

- **Section 1.0 (Introduction)**: introduces the Project, the Proponent and provides an outline of the structure of the document.
- **Section 2.0 (Strategic Context)**: outlines the strategic context for the Project, including the justification for the Project, a summary of the locality in which the Project is undertaken and an overview of the environmental, social and economic context.
- **Section 3.0 (Project)**: contains a description of the Project, including an overview of alternatives considered and strategies to avoid and minimise environmental impacts.
- **Section 4.0 (Statutory Context)**: summarises the relevant State and Commonwealth statutory context applicable to the approval process for the Project.
- **Section 5.0 (Engagement)**: describes the stakeholder engagement program for the Project and identifies the environmental, social and economic matters identified during the scoping phase for further consideration in the EIS.
- **Section 6.0 (Proposed Assessment of Impacts)**: contains analysis of the environmental, social and economic matters relevant to the Project and the assessments proposed to be completed for the EIS.
- **Section 7.0** References.
- **Appendix 1** Scoping Summary Table.
- **Appendix 2** Social Impact Scoping Report.
- **Appendix 3** Preliminary Visual Assessment.
- **Appendix 4** Preliminary Noise Impact Assessment.
- **Appendix 5** Biodiversity Constraints Assessment.
- **Appendix 6** Preliminary Heritage Constraints Assessment.

2.0 Strategic Context

2.1 Project Justification

The development of renewable energy projects aligns with both Commonwealth and NSW commitments to increase renewable energy generation and reduce carbon emissions across the NSW and Australian economies. In particular, the NSW Government is taking action to lead investment in new renewable generation to ensure an orderly transition away from coal (EnergyCo NSW, 2022), with the State's five existing coal-fired power stations scheduled for progressive closure from 2022-2023.

The proposed location of this Project is within the South-West REZ, being an area identified by the NSW Government to be targeted for renewable energy development. The REZs form a critical component of the NSW Government's Electricity Infrastructure Roadmap (NSW Government, 2020a). The purpose of each REZ is to group new wind and solar power generation projects in areas where it can be efficiently stored and transmitted across NSW. The REZs will help to ensure reliable electricity supply and deliver lower wholesale electricity costs.

The NSW Government has also indicated that the REZs are expected to unlock a significant pipeline of large-scale renewable energy and storage projects, while supporting private sector investment and jobs throughout regions of NSW. The NSW Government expects the South-West REZ to bring up to $2.8 billion in private investment by 2030 and, at its peak, the REZ is expected to support more than 2,000 construction jobs.

As demonstrated in **Section 2.1.1** below, the Project will contribute to meeting these Commonwealth and NSW Government objectives and will provide significant renewable energy generation capacity within an area planned for renewable energy development by the NSW Government.

Furthermore, the Project will contribute capital investment, generate jobs during the construction and operational phases, provide indirect benefits to local services throughout the life of the Project, deliver additional income to Host landholders, and provide benefits to the local community through the implementation of a proposed community benefit fund.

Further details regarding Project benefits are provided in **Section 2.5**.

2.1.1 Strategic and Regional Context

2.1.1.1 Commonwealth Policy

Australia is one of the 192 countries from around the world signed to the international climate change agreement (The Paris Agreement). The Paris Agreement aims to:

- Hold the increase in the global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- Increase the ability (of nations) to adapt to the adverse impacts of climate change and foster climate resilience and low GHG emissions development, in a manner that does not threaten food production.

- Make finance flows consistent with a pathway towards low GHG emissions and climate resilient development.

The Paris Agreement seeks to meet its objectives by developing programs and mechanisms that:

- Require participating Parties to prepare and communicate GHG mitigation contributions. Parties were expected to set mitigation targets for 2020, and then develop new targets every five years. Each successive target is expected to represent a larger mitigation effort than the previous target.
- Promote climate change resilience and adaptation.
- Provide mitigation and adaptation funding to developing countries.
- Foster mitigation and adaptation technology transfer between Parties.
- Require participating Parties to report progress towards their mitigation contributions on an annual basis.

Australia signed The Paris Agreement on 22 April 2016. The obligations under The Paris Agreement are driving national GHG policy between 2020 and 2030. Australia's commitment to The Paris Agreement includes reducing GHG emissions by 26% to 28% on 2005 levels by 2030 (Commonwealth of Australia, 2021). Australia's Nationally Determined Contribution (NDC) prescribes an unconditional economy-wide target to reduce GHG emissions, and states that future policies will target emissions generated from energy use, industrial processes, agriculture, land-use, land-use change and forestry and waste.

The Project, as a large-scale renewable energy project, will contribute to achieving Australia's GHG emission reduction targets through reducing emissions from energy production in NSW.

2.1.1.2 NSW Policy

NSW Climate Change Policy Framework

The NSW Government has developed its NSW Climate Change Policy Framework, which aims to deliver net zero emissions by 2050, and a State that is more resilient and responsive to climate change (NSW Government, 2016).

Under the NSW Climate Change Policy Framework, NSW has committed to both follow the Paris Agreement and to work to complement national action.

The policy framework is being delivered through:

- the Climate Change Fund
- developing an economic appraisal methodology to value GHG emissions mitigation
- embedding climate change mitigation and adaptation across government operations
- building on NSW's expansion of renewable energy
- developing action plans and strategies.

In 2013 the NSW Government released the Renewable Energy Action Plan (REAP) and the NSW Energy Efficiency Action Plan (EEAP). The REAP aimed to increase the generation, storage and use of renewable energy in NSW, at least cost to customers and with maximum benefits to NSW. The three core goals of the REAP were to attract renewable energy investment, build community support for renewable energy and attract and grow expertise in renewable energy. Based on the implementation of the REAP, renewable energy is now well-placed to play a leading role in meeting NSW's energy needs into the future.

The location of the Project is mapped as an area with high wind renewable energy source potential under the NSW REAP. The Renewable Energy Resource Mapping (DPIE, 2019) is reproduced in **Figure 2.2** which indicates the existing wind resources applicable to the Project Area. This high wind resource makes the location suitable for a productive wind farm.

NSW Electricity Strategy and Electricity Infrastructure Roadmap

Current and future electricity development in NSW is supported though the NSW Government's Electricity Strategy and the NSW Electricity Infrastructure Roadmap (NSW Government, 2020a) which builds on the framework set out in the Electricity Strategy taking an integrated approach to all demand and supply options, including action by households and small businesses, demand management and investment in large-scale, affordable and reliable generation.

EnergyCo NSW has been appointed as the Infrastructure Planner for the South-West REZ and will lead development of this REZ.

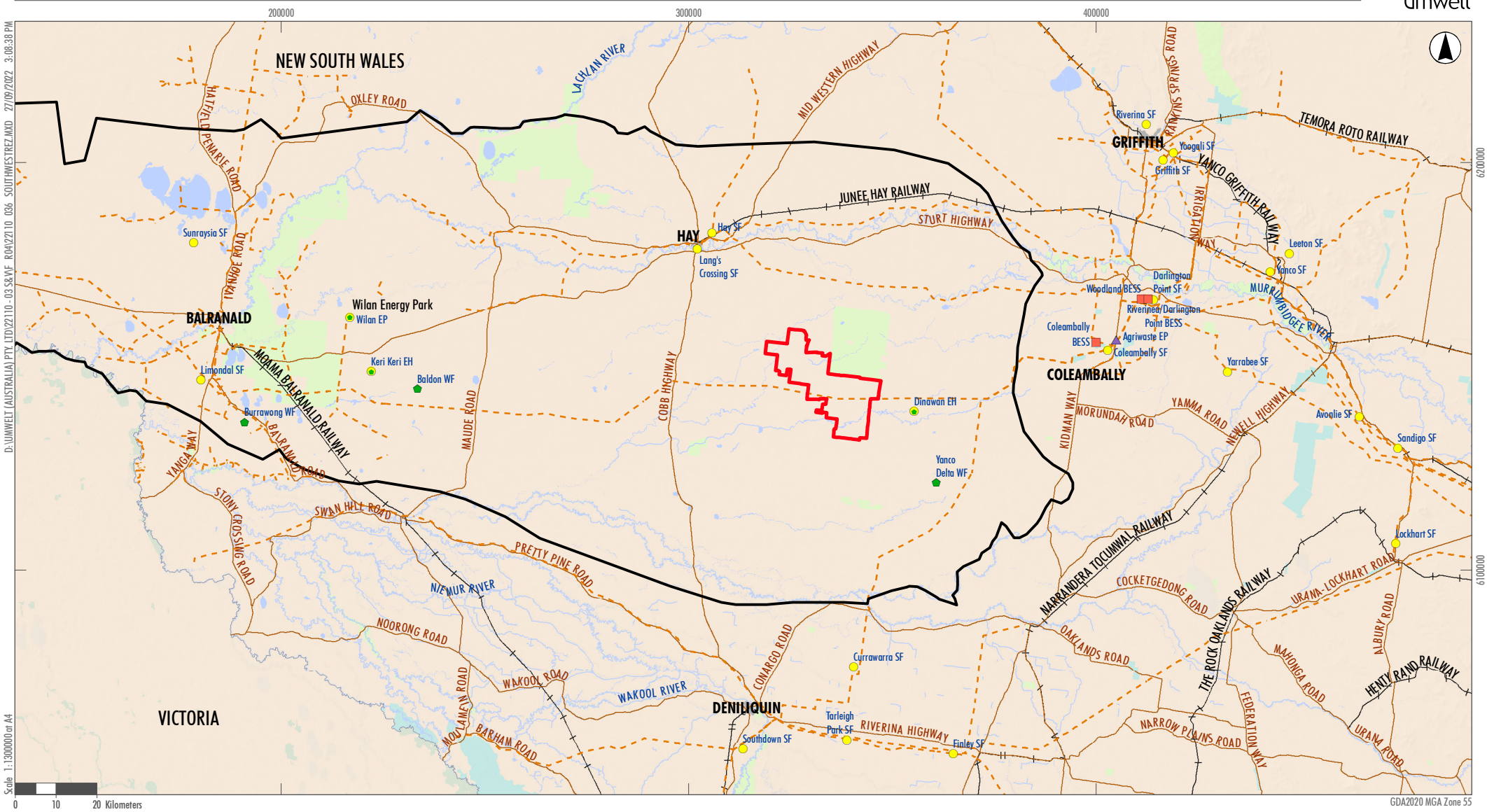
South-West REZ

The indicative location of the South-West REZ was first published in 2018 following a detailed state-wide geospatial mapping exercise overlaying 25 data layers, including renewable energy resource potential, proximity to the existing electricity network and existing land uses such as agricultural lands and biodiversity conservation. The geographical extent of the South-West REZ has been subsequently refined through an ongoing process of consultation with NSW Government agencies and stakeholder groups.

Changes to the South-West REZ map have had no influence on the Project which is well within the REZ boundary. EnergyCo NSW will continue to refine the geographic extent of the South-West REZ as it progresses toward the declaration of the REZ. The final geographical area will be informed by the results of the industry registration of interest process, consultation with technical experts including AEMO, and further consultation with key stakeholders, including the South-West Regional Reference Group.

The region is traversed by Project EnergyConnect, an interconnector being built by Transgrid and ElectraNet between Wagga Wagga in NSW and Robertstown in South Australia, with a connection to Red Cliffs in Victoria. Project EnergyConnect also involves an upgrade to the 330 kV transmission line between Wagga Wagga and Dinawan to 500 kV, which links to the eastern edge of the South-West REZ and south of the indicative Project location. The completion of Project EnergyConnect would support the South-West REZ and more broadly support the Project by unlocking up to an additional 1.2 GW of transmission capacity, transporting electricity from the South-West REZ to homes and businesses across NSW. The South-West REZ would be further boosted by the construction of the Victoria-NSW Interconnector West, a 500kV interconnector proposed by TransGrid which is expected to be completed by 2031.

Based on the current mapping, the Project is wholly located within the current South-West REZ (refer to **Figure 2.1** below). The Project is consistent with the objectives of the Electricity Strategy and Infrastructure Road Map, in aiming to provide large-scale renewable electricity generation that is affordable and reliable.



Legend

- Project Boundary
- South-West REZ boundary
- State Border
- NPWS Estate
- State Forest
- Waterbodies
- Existing 220kV Electricity Transmission Line
- Major Roads
- Railway
- Watercourses

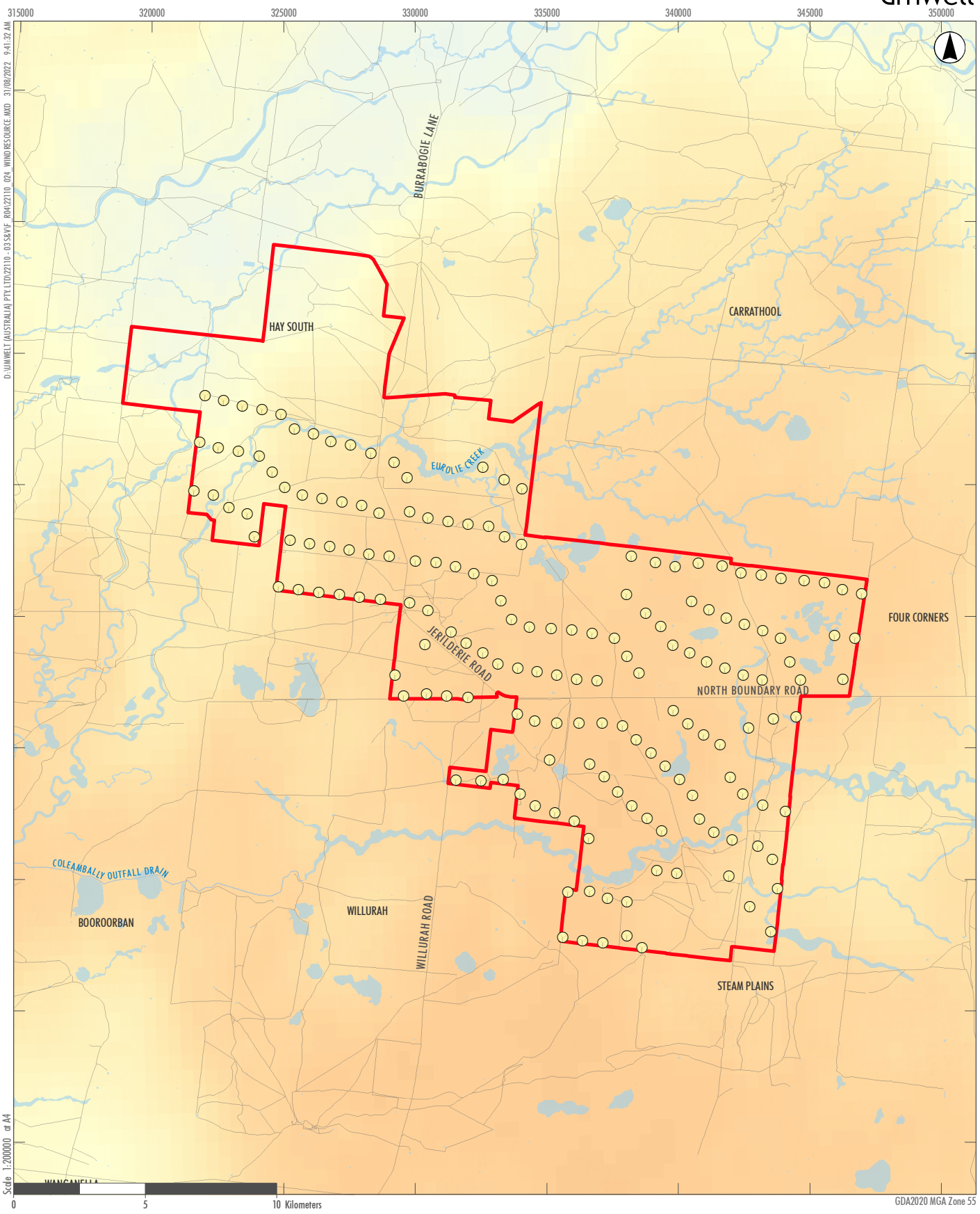
South-West REZ Renewable Projects

- Battery Energy Storage System (BESS)
- Bioenergy
- Renewable Energy Hub (EH)/Energy Park (EP)
- Solar Farm (SF)
- Wind Farm (WF)

Data source: NSW DFSI (2021)

FIGURE 2.1

Project Context in South-West REZ



Legend

- Project Boundary
- Indicative Wind Turbine Locations
- Road
- Watercourse

Wind speed (metres per second)

- High : 10.2
- Low : 2.4

FIGURE 2.2

Wind Resource Mapping

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

2.1.2 Regional and Local Plans

2.1.2.1 Riverina Murray Regional Plan 2036

The Riverina Murray Regional Plan 2036 (RMRP) is the NSW Government's strategy for guiding land use planning decisions for the Riverina Murray Region over the next 14 years. The vision of the RMRP is to create 'a diversified economy founded on Australia's food bowl, iconic waterways and a network of vibrant connected communities' (DPE, 2017). The supporting goals of the RMRP are to create:

- A growing and diverse economy.
- A healthy environment with pristine waterways.
- Efficient transport and infrastructure networks.
- Strong, connected and healthy communities.

The RMRP promotes further development of renewable energy across the Riverina Murray region through Direction 11, being '*Promote the diversification of energy supplies through renewable energy generation*'. The region is identified as having significant potential for renewable energy industries with vast open spaces and higher altitude tablelands with potential for wind power generation, large-scale solar energy and bioenergy generation. The RMRP indicates that renewable energy generation will also create a more sustainable energy future for the region.

The Project is considered to be consistent with the vision of the RMRP, particularly in light of the proposed development of renewable energy generation.

2.1.2.2 Western Riverina Regional Economic Development Strategy 2018-2022

The Western Riverina Regional Economic Development Strategy 2018-2022 has been developed to facilitate economic growth and opportunities across the Western Riverina region (Department of Premier and Cabinet, 2018). A key infrastructure priority is to increase the capacity, reliability and affordability of energy supply in the Western Riverina.

The development of the Project will contribute towards achieving the key infrastructure priority above by promoting the development of reliable and affordable renewable energy within the Murrumbidgee LGA and wider Western Riverina area.

2.1.2.3 Hay Community Strategic Plan 2017-2027

The Hay Community Strategic Plan (Hay CSP) (Hay Shire Council, 2017) is a rolling 10-year plan that sets out the vision, objectives strategies, priorities and aspirations for the regional town of Hay. The Hay CSP identifies five key areas in which the plans vision and objectives are built around, including:

- Environmental Sustainability.
- A liveable and Vibrant Community.
- Economic Prosperity and Sustainability.
- Governance and Organisational Performance.
- Infrastructure.

The Hay CSP includes strategies against each key area above, with the aim to achieve a desired outcome in line with the overarching vision of the Hay CSP. Specifically, and in relation to the Project, Strategy 1.1.1 of the Hay CSP is to 'Investigate renewable resource options', where a move to renewable energy sources is identified as a priority under the Environmental Sustainability key area.

2.1.2.4 Hay Shire Council Draft Local Strategic Planning Statement

The Hay Shire Council Draft Local Strategic Planning Statement (Hay Shire LSPS) (Hay Shire Council, 2020) establishes a 20-year vision for land use planning in the Hay Shire, outlining how growth and change will be managed to maintain the high levels of environmental amenity, liveability and landscape quality that characterises the Hay Shire. The Hay Shire LSPS builds upon the five key areas outlined in the Hay CSP to guide land use planning and future development within the Hay Shire.

The Project is considered consistent with the objectives and strategic visions of both the Hay CSP and Hay Shire LSPS, as it will promote environmentally sustainable infrastructure development and corresponding economic prosperity to the local Hay Shire community.

2.1.2.5 Murrumbidgee Council Community Strategic Plan 2017-2027

The Murrumbidgee Council Community Strategic Plan 2017-2027 (Murrumbidgee CSP) (Murrumbidgee Council, 2017) outlines a shared vision for the wider Murrumbidgee community. The Murrumbidgee CSP includes five key strategic themes which align with the proposed development, including:

- Protecting the existing regional natural environment for future generations.
- Exploring and promoting alternative, sustainable energy sources and practices.
- Maintaining a balance between growth, development and environmental protection.
- Welcoming and supporting business and industries growth, diversity and productivity.
- Promoting and supporting a regional economy and growth.

2.1.2.6 Murrumbidgee Council Local Strategic Planning Statement 2020

The Murrumbidgee Council Local Strategic Planning Statement (Murrumbidgee LSPS) (Murrumbidgee Council, 2020) is a 20-year vision for land use planning for Darlington Point, Coleambally and Jerilderie and provides an overarching strategic direction for future land use planning in the Murrumbidgee LGA.

The strategic planning vision outlined in the Murrumbidgee LSPS is '*to experience land use and development outcomes in the future that both benefit the community and minimise environmental impacts*'. This vision builds upon the key themes of the Murrumbidgee CSP and includes a number of strategic agendas to assist in the realisation of the vision. Key aspects of the Murrumbidgee LSPS relevant to the Project include strategic agenda EG1: '*A diversified economy*', which aims to future-proof the local economy by promoting employment growth within the local community, and strategic agenda EG14: '*Renewable energy projects*', which outlines the ambition to support renewable energy developments in the Murrumbidgee region.

The Project is considered consistent with the visions and strategic direction of both the Murrumbidgee CSP and Murrumbidgee LSPS; and will assist in promoting the growth of a diverse, regional economy through the development of renewable energy, maintaining the balance between growth, development and environmental protection.

2.1.2.7 Edward River Council Community Strategic Plan 2018-2030

The Edward River Council Community Strategic Plan 2018-2030 (Edward River CSP) (Edward River Council, 2018) develops a shared vision underpinned by five strategic outcomes:

- A great place to live.
- A prosperous and vibrant economy.
- A valued and enhanced natural environment.
- A region with quality and sustainable infrastructure.
- A community working together to achieve its potential.

The Edward River CSP also identifies opportunities to enable diverse economic and industrial development opportunities, leverage natural assets, and encourage value-adding industry within the region.

2.1.2.8 Draft Edward River Local Strategic Planning Statement

The Draft Edward River Local Strategic Planning Statement (Edward River LSPS) (Edward River Council, 2019) sets the framework for Edward River's economic, social and environmental land use needs over the next 20 years. The Edward River LSPS identifies the main priorities and aspirations for future land use within the LGA and establishes objectives and strategies to achieve those objectives. These objectives address social, environmental, economic and civic leadership issues as identified by the Edward River CSP.

The Project is considered to be consistent with the vision and intent of the both the Edward River CSP and Edward River LSPS as it provides for economic diversity and allows the co-location of complementary industry alongside agricultural enterprises.

2.2 Project Location Context

The north-western extents of the Project Area fall within the Hay LGA, whilst the eastern and southern extents of the Project Area fall within the Murrumbidgee LGA and Edward River LGA, respectively. The closest larger population centres are Griffith (88 km northeast of the Project Area, population 27,300), Deniliquin (66 km southwest of the Project Area, population 7,862), and Hay (28 km northwest of the Project Area, population 2,400). Smaller townships of Darlington Point, Jerilderie and Coleambally are nearer to the Project.

The Project Area is located mostly east of the Jerilderie Road, North Boundary Road and Willurah Road junction, either side of the Balranald to Darlington Point transmission line, and south of the Oolambeyan National Park. The Cobb Highway is situated ~20 km west of the Project Boundary (western most extent) and Conargo Road is ~8.5 km east of the Project Boundary (eastern most extent), while Jerilderie Road traverses the Project Area in a north to south direction until the intersection of North Boundary Road and Willurah Road. North Boundary Road crosses the middle section of Project Area in an east to west direction, whilst Willurah Road is adjacent to the western side of the southern extent of the Project

Boundary, running parallel in a north to south direction. The Sturt Highway (which runs in an east to west direction, passing just south of Hay township) is located 20 km north of the Project.

The Project Area is zoned as RU1 Primary Production within the Hay Local Environment Plan (LEP) 2011, the Murrumbidgee LEP 2013 and Conargo LEP 2013. The majority of land that surrounds the Project is also zoned RU1 Primary Production, however the Oolambeyan National Park (directly north and adjacent to the Project Boundary) is primarily zoned as E1 National Parks and Nature Reserves (refer to **Section 4.1.2**).

Additional contextual features of the Project Area are summarised below and addressed further in subsequent sections of this Scoping Report (where necessary):

- **Crown Lands:** Crown Land easements and enclosures (primarily roads and waterways) traverse portions of the Project Area. Works which may intercept these easements and enclosure will likely require approval under the *Crown Land Management Act 2016*, which will be investigated further during preparation of the EIS.

- **Community**: Several SSD projects at various stages of development are present within the region and the South-West REZ more broadly (as outlined in **Section 2.1.1** above), which are of relevance to local communities. Further discussion regarding local community and other stakeholders is provided in **Section 5.0** and the Social Impacts Scoping Report (SISR) provided as **Appendix 2**.

- **Land Use**: Agricultural land uses are prevalent within and surrounding the Project Area. There are no areas of mapped Biophysical Strategic Agricultural Land (BSAL) and there are no current mining and/or exploration licence applications within the Project Area.

- **Biodiversity**: The Project Area comprises of grazed mixed native and exotic grassland, shrublands, ephemeral wetlands, and small areas of agricultural cropping. Remnant woodland has been retained as small patches scattered across the Project Area, with larger tracts of retained woodland and forest occurring along larger creeklines, rivers, and drainage channels/outfall drains. Further discussion around biodiversity values within the Project Area is provided in **Section 6.2.3**.

- **Traffic and Access**: The Sturt Highway is located to the north of the Project Area and acts as primary connection between Wagga Wagga and the Riverina region. Other key routes in the locality include the Cobb Highway and the Newell Highway (refer to **Figure 3.2**). Further discussion around traffic, transport and access is provided in **Section 6.2.5**.

- **Topography:** The topography of the Project Area is relatively flat and homogeneous ranging from between 94 – 103 metres Australian Height Datum (AHD). The closest national park, state park or nature reserve is the Oolambeyan National Park which is adjacent to part of the north eastern boundary of the Project Area (refer to **Figure 1.2**).

- **Hydrology:** The Project Area is dissected by a number of larger waterways namely Abercrombie and Eurolie Creeks in the north, and Coleambally Outfall Drain in the south (refer to **Section 6.2.8).** No flood prone land or flood management areas are identified within the Project Area. Further discussion around water and soil resources relevant to the Project is provided in **Section 6.2.8**.

- **Hazards:** With areas of remnant or plantation vegetation, bushfire presents a potential hazard for the Project Area. The EIS will include an assessment of potential hazards associated with the Project. Further discussion around hazards and safety is provided in **Section 6.2.7**.

2.3 Cumulative Impact Considerations

A key component of environmental impact assessment is the consideration of cumulative impacts. The Project will be assessed in accordance with the requirements of the Cumulative Impact Assessment Guidelines for State Significant Project (CIA Guidelines) (DPIE, 2021g), which sets clear expectations and requirements for assessing project-level cumulative impacts related to SSD projects. The EIS will consider other relevant construction, industrial and employment-generating projects within the locality.

There are a number of renewable energy projects within and in the vicinity of the South-West REZ, at different stages of the approval process (refer to **Figure 2.1** and **Table 2.1**). It is anticipated that there will be additional renewable energy projects proposed in the vicinity of the Project that are not publicly known at the time of preparing this report. At the time this Scoping Report was prepared the closest renewable energy developments to the Project are:

- the Dinawan Energy Hub, a hybrid wind, solar and battery energy storage project located approximately 10 km east of the Project, and
- the Yanco Delta Wind Farm, approximately 16 km south east of the Project.

Given the strategic importance of the South-West REZ for the NSW Electricity Infrastructure Roadmap and the number of approved and proposed renewable energy projects in the region, the potential for cumulative environmental, social and economic impacts will require detailed consideration during the EIS phase of the Project, in line with the CIA Guidelines.

Table 2.1 Renewable Energy Projects Surrounding the Project

Project	Status	Generation Capacity (MW)	Potential Construction Start Date
Darlington Point Solar Farm	Approved	275	Operating
Yanco Delta Wind Farm	Proposed	730	2024
Hay Solar Farm	Approved	110	Operating
Coleambally Solar Farm	Approved	150	Operating
Coleambally Battery Energy Storage System	Proposed	200	Unknown
Woodland Battery Energy Storage System	Proposed	200/800MWh	Unknown
Riverina/Darlington Point Energy Storage Systems	Proposed	150/300MWh	Unknown
Currawarra Solar Farm	Approved	195	Operating
Southdown Solar Farm	Proposed	70	Unknown
Tarleigh Park Solar Farm	Approved	90	Operating
Finley Solar Farm	Approved	170	Operating
Baldon Wind Farm	Proposed	1000	Unknown
Keri Keri Solar Farm	Proposed	1000	2024
Keri Keri Wind Farm	Proposed	N/A	2024
Burrawong Wind Farm	Proposed	750	2023
Limondale Solar Farm	Approved	250	Operating
Sunraysia Solar Farm	Approved	200	Operating
Dinawan Energy Hub	Proposed	2500	Unknown

Project	Status	Generation Capacity (MW)	Potential Construction Start Date
Wilan Energy Park	Proposed	800	Unknown
The Plains Renewable Energy Park	Proposed	400	Unknown

2.4 Planning and Other Agreements

Should the Project be approved, BayWa r.e. will enter into a planning agreement (PA) in accordance with the requirements of the EP&A Act. The PA will be negotiated with the relevant Council(s) for the provision of infrastructure or other items to support local communities.

BayWa r.e. is currently negotiating agreements with Host landholders in respect of the Project. These negotiations are well progressed and BayWa r.e. will seek to finalise all agreements with Host landholders during the preparation of the EIS. Where appropriate, BayWa r.e. will also seek to enter into negotiated agreements with neighbouring landholders (for example, having regard to impact thresholds under the Visual and Noise Bulletins) during the preparation of the EIS.

2.5 Project Benefits

The Project will provide long-term, strategic benefits to the state of NSW, including:

- Renewable energy supply to assist with fulfilling the current obligations under State and Commonwealth renewable energy targets.
- Contributing to the South-West REZ. The NSW Government expects that REZs will deliver multiple benefits to NSW, including:
    - more reliable energy from significant amounts of new energy supply
    - energy bill savings from reduced wholesale electricity costs
    - emissions reduction from a cleaner energy sector
    - community partnership from strategic planning and best practice engagement and benefit sharing.
- Providing for cleaner reliable electricity generation, assisting with meeting current load demand while reducing greenhouse gas emissions and the impacts of climate change.
- Providing regional investment in the NSW renewable energy sector.
- The Project will also provide direct financial benefits to the regional and local community, including:
    - substantial investment in local infrastructure
    - employment generation creating approximately 400 jobs during the construction phase and approximately 40 jobs during the operational phase
    - flow on economic benefits to local services through the construction and operation phases
    - additional income to Host landholders with flow on economic benefits to the local community, and
    - the development of a Community Benefit Fund.

3.0 Project

3.1 Project Summary

The Project will include the installation, operation, maintenance and decommissioning of 170 wind turbines, BESS facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The key components of the Project include:

- ~170 (three blade) wind turbines, with a maximum blade-tip height of 300 m above ground.
- Power infrastructure providing connection to Project EnergyConnect, i.e. on-site substations/switchyards to connect the proposed wind turbines to the South-West REZ transmission line that runs through the Project Area.
- Internal electrical reticulation network, i.e. electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings.
- A single grid-scale BESS (~500 MW, up to four-hour battery).
- Temporary and permanent meteorological monitoring masts.
- Temporary construction facilities including:
    - Construction compound/s and site office buildings and storage areas
    - On-site concrete batching plants for use during the construction phase
    - Laydown areas used for wind turbine installation and storage of wind turbine components.
- Targeted road network upgrades to facilitate the delivery of wind turbine components to the Project Area, as required.
- Provision for a temporary accommodation camp on site (if required).

The indicative Project layout is shown on **Figure 3.1**. Within this figure we highlight that 170 wind turbines are shown and utilise the BayWa r.e. numeric identification system. This includes wind turbines with ID's up to 174 (i.e. 171, 172 and 174 are shown) however the indicative Project layout excludes four (4) wind turbines with ID's 39, 40, 41 and 173. It is important for BayWa r.e. to maintain the current numeric identifications for design reasons hence these ID's are utilised. However, and to avoid any misunderstanding, the indicative Project layout (as shown on **Figure 3.1**) and utilised throughout this Scoping Report (and associated technical studies) includes a total of 170 wind turbines.

The indicative Project components are provided in **Table 3.1** noting that these will be subject to further refinement as part of ongoing design development and the planning and approvals process.

Table 3.1 Indicative Project Components and Approximate Dimensions

Project component(s) / infrastructure	Approximate dimensions	Quantity
WTGs		
WTG height	Up to 300 m	170
Rotor diameter	Up to 200 m	
Uppermost blade tip	300 m	
Lowermost blade tip	100 m	
Tower (hub) height	Up to 200 m	
WTG foundations (excavation size)	30 m x 30 m	
Ancillary Infrastructure		
Main (on-site) substations/switchyards, for grid connection	550 m x 500 m (also includes BESS – see below)	1
Collector (on-site) substations	250 m x 250 m	Up to 5
Overhead transmission lines (high voltage)	No external overhead cables (i.e. high voltage transmission lines from the on-site substation to the grid connection point) are required.	n/a
Overhead transmission lines (high to low voltage)	<50 km of internal overhead cables of easement width approximately 30 m.	n/a
Underground transmission cables (medium to low voltage)	<150 km	n/a
Turbine hardstands, laydown areas, crane pads,	200 m x 100m	170
Internal access tracks	180 to 200 km	n/a
Primary site access point	Subject to intersection design	2
Secondary site access point/s	Subject to intersection design	Up to 9
Operations and maintenance facility	300 m x 300 m	1
Permanent meteorological masts	Up to 200 m high	9
Battery Energy Storage System		
Facility/compound	Included in main substation footprint (see above)	1
Temporary Construction Facilities		
Main Construction Compound	200 x 200 m	1
Construction site compounds, including: • construction laydown areas for equipment and supplies • concrete batching plants • construction compounds, site office, etc.	150 x 150 m	Up to 30
On-site concrete batching plants	50 m x 100 m	

Project component(s) / infrastructure	Approximate dimensions	Quantity
Rock crushing facilities	50 m x 100 m	Within Construction Site Compounds
Site compound and office	150 m x 150 m	
Stockpiles and materials storage compounds	Subject to construction requirements	
Laydown Areas	Subject to construction requirements	
Main Laydown Area	500 x 200 m	
Temporary Meteorological Masts	110 to 200 m high	Up to 3
Accommodation Camp	600m x 300m	1

The proposed Project infrastructure (as summarised in **Table 3.1** above) would be contained within the Project Boundary including WTG blades. The proposed layout allows for micro-siting and will be subject to further detailed design as the environmental, social and economic impact assessments progress.

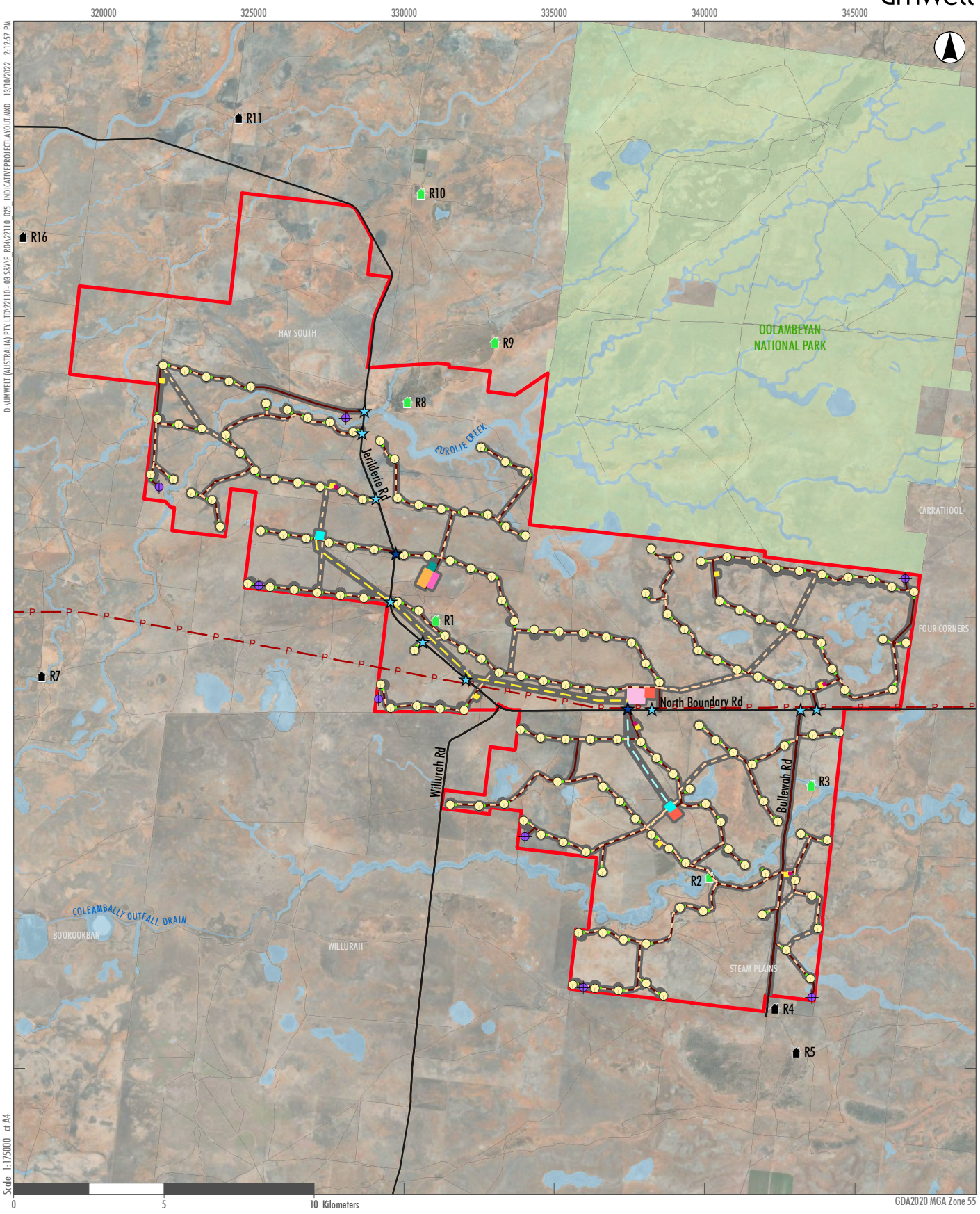
3.1.1 Anticipated Timeframes

It is anticipated that construction works will commence within one year of Project approval i.e. construction commencing in ~mid-to-late 2025. The timing of construction will be driven by additional permits and authorisations, contractor selection, detailed design and procurement processes, and a final investment decision. The construction phase of the Project is anticipated to be 24 months. The Project has an estimated operational life of 30 years after which it may be decommissioned or re-powered.

In summary the anticipated timeframes for the Project are:

- **Planning and approvals (prior to commencement of construction)**: in progress, and aiming to be completed in 2024
- **Construction and Commissioning**: planned to commence in 2025, for approximately 24 months
- **Operation**: planned to commence in 2026 with full scale operations planned for 2027, with an estimated operational life of 30 years.

BayWa r.e. aim to construct the Project as a single stage of development. However, the Project may be completed in several stages depending on factors such as grid connection capacity and the access scheme rights associated with the South-West REZ. BayWa r.e. will continue to engage with the EnergyCo NSW and will update DPE during the EIS phase on whether staging is required. There is potential that any stages, as part of a broader staged development, would overlap as if it were a continuous phase. Regardless of any staging it is anticipated that the Project (and its stages) will still require development consent under Part 4 of the EP&A Act, as the stages of the development (for the purpose of electricity generation) will in all likelihood have a Capital Investment Value (CIV) of more than $30 million.



Legend

- Project Boundary
- Indicative Development Area
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Main Site Entry
- Secondary Site Entry
- Existing 220kV Electricity Transmission Line
- Public Roads
- NPWS Estate

Project Infrastructure

- Internal 330kV Transmission Line (Central to South)
- Internal 330kV Transmission Line (North to Central)
- Cable Route
- Access Tracks
- Permanent Meteorological Masts
- Collector Substation
- Conceptual Temporary Accommodation Camp
- Hardstands
- Main Substation including BESS
- Operation and Maintenance Building
- Main Temporary Construction Compound
- Main Temporary Laydown
- Temporary Construction Compound
- Temporary Satelitte Laydown

FIGURE 3.1

Preliminary Layout

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

3.2 Wind Turbine Generators

The Project is designed to accommodate approximately 170 WTGs of up to 300 m in height. This enables a conservative assessment allowing for WTG advances between the time of assessment for the Project and the commencement of construction. The WTGs will be three-bladed with the rotor and nacelle mounted on a tower with an internal ladder or lift. The WTGs would be installed at final locations to be confirmed within a 100 m micro-siting buffer of the proposed locations identified in the EIS, with the current conceptual locations shown on **Figure 3.1**.

3.3 Battery Storage

Battery storage forms part of the Project to allow for the storage and discharge of energy. Storage of energy can add significant benefits to renewable generation because it allows for the dispatch of energy in accordance with market demand and overcomes potential issues associated with intermittency of output from the WTGs. The indicative electrical capacity of the battery storage is 500 MW / up to 2000 MWh, (alternatively known as a 500 MW, up to four-hour battery).

A range of technologies are being considered, including but not limited to lithium-ion, sodium-ion, sodium sulphur, sodium hydride, electrochemical technology (i.e. flow batteries), cryogenic storage and compressed air. The final design of the battery storage will depend on the technology selected. The storage will be connected to the WTGs and substations via underground and/or overhead cables. Potential locations are shown on **Figure 3.1** however, these locations are subject to further design work and the storage facilities may be co-located with other compounds within the Project Area.

3.4 Ancillary Infrastructure

Ancillary infrastructure required to support the construction and operation of the Project is presented in **Table 3.1** above and includes, but is not limited to:

- main and collector substations and switchyards
- underground and overhead transmission lines at varying voltages (i.e. high, medium and low)
- temporary and permanent offices and site compounds
- an operations and maintenance facility (two potential locations for the facility are shown in **Figure 3.1** , however only one facility would be constructed)
- permanent meteorological masts
- communication cables (includes control cables and earthing)
- water storage tanks
- hardstands
- internal access tracks and primary and secondary site access points.

Temporary facilities will include site offices and compounds, rock crushing facilities, concrete batching plants, stockpiles and materials storage compounds, temporary laydown areas, minor construction access

roads and temporary meteorological masts. All temporary facility sites will be rehabilitated once they are no longer required.

3.5 Temporary Accommodation Camp

BayWa r.e. will consult closely with key stakeholders during the preparation of the EIS to assess whether existing accommodation facilities in the local area have sufficient capacity for the Project's construction workforce (in combination with other large-scale renewable energy projects within the South-West REZ). If required, a temporary accommodation camp will be established on site as shown conceptually in **Figure 3.1**.

3.6 Access

3.6.1 Project Site Access

Access to the Project Area is proposed via the existing road network. Primary access will likely be via the Sturt Highway, and/or Cobb Highway and then Jerilderie Road. Secondary access is proposed for North Boundary Road. The Sturt Highway (travelling through Hay) is directly north of the Project Boundary at a distance of >20 km. The Cobb Highway is situated ~20 km west of the Project Boundary (western most extent) while Jerilderie Road traverses the Project Area (north to south direction), until the intersection of North Boundary Road and Willurah Road. North Boundary Road crosses the middle section of Project Area (east to west direction). Additional access via Willurah Road is not planned but may be proposed as it is adjacent to the western side of the southern extent of the Project Boundary, running parallel in a north to south direction.

Site access locations are being investigated by the Proponent, however for the purposes of this Scoping Report it has been assumed that access would be provided via the Project site frontage to Jerilderie Road and North Boundary Road, and potentially Willurah Road.

The local access road connections and approach routes to the Project will require further investigations during preparation of the EIS; and will be developed in combination with site planning and wind turbine location selection. Given the large area of the Project, multiple site access points may also be considered by the Proponent to facilitate the ready access and delivery of wind turbine components. **Figure 3.2** depicts the indicative locations of the Project site access points which would be gated and secured, and appropriate warning signs erected.

The Project will seek to allow heavy and light vehicles to use other public roads not discussed above, but only to:

- undertake pre-construction minor works
- construct intersection upgrades, if necessary
- undertake dust suppression
- utilise the secondary intersections and cross overs identified above to facilitate construction and operational vehicles
- procure resources from licensed operators which are located along these roads.

3.6.2 Over-sized, over-mass Vehicle Transport Routes

Over-sized, over-mass (OSOM) vehicle transport to the Project Area from several ports across Australia was the subject of a preliminary transport route feasibility assessment undertaken to consider potential route options and identify opportunities and risks to the transport of WTG. The study involved comparison of a) optimised OSOM routes, b) the relative travel distances from six nominated ports (and assumed relative travel costs), c) interstate permitting and approvals constraints, and d) the results of the National Heavy Vehicle Regulator (NVHR) Route Planner Tool (NHVR, 2022).

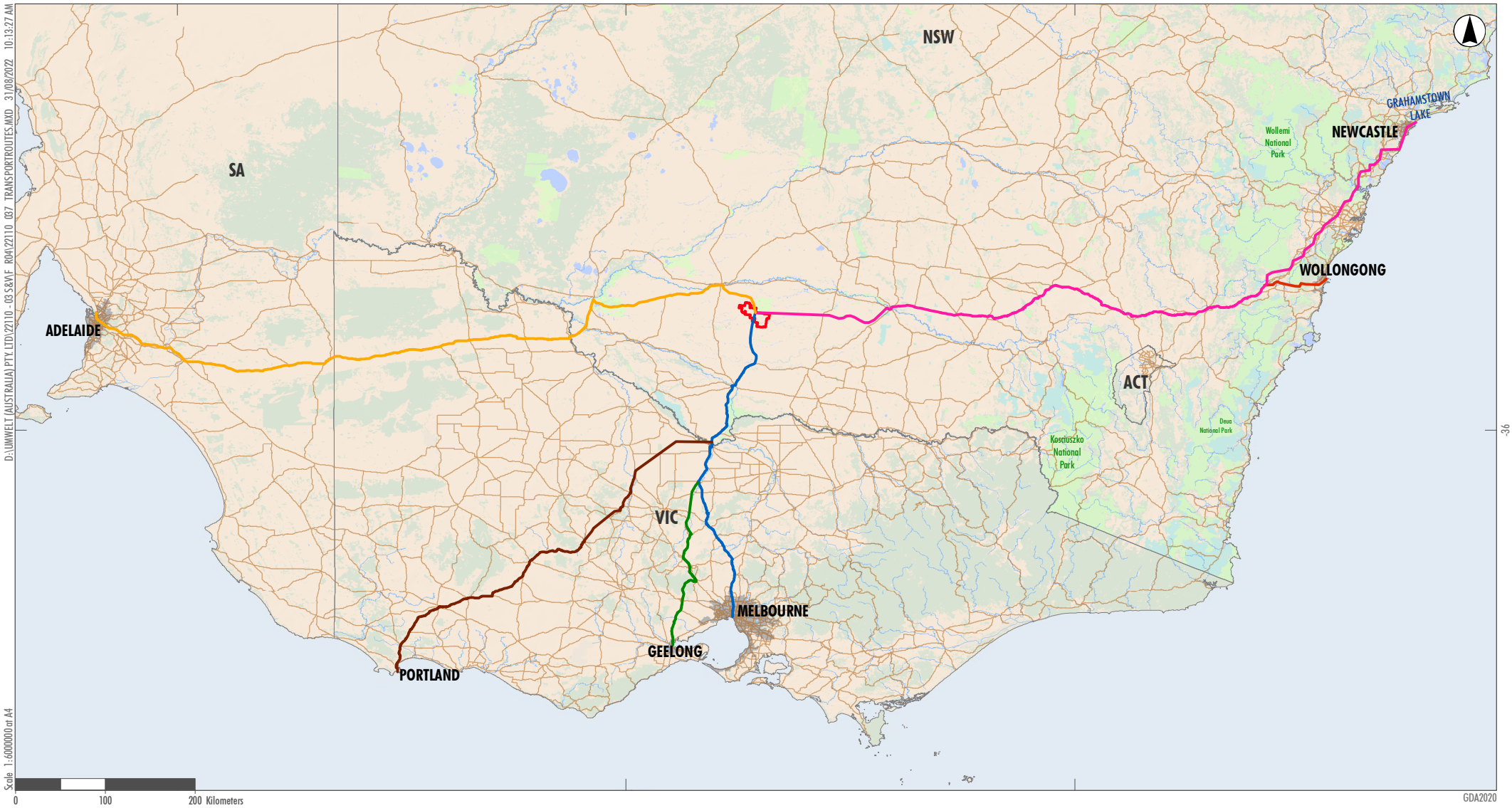
A comparison of the travel distance from each nominated port to the Project site and general commentary is summarised in **Table 3.2** below.

A preferred port and transport route have not yet been established but several options are available as indicated in **Figure 3.2.** The preferred transport route of WTG components and other Project related materials will be confirmed (via the port and transport route assessment), to be prepared as part of the EIS.

Outcomes of the port and transport route assessment will be incorporated into the EIS traffic and transport impact assessment. Amongst other things this will identify a proposed transport route from the preferred port to the Project Area as well as any road upgrades.

Table 3.2 Summary of Port to Project Site Transport Routes – Distance Comparison

Measure	Port of Newcastle	Port Kembla	Port of Melbourne	Port of Geelong (Geelong Port)	Port of Portland	Port Adelaide
Total Travel Distance Port to Project Site (approx.)	850 km	700 km	420 km	450 km	630 km	730 km
Potential Route	Via Sydney, Goulburn, Wagga Wagga	Via Sydney, Goulburn, Wagga Wagga	Via Echuca, Deniliquin	Via Echuca, Deniliquin	Via Ararat, Echuca, Deniliquin	Via Waikerie, Mildura, Hay
Approach to Project Site	From the south-east	From the south-east	From the south-west	From the south-west	From the south-west	From the north-west
General Comments	Newcastle is an established port for the importation of turbines and blades for wind farms projects in the New England REZ.	Port Kembla was used for wind farms in the Goulburn / Collector region, namely Biala and Bango Wind Farms.	The Port of Melbourne is, like Geelong, relatively close to the Project site. However, Port of Melbourne does not have the same convenient access to the regional road network compared with Geelong.	Geelong is a strong potential port option given the proximity to the site as well as its convenient access to the regional road network. Geelong Port has also been utilised for recent renewable projects in the area. The feasibility for use of this port for WTG importation to NSW would need to be investigated further.	Port of Portland is again a strong potential port option given its relative proximity to the Project. The feasibility for use of this port for WTG importation to NSW would need to be investigated further.	Travel distance is significant compared with other sites; however, the route is generally flat with limited traversing of large, populated areas. The feasibility for use of this port for WTG importation to NSW would need to be investigated further.



Legend

- Project Boundary
- State Border
- NPWS Estate
- State Forest
- Native Vegetation Areas
- Waterbodies
- Major Roads
- Watercourses

Transport Routes

- From Adelaide
- From Geelong
- From Melbourne
- From Newcastle
- From Port Kembla
- From Portland

Data source: NSW DFSI (2021); VIC DELWP (2021)

FIGURE 3.2
Transport Routes

3.7 Development Area

The Project Boundary is the maximum spatial extent of potential land access defined by the boundaries of Host landholder property i.e. all agreed Lot/DP owned by Host landholders. The Project Area encompasses all land within and including the Project Boundary and covers approximately 33,000 hectares (ha).

The indicative Development Area for the Project is shown in **Figure 3.1.** The Development Area is defined as the area within which all WTG and associated infrastructure will be placed, providing the necessary flexibility for the detailed design of the Project whilst also allowing a detailed environmental assessment process to be completed. The Development Area is of variable width (to avoid key site constraints) however it generally comprises:

- a 200 m radius buffer around proposed WTGs
- a 100 m buffer measured from the edge of all other infrastructure.

The proposed Development Area associated with the Project is approximately 5,800 ha based on the current indicative Project layout, which will be subject to further design refinement and revision as the Project progresses. This represents less than 18% of the total Project Area.

The proposed disturbance area for the Project will be within the Development Area and is subject to further detailed design as the environmental assessment process progresses. The proposed Development Area is a conservative area for early assessment purposes and the proposed disturbance area will likely be significantly smaller, subject to further detailed assessments and design.

3.8 Project Alternatives

The Project location was selected due to:

- a reliable wind resource and access to this wind resource consistently across the Project Area
- its position within the South-West REZ and proximity to the proposed Project EnergyConnect 330 kV transmission infrastructure
- generally flat topography within the Project Area resulting in straightforward construction when compared to wind farms in other geographies i.e. projects with more substantial topography
- generally positive feedback received from preliminary community and stakeholder engagement with Host landholders, neighbouring landholders and other key stakeholder groups in the region
- low population density and a limited number of nearby rural residential dwellings. There are currently 23 situated within 15 km of the Project Boundary, resulting in the potential to position WTG to maximise distance offsets to neighbouring dwellings such that substantial setbacks have been established and can be maintained
- much of the Project Area being historically cleared for agricultural use, resulting in generally homogenous agricultural land within and surrounding the Project Area
- the Project being compatible with existing pastoral land uses, with minimal impact to current agricultural activities being anticipated during both construction and operation of the Project

- proximity to the existing public road network and access to several existing internal roads
- potential to avoid crossing watercourses (creeks, rivers etc.) via the use of the existing public road network and existing internal roads
- consideration of other important social and environmental values.

BayWa r.e. identified the Project Area for a potential wind farm development prior to the South-West REZ Registration of Interest (ROI) process. Consultation with potential Host landholders started in September 2021 via phone calls and face-to-face meetings conducted by BayWa r.e. staff. Wind farm feasibility studies (e.g. energy yield analysis) commenced in October 2021 to confirm the wind resource of the area, noting that wind monitoring commenced in December 2021 utilising Light Detection and Ranging (LiDAR) technology. Further wind monitoring will commence in late 2022 to further understand the local wind resource and further assess the feasibility of the Project.

The indicative Project layout documented in this Scoping Report (refer **Figure 3.1**), informed by discussions with Host landholders and neighbours, has been subject to several design iterations to incorporate feedback received during this stage of the Project. Where landholders did not wish to be involved in the Project, these areas have been removed from the Project Area and a buffer distance applied.

Three key alternative Project options have been considered to date by BayWa r.e. with the first being a 'do nothing' approach. This option does not meet BayWa r.e. commercial objectives to develop renewable energy projects in NSW; and does not assist to support the strategic context outlined in **Section 2.0** or achieve the Project Objectives outlined in **Section 1.2**. Accordingly, it has not been considered any further. Options to develop a wind farm of up to 170 WTGs a) within other areas of the Project Boundary, and b) within the Development Area identified in **Figure 3.1** were considered and would result in achieving the Project Benefits described in **Section 1.2**.

The option to develop a wind farm of up to 170 WTG within the Development Area (summarised in **Section 3.6** and identified in **Figure 3.1**) is currently preferred as it:

- incorporates feedback from Host landholders and neighbours
- maximises distance offsets to non-associated dwellings to the north-east, and
- optimises the layout with respect to other key environmental matters (e.g. visual, noise, biodiversity and heritage constraints), whilst maintaining a feasible wind farm project that can contribute to both Commonwealth and NSW commitments to increase renewable energy generation and reduce carbon emissions across the NSW and Australian economies.

This option (as represented by the Development Area) is that which is proposed to be progressed to the EIS stage following receipt of the SEARs, noting that the Project layout will be subject to further refinement during that EIS and ongoing design development to minimise impacts on the environment and community. This will be informed by the further technical and environmental studies and continued community and stakeholder engagement. At time of lodgement of the EIS, the specific technology provider for the WTGs and the BESS may not have been selected and may change during future stages of development. As such, reasonable worst-case assumptions will be used to facilitate impact assessment in the EIS.

3.9 Strategies to Avoid or Minimise Impacts

The key impact avoidance and minimisation strategies implemented by BayWa r.e. during the early stages of design development included establishing a 'buildable area'. This was an area defined by BayWa r.e. beyond which Project WTG and ancillary infrastructure would not occur. It was established based on:

- a variable buffer (minimum 500 m) to all Host landholder dwellings
- a 50 m buffer to all waterbodies, and a 100 m buffer to Coleambally Creek
- a 300 m buffer to the Oolambeyan National Park
- a 300 m buffer either side of the existing 220 kV transmission line alignment (600 m total)
- a 100 m buffer to road reserves
- an 80 m buffer from the Project Boundary to any part of a WTG
- a 500 m buffer to the existing airstrip situated within the Project Boundary
- avoidance of any land with 15 degree or greater gradient
- avoidance of any land that is used for irrigation cropping
- WTG locations being placed in locations that are compatible with Host landholders' existing land uses.

The key strategies implemented by BayWa r.e. during the Scoping stage to avoid and minimise impacts includes revising the indicative Project layout to:

- **remove** WTG (and associated ancillary infrastructure) in the north-west section of the Project Area to assist maximise distance offsets to neighbouring dwellings in that area and minimise potential visual and noise impacts. More broadly, this assisted to avoid and minimise potential negative community impacts (for people in that area) and to reduce potential effects on sensitive receivers.
- **relocate** WTG (and associated ancillary infrastructure) to avoid native vegetation clearing and high integrity ecological endangered communities (EECs), where possible. Avoidance of important habitat associated with serious and irreversible impact (SAII) species and associated existing conservation areas within the Project Boundary also occurred. This was based on the outcomes of the Biodiversity Constraints Assessment (that included 12 days fulltime equivalent (FTE) of field work to ground-truth findings; refer to **Appendix 5**) and subsequent design workshops led by Umwelt to assist BayWa r.e. to situate Project infrastructure away from sensitive areas.
- **relocate** WTG (and associated ancillary infrastructure) to avoid sensitive archaeological areas (including variable buffers from watercourses based on stream order) established via preliminary predictive modelling of archaeological potential within the Project Area. This was based on the outcomes of the desk-based Heritage Constraints Assessment (refer to **Appendix 6**) and again informed by subsequent design workshops led by Umwelt to assist BayWa r.e. to situate Project infrastructure sensitive areas.

3.9.1 Summary of Avoidance/Minimisation and Next Steps

The Project layout revisions summarised above reduced the number of turbines from a potential 206 to 170 as represented in this Scoping Report (refer **Figure 3.1**). During the Scoping stage the indicative Project layout was revised on three occasions to accommodate the abovementioned avoidance and minimisation strategies, with each revision incorporating multiple constraints-based changes.

The Project layout will be subject to further refinement during the EIS and further design development to minimise impacts on the environment and community. It will be revised as more social and environmental information is received, constraints are identified, further technical studies and environmental assessments occur and further feedback from stakeholder and community engagement is received.

At time of lodgement of the EIS, the specific technology provider for the WTGs and the BESS may not have been selected and may change during future stages of development. As such, reasonable worst-case assumptions will be used to facilitate impact assessment in the EIS.

4.0 Statutory Context

The relevant statutory requirements for the Project are summarised in the following sections.

4.1 NSW Approval Pathway

The EP&A Act is the primary instrument which regulates the environmental impact assessment and approval process for development in NSW.

The Project will require development consent under Part 4 of the EP&A Act. Being development for the purpose of electricity generation with a capital investment value of more than $30 million, the Project is declared to be SSD under the provisions of the Planning System SEPP. The development application will be lodged with DPE. Currently the Project has a CIV estimated to exceed one billion dollars.

Section 4.15 of the EP&A Act describes the matters for consideration in assessing SSD, which includes the provisions of relevant environmental planning instruments (EPIs), proposed instruments that have been the subject of public consultation, development control plans, planning agreements and statutory regulations. The assessment of SSD must also consider the likely impacts of the development, suitability of the site, any submissions received and the public interest.

4.1.1 Consent Authority

Under Section 4.5(a) of the EP&A Act the consent authority for SSD is the Independent Planning Commission (IPC) (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister (if the development is not of that kind).

In accordance with clause 2.7(1) of the Planning System SEPP if any of the criteria identified below are exceeded the IPC is the consent authority:

- Hay Shire, Murrumbidgee, or Edward River Council/s object to the application.
- 50 submissions (other than from the Councils noted above) are made objecting to the Project.
- BayWa r.e. discloses a reportable political donation.

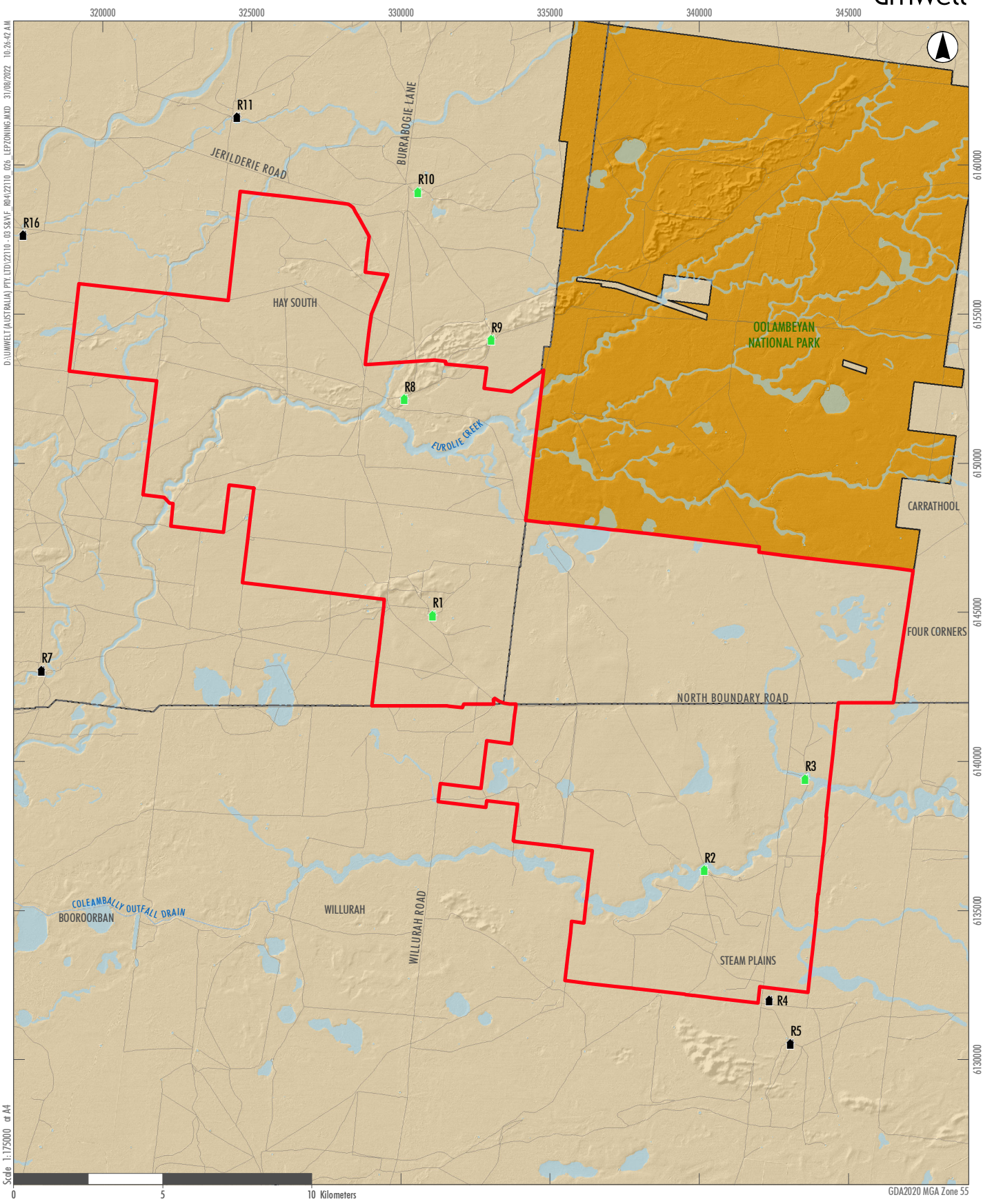
If none of the above criteria are triggered, DPE will determine the development application on behalf of the Minister.

4.1.2 Permissibility

As outlined in **Section 2.2**, the Project Area is situated predominately within the Hay Shire LGA and partly in the Murrumbidgee and Edward River LGA's. The Project Area is zoned as RU1 Primary Production within the Hay LEP 2011, the Murrumbidgee LEP 2013 and Conargo LEP 2013 (refer to **Figure 4.1** below). Electricity generating works are not permitted within the RU1 zoning in each of the three LEPs.

Clause 2.36(1)(b) of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TI SEPP) states that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. Under Clause 2.7(1) of the TI SEPP, the provisions prevail where there are inconsistencies with any other EPIs, including LEPs.

Due to the operation of Clause 2.36(1)(b) of the TI SEPP the Project is permissible with development consent.



Legend

- Project Boundary
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Road
- Watercourse

Local Environment Plan - Land Zoning

Hay (2011), Murrumbidgee (2013), Conargo (2013)

- E1 National Parks and Nature Reserves
- RU1 Primary Production

FIGURE 4.1

Land Use Zoning

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

4.1.3 Other Approvals

In addition to development consent under the EP&A Act, several other NSW Acts or planning policies are applicable or potentially applicable to the Project. **Table 4.1** identifies the other NSW legislation and policies and their applicability to the Project.

Table 4.1 NSW Legislation

State Legislation	Description
Biodiversity Conservation Act 2016 **(BC Act)**	Under the BC Act, biodiversity assessment in accordance with the Biodiversity Assessment Method (BAM) is required for any SSD project. The Project (as SSD) triggers the need to prepare a Biodiversity Development Assessment Report (BDAR) in accordance with the BAM. The EIS will include a BDAR.
Protection of the Environment Operations Act 1997 **(POEO Act)**	The POEO Act regulates pollution to the environment and requires licences for environment protection including waste, air, water, and noise pollution control. Wind farms are a scheduled activity under the POEO Act and require an Environment Protection Licence (EPL). An EPL would be sought in relation to the construction and operation of the Project.
Water Management Act 2000 **(WM Act)**	Any water extractions from water sources (i.e. surface and groundwater) regulated by a Water Sharing Plan (WSP) required for construction or operational purposes will require licensing under the WM Act. The potential water requirements during construction and operation will be assessed as part of the Water and Soil Impact Assessment prepared as part of the EIS. Any necessary licences would be obtained for the Project.
Roads Act 1993 **(Roads Act)**	A consent is required under section 138 to work on or above a road or to connect a road to a classified road. Consents under section 138 will be required for proposed road works.
Crown Land Management Act 2016 **(Crown Land Act)**	The Crown Land Act provides for the administration and management of Crown Land in NSW. Crown land may not be occupied, used, sold, leased, licensed, dedicated, reserved or otherwise dealt with unless authorised by the Crown Land Act. There are some areas of Crown Land (e.g. Crown enclosure permits) within the Project Area and should any works be proposed in these areas an approval would be obtained.
Contaminated Land Management Act 1997 **(CLM Act)**	The CLM Act establishes the process for investigating and if required, remediating land that the NSW EPA considers to be contaminated significantly enough to require regulation. The Project Area does not contain land listed on the Contaminated Lands Register. Relevant mitigation and management measures would be incorporated as part of the Project to address potential contamination issues.

4.2 Commonwealth Legislation

4.2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a framework for protection of the Australian environment, including its biodiversity and its natural and culturally significant places.

Any action which will or is likely to have a significant impact on a matter of national environmental significance (MNES) must be referred to the Minister for the Environment, MNES includes:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (listed under the Ramsar Convention).
- Listed threatened species and ecological communities.
- Migratory species protected under international agreements.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mines).
- A water resource, in relation to coal seam gas development and large coal mining development.

The Project Area is not within a world heritage property or place, does not have wetlands of international importance, is not within either a Commonwealth marine area or the Great Barrier Reef Marine Park, and does not relate to a nuclear action, coal seam gas or coal mining development.

There is potential for the Project to impact on listed threatened species and ecological communities, and migratory species, including the Plains-Wanderer, an endangered and critically endangered fauna species under the BC Act and EPBC Act, respectively. Further discussion around impact to threatened species is provided in **Section 6.2.3**.

A EPBC Act Referral will be lodged to determine whether the Project requires formal assessment and approval under the EPBC Act as a Controlled Action. If deemed a Controlled Action, it is proposed that the Project would be assessed under the bilateral agreement between the NSW and Commonwealth Governments.

4.2.1.2 Civil Aviation Regulations 1988

Reporting of tall structures to the Royal Australian Air Force (RAAF) is required under the *Civil Aviation Regulations 1988*. A detailed assessment in accordance with the regulations and consultation with the relevant agencies will be undertaken as part of the preparation of the EIS.

4.2.1.3 Heavy Vehicle National Law

Approvals would be required for the transport of wind turbines and associated infrastructure by OSOM vehicles. The requirements for such OSOM transport will be assessed via a route analysis study as part of the EIS.

4.3 Statutory Requirements Summary

This section provides an overview of the key statutory requirements for the Project. The statutory requirements addressed in **Table 4.2** are categorised as per the SSD Scoping Report Guideline.

Table 4.2 Statutory Requirements Summary

Matter	Detail	Comment
Power to grant consent	The legal pathway under which consent is to be sought, why the pathway applies, and who the consent authority is likely to be.	As outlined in **Section 4.1.1**, the Project requires approval under Part 4 of the EP&A Act being SSD. The consent authority will be the IPC or DPE based on the number and type of any objections to the Project or any political donations made by BayWa r.e. or related entities.
Permissibility	The relevant provisions affecting the permissibility of the Project, including any land use zones. Any provisions or actions being taken that would allow the Project to be considered on its merits, where the Project would otherwise be partly or wholly prohibited.	As outlined in **Section 4.1.2**, the Project Area is zoned RU1 Primary Production within the Hay LEP 2011, the Murrumbidgee LEP 2013 and Conargo LEP 2013. Electricity generating works are not permitted within the RU1 zoning in any of the above-mentioned LEPs. Clause 2.36(1)(b) of the TI SEPP states that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. Under Clause 2.7(1) of the TI SEPP, the provisions prevail where there are inconsistencies with any other EPIs, including LEPs. Therefore the Project is permissible with development consent.
Other approvals	Other approvals that are required to carry out the Project and why they are required.	**Section 4.1.3** provides a list of other NSW approvals required or that may be required for the Project. **Section 4.2** discusses potential Commonwealth approvals that may be required for the Project.
Pre-conditions to exercising the power to grant consent	Pre-conditions to exercising the power to grant consent for the Project that may be relevant to setting the SEARs.	An EIS will be prepared in accordance with relevant legislative requirements and guidelines. No pre-conditions to exercising the power to grant consent for the Project are currently envisaged.
Mandatory matters for consideration	Matters that the consent authority is required to consider in deciding whether to grant consent to any development application for the Project that may be relevant to setting the SEARs.	As outlined in **Section 4.1**, Section 4.15 of the EP&A Act describes the matters for consideration in assessing SSD, which includes the provisions of relevant environmental planning instruments, proposed instruments that have been the subject of public consultation, development control plans, planning agreements and statutory regulations. The assessment of SSD must also consider the likely impacts of the development, suitability of the Project site, any submissions received and the public interest. All relevant mattes will be addressed in the EIS based on the outcomes of environmental assessments to be undertaken (refer to **Section 6.0**).

5.0 Engagement

BayWa r.e. recognise that respectful, inclusive, and meaningful engagement is fundamental to the development of wind farm projects, and that effective engagement is a key component of the SSD process, in line with the NSW Government's Engagement Guidelines (DPIE, 2021f).

BayWa r.e. acknowledges that effective engagement requires everyone involved to do their part, at the appropriate stage in the process. BayWa r.e. aims to provide engagement that is meaningful, proportionate and tailored to the needs of the community, councils and government agencies as well as outlining the statutory context that ensures the community can participate in planning and assessment.

Accordingly, Umwelt (on behalf of BayWa r.e.) has prepared a CSEP for the Project to outline the objectives and approach to community engagement throughout the life of the Project from development through construction and operation.

The following section provides a summary of the CSEP, the consultation undertaken to date and key issues raised.

5.1 Community and Stakeholder Engagement Plan

The CSEP identifies the stakeholder engagement approach and objectives for the Project and the surrounding communities.

Through the implementation of the CSEP, BayWa r.e. aims to:

- inform and consult with the community in relation to the proposed Project
- develop an understanding of the social locality/social area of influence of the Project, specifically the host community/communities in which the Project is proposed
- scope and identify any impacts upon people associated with the Project
- enable community and stakeholder input into the Project design, planning and development
- collaboratively develop relevant strategies to respond to impacts in the form of mitigation or enhancement measures and community benefit sharing options
- identify future engagement preferences of stakeholders and potential partnerships between the proponent and the community.

The CSEP provides an overview of the BayWa r.e. approach to stakeholder engagement throughout all stages of the Project, outlines the Project and the relevant stakeholders, provides detail on the consultation undertaken to date and outlines various community benefits.

5.2 Stakeholder Engagement

Engagement with local landholders commenced in 2021 and has predominantly been undertaken by the Bullawah Wind Farm Project team of two BayWa r.e. staff, supported by Umwelt. The Project team have

engaged in a range of activities, including hosting community information sessions and meeting with neighbouring landholders and local stakeholders in-person and online to build and maintain genuine, trusting relationships. The overall approach to consultation with local community is to be flexible, inclusive, open and responsive.

Stakeholder and community engagement has been undertaken early in the scoping phase to:

- Proactively inform Project design and development.
- Identify perceived issues/impacts to be addressed in the assessment process.
- Establish stakeholder relationships with hosts, near neighbours and key stakeholders for the Project.

The key stakeholders identified for the Project within each stakeholder group are outlined in **Table 5.1**.

Table 5.1 Identified Stakeholders

Stakeholder Group	Stakeholders
Host Landholders	• Landholders with the potential to host WTGs and/or Project infrastructure. There are currently no Associated landholders participating in the Project
Neighbouring Landholders	• Neighbouring dwellings within 8 km of the potential WTG locations
Community within the Social Locality	• Proximal / local communities / localities, including Conargo, Coleambally, Darlington Point, and Wanganella • Regional towns, including Jerilderie, Hay, and Deniliquin • Regional community, including Hay, Murrumbidgee and Edward River regional LGAs
Government – State	• NSW Crown Lands • DPE Secretary • DPE Director-Energy Infrastructure and Renewable Energy Zones • NSW Environment Protection Authority (EPA) • Aboriginal Affairs NSW • Transport for NSW (TfNSW) • Regional Development Australia • Riverina Local Land Services • Murray Local Land Services • National Park and Wildlife Services (NPWS)
Government – Federal	• Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly DAWE) • Airservices Australia • Bureau of Meteorology (BOM) • Civil Aviation Safety Authority (CASA) • Department of Defence

Stakeholder Group	Stakeholders
Local Council	• Edward River, Hay, and Murrumbidgee Council – Mayor, Deputy Mayor, and Executive team
Community Interest Groups and Community Services	• Hay Plains Landcare Group • Murrumbidgee Landcare Inc • Coleambally Landcare Group • Murrumbidgee Environmental Water Advisory Group • Murray Darling Wetlands Working Group Ltd • Nature Conservation Council • NSW Farmers Deniliquin Branch • New Farm and Districts Historical Society • Murrumbidgee Valley Food and Fibre Association (MVFFA) • Riverina Ag Network • Deniliquin Community Group Inc • Coleambally Lions Club • Lions Club of Hay • Lions Club - Deniliquin
Local Businesses & Service Providers – Accommodation, Education, Emergency Services, Employment & Training, **Health**	• TAFE NSW • Hay War Memorial High School • Deniliquin High School • Deniliquin Business Chamber • NSW Rural Fire Service • Saltbush Motor Inn, Hay • Settlement Motor Inn, Deniliquin • Riviana Motel, Deniliquin • Centrepoint Motel, Deniliquin • Riviana Motel, Deniliquin • Deniliquin Motor Inn • Darlington Point Motel • Deniliquin Hospital and Health Services • Hay District Hospital • Utilities providers; Transgrid, Essential Energy • Bus services

Stakeholder Group	Stakeholders
Aboriginal Groups	• Deniliquin Local Aboriginal Land Council (LALC) • Griffith LALC • Hay LALC • Hay Working Party • Nari Nari Tribal Council • Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation • Local Aboriginal service providers

5.2.1 Community Engagement

BayWa r.e. has commenced stakeholder engagement as part of the initial Project design phase. The community consultation undertaken to date is summarised in **Table 5.2**.

Table 5.2 Community Engagement

Engagement	Details
Face-to-face meetings	Face to face meetings, phone calls and emails have been (and continue to be) undertaken with potential hosts and near neighbours. A total of 19 landholders have been contacted to date in relation to the Project. Meetings have been held over the periods of: • May 2022 – meetings to hear community perspectives and obtain feedback on the proposed Project. • February to June 2022 – meetings as required to obtain feedback, discuss the studies being undertaken, next steps and answer questions. • Refer to **Table 5.3** for additional face to face meetings with community groups and State and Local government.
Community Drop-in Session	Two community drop-in sessions were held in May 2022, one in the Coleambally Coffee Nest Café on May 18, 2022 and one in the Hay War Memorial Hall on May 19, 2022. The sessions provided updates on the next steps of the process and provided community members an opportunity to provide perspectives and feedback. The community drop-in sessions were resourced by four BayWa r.e. staff and attended by 33 people.
Community Survey	A community survey was distributed in May 2022 to understand community perceptions on the Project and obtain feedback on the key landscape features and values. A total of 23 responses were provided to BayWa r.e.
Newsletters	Community newsletters were distributed in May 2022 to introduce the Project and BayWa r.e., invite community members to community drop-in sessions and provide updates on the Project. The newsletters were distributed to landholders (Hosts and neighbours), community members and other stakeholders. The newsletters were delivered to letterboxes by Australia Post, also by means of Facebook posts on the three council pages and two community pages, it sits permanently and prominently on the Project's website page which was promoted again by Facebook posts on the abovementioned pages and by way of A4 posters on community notice boards in the towns of Coleambally and Hay and in a newspaper advertisement in the local Riverine Grazier newspaper. Hard copies of the newsletter were available at the community information sessions and at Council offices.

Engagement	Details
Newspaper Articles	The Project has been covered in local media. On April 6 the *Riverine Grazier* ran an article on the Project, reporting that Managing Director Fleur Yaxley had met with Hay Shire Council and the company was hoping to work with the community. Another separate editorial piece on May 18, 2022 focussed on promoting the upcoming information sessions and was accompanied by four Riverine Grazier Facebook posts using a drone video explaining the Project, pointing also to the website and community feedback survey.

It is noted that the formal notification process for the Aboriginal Cultural Heritage Assessment will commence following submission of the Scoping Report to DPE, or receipt of the SEARs. Once commenced, detailed consultation will be undertaken with the Registered Aboriginal Parties (RAPs) for the Project. Consultation will be undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010b). Further detail on the proposed EIS stage heritage assessment is provided in **Section 6.2.4**.

5.2.1.1 Community Views

As discussed in the SISR (refer to **Appendix 2**), the following key community views were identified in engagement conducted for the social scoping phase. When stakeholders and community members were asked directly about potential negative impacts of the Project, both prompted and unprompted, the top issues raised included:

- impacts on surroundings, and in particular the potential for the Project to impact on the habitat of the Plains Wanderers
- visual changes due to the presence of WTGs
- impacts relating to traffic and conditions on local roads
- impacts relating to changing land uses and the associated impacts on how people sustain their livelihoods
- Increased pressure on the rental market in response to an incoming construction workforce.

When community members were asked directly to identify potential positive impacts of the Project, the most frequently cited responses relate to:

- the creation of jobs and training, and procurement opportunities
- the potential to attract people, particularly younger people, to move to the area over the longer term
- the provision of renewable energy to address climate change
- the sharing of Project benefits through direct investment in the local community
- the potential to support tourism in the area.

5.2.1.2 Continued Engagement

BayWa r.e. will continue to implement the CSEP throughout the Project assessment phase. Key consultation mechanisms and activities will include:

- one-on-one meetings and phone calls
- email/letter updates and Project newsletters
- the maintenance of a Project website
- community information sessions
- community surveys.

5.3 Agency and Elected Official Stakeholder Engagement

Agency and elected official consultation undertaken to-date in relation to the Project is provided in **Table 5.3** below.

Table 5.3 Agency Consultation

Agency	Date	Mechanism	Details
Hay Shire Council	17 February 2022	Meeting	Meeting to introduce the Project.
Edward River Council	17 February 2022	Meeting	Meeting to introduce the Project.
NSW National Parks and Wildlife Services	15 March 2022	Letter	Introduction to the Project and request for further information. Offer for further consultation.
Hay Shire Council	22 March 2022	Meeting	Meeting to introduce the Project.
Murrumbidgee Council	08 April 2022	Meeting	Meeting to introduce the Project.
TAFE NSW Hay	10 April 2022	Letter	Introduction to the Project and the offer for further consultation.
Coleambally Land Care	21 April 2022	Letter	Introduction to the Project and the offer for further consultation.
Nari Nari Tribal Council	21 April 2022	Phone call	Introduction to the Project and the offer for further consultation.
Deniliquin Local Aboriginal Land Council	21 April 2022	Letter	Introduction to the Project and the offer for further consultation.
Regional Development Australia	21 April 2022	Letter	Introduction to the Project and the offer for further consultation.

Agency	Date	Mechanism	Details
Landcare Bidgee West	03 May 2022	Project Presentation	Presentation at Landcare Bidgee Wests Women's Forum. Introduction to the Project and the offer for further consultation. Feedback obtained.
Tirkandi Innaburra Cultural Development Centre NSW	09 May 2022	Meeting	Introduction to the Project and the offer for further consultation.
NSW Department Planning and Environment	10 May 2022	Phone call	Initial contact made in relation to the Plains Wander.
Griffith Local Aboriginal Land Council	11 May 2022	Phone Call	Introduction to the Project and the offer for further consultation.
TAFE NSW Hay	16 May 2022	Meeting	Introduction to the Project. Discussions of potential collaboration as the Project progresses.
Riverina Local Land Services	18 May 2022	Meeting	Introduction to the Project.
	06 October 2022	Phone Call	Discussion regarding Black Falcon Environmental Trust Program and its potential relevance to the Project.
Regional Development Australia	21 May 2022	Letter	Introduction to the Project and the offer for further consultation.
Energy Corporation of NSW	03 June 2022	Meeting	Introduction to the Project and the offer for further consultation.
Helen Dalton, Member for Murray	06 June 2022	Letter	Introduction to the Project and the offer for further consultation.
Nature Conservation Trust	14 June 2022	Phone call	Introduction to the Project and the offer for further consultation.
Coleambally Chamber of Commerce	15 June 2022	Meeting	Introduction to the Project and the offer for further consultation.
Hay Working Party	15 June 2022	Meeting	Introduction to the Project and feedback obtained.
Deniliquin Local Aboriginal Land Council	15 June 2022	Meeting	Meeting to introduce the Project.
Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation	15 June 2022	Meeting	Introduction to the Project and the offer for further involvement.

Agency	Date	Mechanism	Details
Coleambally Chamber of Commerce	15 June 2022	Meeting	Meeting to introduce the Project.
Biodiversity and Conservation Division (BCD)	19 July 2022	Meeting	Meeting to introduce the Project and discuss the bird and bat strike utilisation survey and assessment methodology (BBUSAM)
Griffith Local Aboriginal Council	17 August 2022	Meeting	Introduction to the Project and the offer for further consultation.
Hay Local Aboriginal Council	5 October 2022	Meeting	Introduction to the Project and the offer for further consultation.
Nari Nari Tribal Council	5 October 2022	Meeting	Introduction to the Project and the offer for further consultation.

Consultation with agencies and elected officials to date has been primarily to commence engagement, introduce the Project and key Project team members.

As outlined in **Section 2.2**, the Project Area is situated predominately within the Hay Shire LGA and partly in the Murrumbidgee and Edward River LGA's. Consultation with Hay Shire, Murrumbidgee and Edward River Councils has occurred and feedback from that consultation is summarised below:

- Hay Shire Council: BayWa r.e. presented the Project to Hay Shire Council in February and March 2022. The project was well received, and Council acknowledged the potential benefits the Project may have on the community. BayWa r.e. and Hay Shire Council also discussed about education opportunities in which BayWa r.e is currently considering.

- Edward River Council: BayWa r.e. presented the Project to Edward River Council in February 2022. The project was well received and noted that it is important for BayWa r.e. in leaving a legacy and was receptive to the potential investment in the area. Council noted the importance of transport upgrades and telecommunications for the community. Education opportunities were also discussed. The Project received feedback from Edward River Council via online survey with impacts to local roads and infrastructure noted.

- Murrumbidgee Council: The Project was well received when presented to Council on 8 April 2022. Council acknowledged the potential benefits the Project may have on the community and were pleased that BayWa r.e. is planning a significant project in the area, however also advised of a shortage of accommodation in the LGA.

Consultation with further agencies will be undertaken throughout the assessment process, in accordance with the SEARs for the Project.

5.4 Feedback from Proximal Neighbours

The following section summarises consultation outcomes with proximal neighbours situated with an approximate 8 km radius of the Project.

5.4.1 Specific Feedback from Neighbours within 8 km of a Wind Turbine

The feedback received from receivers within 8 km of the site was generally positive towards the Project with a scoring of 9.1 out of 10 for level of acceptance. The Social Impact Scoping Report (SISR) in **Appendix 2** of this Scoping Report outlines some of the feedback received from neighbouring landholders as well as the wider community. The below lists some specific feedback from proximal neighbours to the Project:

- "*More renewables - good for the planet and the local area.*"
- "Good for employment - It'll create a lot of work / jobs."
- "I think its common sense, we live in an area with a fair bit of wind and a lot of sunshine. That's the way it's going to be. Europe are way in front of us and we need to catch up, we get a lot more sunshine."
- "Industry diversification - may help move the community from agriculture, especially during periods of drought."
- "Nothing I can think of. I have seen them around the place, and they don't worry me - they look alright. This is the ideal place to have them because there's no neighbours whinging about noise. They look good."
- "Be active in the community through scholarships and sporting grants (similar to Aus Scott). I think if you're going to have a footprint you need to have that type of ongoing activity – it doesn't need to be upfront, but you do need consistency."
- "Another concern would be the influx of the community and changing the dynamics of the town – especially with all the projects that are in the pipeline. Also, the impact it will have on the wider community. The town might change dramatically in construction but because of the nature of renewables its only really a few people there for maintenance."

There was minimal concern regarding visual impacts with one neighbour saying: "*Aesthetically it will be a change - it's very flat plains and you can see things for a long way. It'll be a way from us so won't impact us too much. If you can see it would be a small visual imprint. We won't be looking and seeing turbines for the whole horizon.*"

There were biodiversity concerns raised with one neighbour saying: "*Major concern is the wildlife - we have spent a lot of money doing shelter belts on trees, as have neighbours. The road we live on is one of the main family-owned farms and we are big on conservation and sustainability. We do not want to detract from wildlife. We're concerned about the noise and how far it radiates and what this will mean for the wildlife. We have spent a lot of money attracting the wildlife, as have neighbours. We don't want to detract from that.*"

The protection of the plains wanderer was also a concern of the neighbouring properties outlining they would like to "*Ensure habitat remains as untouched as much as possible.*"

There was some commentary on land values and compensation with a neighbour saying "*How it will relate to the value of the land. The turbine income would be reflected in the land value. It may become a barrier to expand rural holding, but also may be a positive because there is another form of income to help them leverage buying more.*"

5.4.2 Preliminary Visual Consultation

A key component of the Scoping phase consultation conducted for the Project was gaining an understanding of community opinions and views regarding visual and landscape values. Consultation with proximal neighbours included targeted questions relating to visual aspects of the development. To avoid known issues with consultation fatigue these questions were incorporated into the broader community and stakeholder engagement that occurred for the Project.

In summary, the format of this visual consultation (including but not limited to landholders within 8 km of a wind turbine) included written notification/newsletter, online surveys, phone interviews and face-to-face meetings, in addition to the two community information sessions held in May 2022, one in the Coleambally Coffee Nest Café on May 18, 2022 and one in the Hay War Memorial Hall on May 19, 2022. Where possible, participants were asked targeted questions relating to visual and landscape features, including:

1. Are there any areas or landscape features close to the proposed Project site that are of significant value to yourself, your business, or your community?
2. What are the best lookouts/ public viewing areas in the area? If you have a visitor, where do you take them to showcase your local area?
3. Are there things BayWa r.e. could do to reduce the visual impact of the wind farm or make it more visually appealing?

By comparison to online surveys and questionnaires, phone interview and face-to-face meeting based consultation was able to be extended (via open communicative dialogue) to seek deeper insights and feedback from participants on these specific matters.

This information was reviewed by the Umwelt social team and specialist visual consultant to evaluate community views relating to the visual significance of landscape features as outlined in the Visual Bulletin. A summary of this consultation, including number of surveys received, number of survey/phone call attempts and Umwelt dissemination mechanisms is provided in **Table 5.4** and **Table 5.5** below.

The verbatim responses to the general visual questions are outlined in **Table 5.6** below. Reponses from participants that ranked landscape features and their scenic quality (into high, moderate or low visual significance as outlined in the Visual Bulletin) are then provided in **Table 5.7** below.

Ongoing consultation on these matters will occur during the EIS and incorporated into the detailed the detailed Landscape Visual Impact Assessment (LVIA) that is to be prepared in accordance with the requirements of the Visual Bulletin. This ongoing consultation represents the first step in the detailed LVIA process which relates to the preparation of visual baseline study inputs, including consulting the

community on aspects of the baseline study. The detailed LVIA is a key component of the EIS, as described further in **Section 6.2.1**.

Table 5.4 Surveys Completed / Attempted

Status	Summary
Completed	Seven (7) surveys completed with eight (8) participants
Contacted (not completed)	**Total contacted: nine (9)** Six (6) neighbours contacted, three (3) or more times by Umwelt (combination of phone and email attempts). Survey links emailed to five (5) of these. One (1) additional landholder was emailed the survey link only, as they are based overseas. Survey link also emailed to two (2) proximal neighbours not originally identified by BayWa r.e., rather by Bidgee West Landcare. Based on survey data output, none of these landholders completed a survey.
No contact details	One (1) landholder was listed has having no contact details at time of the SISR engagement, as such consultation was not possible. BayWa r.e. has subsequently began consultation directly with this neighbour. Prioritisation of this neighbour will occur during the next phase of the community and stakeholder engagement process, and EIS.
TOTAL Proximal Landholders Contacted	**16**

Table 5.5 Additional Methods for Broader Community

Format	Comment
Project Newsletter	Delivered by Australia Posts Unaddressed mail system to 2,872 households which covered, Hay, Deniliquin, Coleambally and Darlington Point. B Mail out included QR code to online survey.
Media release	Via the BayWa r.e. website, social media posts and updates on the Project, advertisements in local papers, and BayWa r.e. presentations at local industry event.

Table 5.6 Verbatim Responses to General Visual Questions

Question	Verbatim Response
Are there any areas or landscape features close to the proposed Project site that are of significant value to yourself, your business, or your community?	• *It all is. We don't think the project takes away from any of that though. I don't think they look bad. If everyone said not in my backyard than nothing would ever happen. Some people think they look ugly, but people next to a power station would also think they're very ugly- they are going to be very remote. Only a few landholders will ever see them.* • *No* • *No. I wouldn't think so, Nothing that will be impacted* • *Not really. I don't see them. It'll only be when you drive down the road. There are some sand hills in that area and I guess building them on sand hills, keeping them at a consistent height would be better.* • *No* • *We wjust like the wide opens space s and the sunrise and sunset* • *I usually only fdarft*

Question	Verbatim Response
	• *You would need to contact local indigenous groups from Hay and Jerilderie* • *State Forrest; agricultural land* • *This project does not impact me directly living in the Deniliquin Township.* • *"The beautiful unbroken vista of the plains.* • *It would be prime Plains Wanderer country and I don't want to see them put at risk. You won't find them near trees as hawks can get at them. Make sure hawks can't land on the turbines or you'll wipe out the Plains Wanderers. "* • *Plain Wanderer habitat needs to be acknowledged and protected during construction* • *The landscape itself is the feature and filling it with wind turbines will forever change the landscape, and environment and would have many ramifications for surrounding wild life and plant species.* • *No lookouts. But the nearest area of concern is the Oolambeyan National Park. Toganmain woolshed is s historic landmark.* • *Unsure*
What are the best lookouts/ public viewing areas in the area? If you have a visitor, where do you take them to showcase your local area?	• *Wouldn't impact any of those areas.* • *No - country is as flat as a pancake.* • *No not really, I know they have lookouts around town but I've never been to them* • *I dont think from where we are / where we would take a visitor we would see them. We have very open plains, and people love looking at the sunset to the west so it wouldn't impact that. I think we would only see it on cool morning when you can see a long way.* • *None* • *In the middle of our paddocks.* • *Staight ot the woolshed* • *To the river* • *unknown* • *Pretty Pine Hotel, Wanganella Store, Booroorban Hotel, Conargo Hotel.* • *Just drive down a road mate. There's sights to see everywhere.* • *Riverside: sunset viewing area; Hay Plains* • *The hay plain is the best lookout in the district, which is right in the middle of your proposed site.* • *Out in the plains* • *Around the rivers for viewing*

Question	Verbatim Response
Are there things BayWa r.e. could do to reduce the visual impact of the wind farm or make it more visually appealing?	• *Camouflage, - a design to make them blend a little more. They're a sign of progress . They are part of what is happening on a greater scale around the world* • *Nothing I can think of. I have seen them around the place and they don't worry me -they look alright. This is the ideal place to have them because there's no neighbors winging about noise. They look good.* • *Not that I can think of. I'm not too concerned about the look of them.* • *They all seem to be white. Whether they could paint them - make them a earthy colour. I think it is probably working with the lay of the land that could minimise how much you could see them. Maybe the alignment of the turbine to minimise how many you see from one direction.* • *No* • *I'm not too sure.* • *They look alright the way they are, just keep them turning.* • *Tree planting on perimeter* • *paint the towers in a colour that blends in with the landscape* • *I understand you can't hide wind farms however keeping the surrounding areas well maintained.* • *Build it somewhere else. Back in Germany would be best.* • *Revegetation projects but if your company supports Hay in other ways, I bet suddenly the turbines will look much more attractive* • *Don't have it, put it somewhere else* • *Where the project is proposed, is far enough to not see them from highways or roads* • *Probably not*

Table 5.7 Reponses that Ranked Landscape Features and their Scenic Quality

Stakeholder group	Please rate the scenic value of the following landscape features: - Grazing land	Please rate the scenic value of the following landscape features: - Bushland areas	Please rate the scenic value of the following landscape features: - Rivers / creeks	Please rate the scenic value of the following landscape features: - Vegetation	Please rate the scenic value of the following landscape features: - Plains	Please rate the scenic value of the following landscape features: - Townships
Neighbouring landholder	High	High	High	High	High	High
	High	Low	Low	High	High	Low
	High	High	High	High	High	Low
	High	Medium	High	Medium	High	High
	Low	Low	Low	Low	Low	Medium
	High	Medium	Medium	High	High	High
	High	Medium	Medium	High	High	Low
Community member	High	High	High	High	High	High

6.0 Proposed Assessment of Impacts

6.1 Key Environmental, Social and Economic Matters

A review of the environmental, social and economic matters relevant to the Project have been conducted to determine which issues need to be assessed as part of the EIS and the level of assessment that is required. This review has been undertaken with reference to the categories of assessment matters identified in the SSD Scoping Report Guideline (DPIE, 2021a), with the key issues and the proposed level and scope of assessments discussed in the following sections.

The environmental and social matters relevant to the Project are identified and have been characterised (in accordance with the SSD Scoping Report Guideline) as follows:

- matters requiring further assessment in the EIS (refer to **Section 6.2**)
- matters requiring no further assessment in the EIS (refer to **Section 6.3**).

For the matters requiring further assessment in the EIS, **Section 6.2** identifies whether detailed or standard assessment is required (as defined by Appendix D of SSD Scoping Report Guideline). **Appendix 1** presents a Scoping Summary Table showing the outcome of the scoping stage review of matters as required under the SSD Scoping Report Guidelines.

6.2 Matters Requiring Further Assessment in the EIS

The environmental, social and economic matters discussed in this section have been identified as key issues requiring further assessment as part of the EIS to fully understand the potential impacts and identify project-specific mitigation measures and/or alternatives. The relevant assessments will be undertaken in consideration of the Wind Energy Guideline (DPE, 2016a).

6.2.1 Visual Amenity

A Preliminary Visual Impact Assessment (PVIA) has been undertaken by Moir Landscape Architecture Pty Ltd (Moir) in accordance with the requirements of the Visual Bulletin. This section provides a summary of the outcomes of the PVIA with the full report provided in **Appendix 3**.

The Project Area comprises a largely flat, sparsely vegetated floodplain which is characteristic of the Hay Plains. Extensive areas within and surrounding the Project Area have been cleared for agricultural purposes, with patches of remnant vegetation scattered throughout the Project Area. The Project will be visible from both Host and non-associated dwellings which will be a key focus of the detailed Landscape and Visual Impact Assessment (LVIA) in the EIS.

As outlined in **Section 5.0**, BayWa r.e. undertook community consultation during the scoping phase with landholders within and surrounding the Project Area. Feedback from information sessions and interviews identified comparatively little community concern regarding visual impacts, citing that the Project's remote location and distances from non-associated dwellings. However, two respondents raised concern that the Project could impact upon natural features of the landscape that have high community value. Consultation with these landholders will continue through the development of the detailed LVIA and broader EIS.

Additionally, while not raised as a key issue during community consultation, potential visual impacts to the landscape values of the Oolambeyan National Park (including cumulative impacts) will also be subject to further assessment in the detailed LVIA.

6.2.1.1 Visual Magnitude Assessment

Visual magnitude is a key visual parameter in the preliminary assessment tool within the Visual Bulletin. The visual magnitude is determined by a ratio of turbine height and distance, determining the visual extent of WTGs relative to dwellings and key public viewpoints. This visual extent assists with identifying viewpoints that may require further assessment during the preparation of the EIS.

The Visual Bulletin provides a graph which provides an indication of where proponents should give detailed consideration to the visual impacts on dwellings or key public viewpoints associated with WTGs. In accordance with the Visual Bulletin, proposed WTGs below the 'black line' must be identified along with the dwellings or key public viewpoints. Applying the Visual Bulletin graph to the proposed WTG tip height of 300 m means that the 'black line' intersects at a distance of 4,000 m and the 'blue line' intersects at 5,900 m. The 'black' and 'blue' lines based on the current Project design are shown in **Figure 6.1**.

Within the 'black line' (0 – 4,000 m) there are seven dwellings, of which five are Host dwellings and two are non-associated dwellings (R4 and R5). Within the 'blue line' (4,001 – 5,900 m) there is one non-associated dwelling (R20). There are two additional non-associated dwellings (R7 and R16) located outside the 'blue line', but within 8,000 m of a WTG.

Figure 6.2 illustrates the Visual Zone of Influence Analysis, which indicates the theoretical number of WTGs that will be visible within the landscape. It should be noted the Visual Zone of Influence Analysis is preliminary only and is generated from topography mapping, which does not take into consideration other factors that would restrict views such as orientation, vegetation, distance, perspective, etc. It should also be noted that the Visual Bulletin preliminary assessment tools are not determinative, and rather provide early indication of where placement of WTGs will require further detailed assessment and justification. Further detailed assessment and justification will be completed in the LVIA.

Figure 6.1 Preliminary Assessment Tool 1: Visual Magnitude

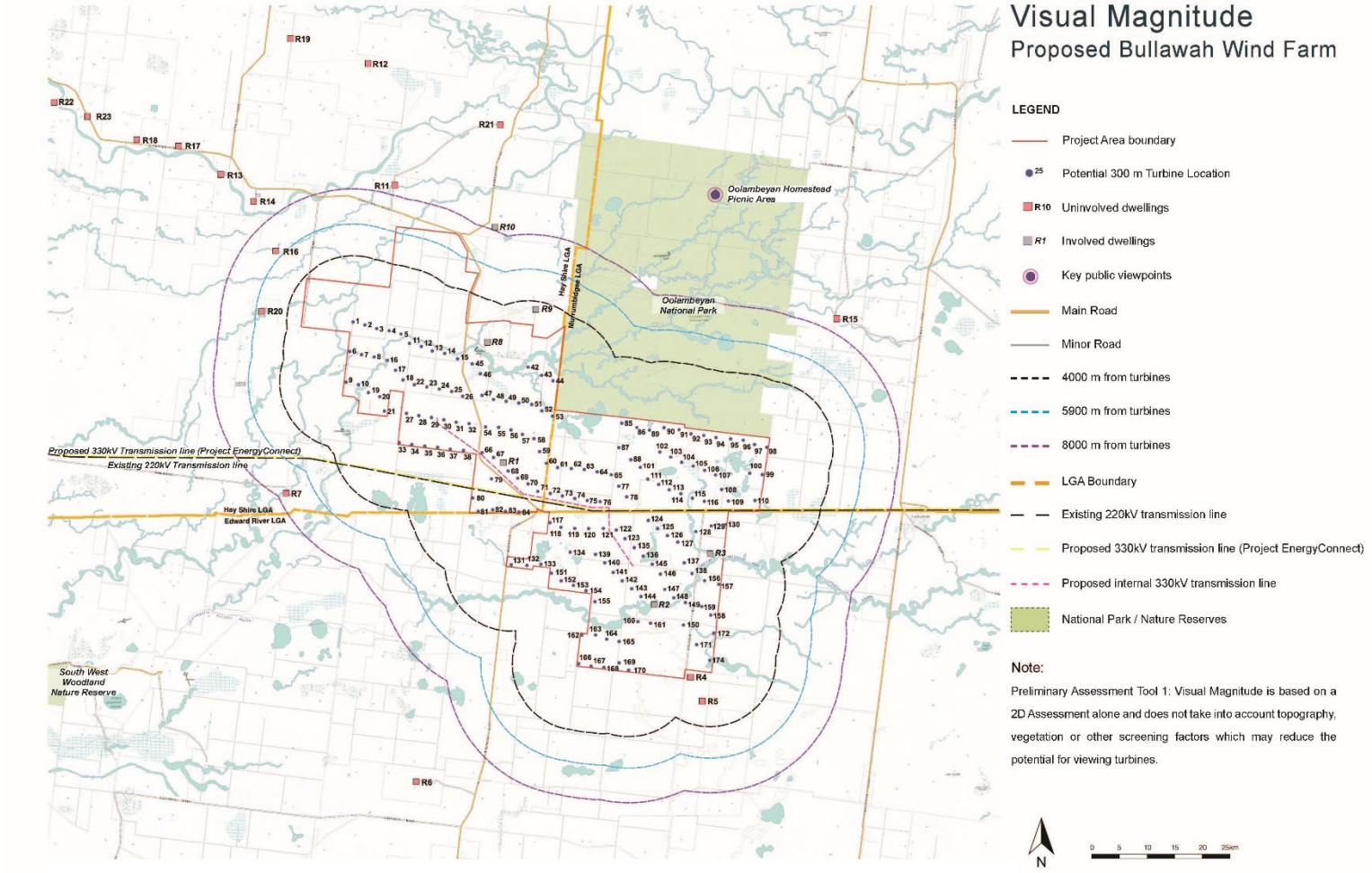
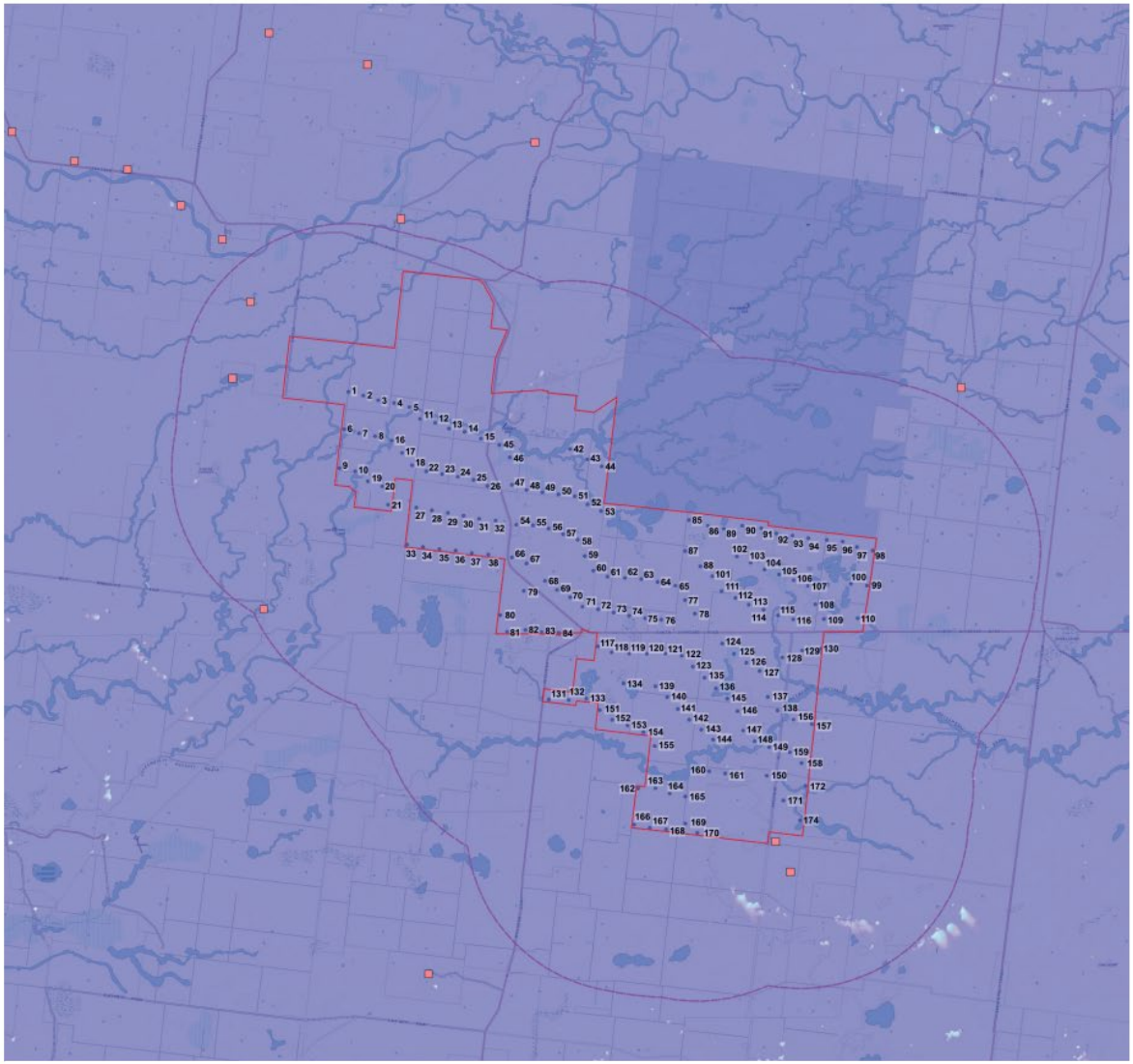


Figure 6.2 Zone of Visual Influence



Zone of Visual Influence
Blade Tip Height 300 m
Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- 25 Potential 300 m Turbine Location
- Uninvolved dwellings
- 8000 m from turbines

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

- 0
- 1-70
- 71-140
- 141 and above

Note:

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

N

0 5 10 15 20 25km

6.2.1.2 Multiple Wind Turbine Analysis

The Visual Bulletin outlines the requirements for the multiple wind turbine assessment which provides a preliminary indication of potential cumulative impacts arising from Project. To establish the degree to which dwellings or key public viewpoints may be impacted by multiple WTGs, the proponent must map into six sectors of 60° any proposed WTGs, and any existing or approved WTGs within eight (8) kms of each dwelling or key public viewpoint.

Figure 6.3 provides an overview of the number of 60° sectors visible from each of the dwellings identified within eight (8) kms. This gives an indication of the number of WTGs visible across the landscape, however, it should be noted that this is based on topography alone and does not take into consideration other factors such as orientation, vegetation, distance, perspective etc. which would restrict views of the WTGs. This may result in the WTGs being either completely screened from view or only partially visible (i.e. only the tip of the WTG may be visible). It is noted that the Multiple Wind Turbine Tool does not take into account topography, vegetation or other screening factors which may reduce the potential for viewing turbines.

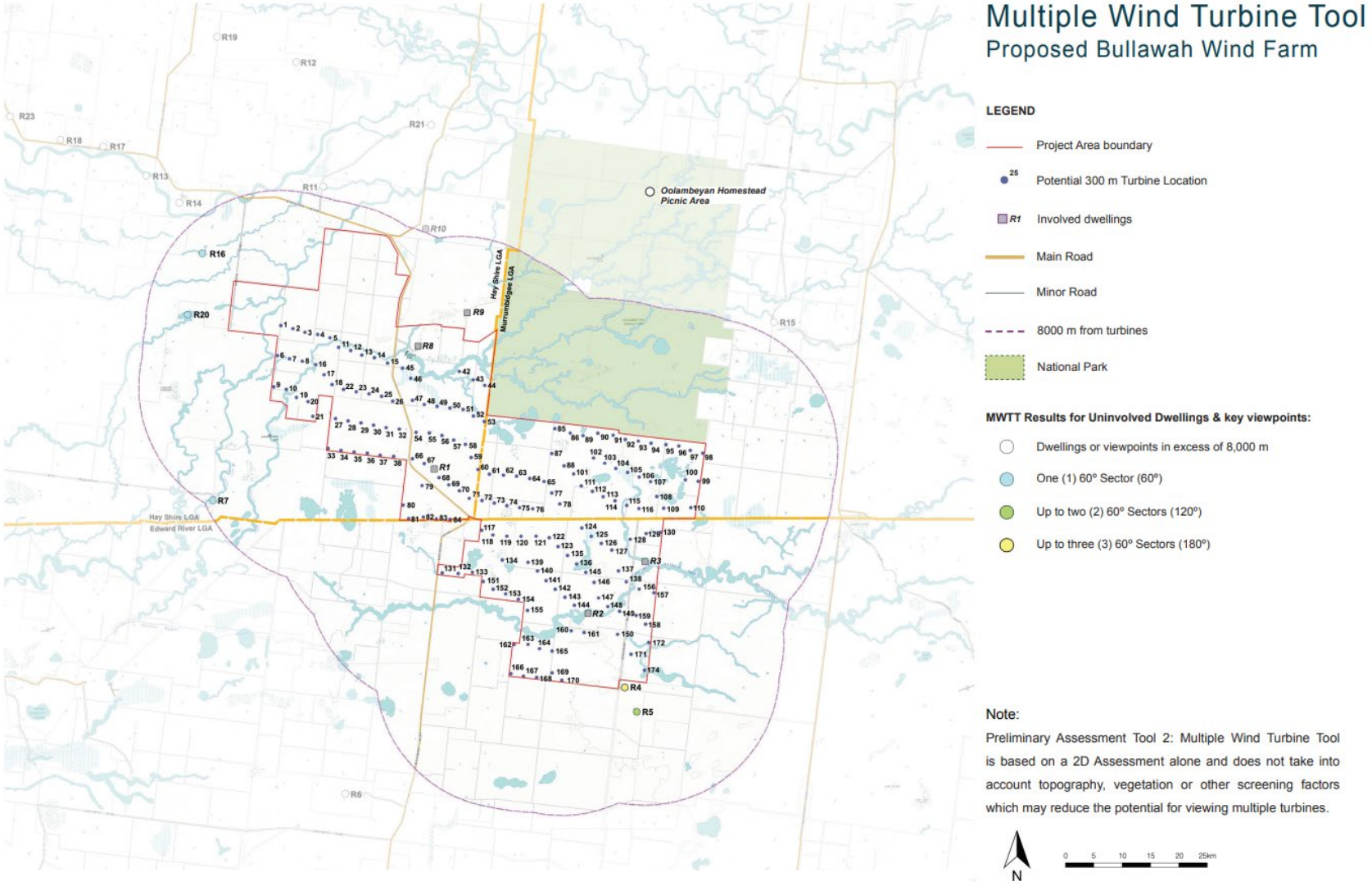
The PVIA notes that there are five (5) non-associated landholder dwellings that will have WTGs in more than at least one 60° sector. Of the five dwellings identified:

- one (1) dwelling (R4) has WTGs in three 60° sectors
- one (1) dwellings (R5) has WTGs in two 60° sectors
- three (3) dwellings (R7, R16 and R20) have WTGs in up to one 60° sector.

It is noted that both R4 and R5 are non-habitable structures but have been assessed in this Scoping Report as dwellings. Additionally, the preliminary site assessment undertaken to support the PVIA indicates that existing vegetation would partially reduce visibility from each of the five non-associated receiver locations identified above.

The Oolambeyan Homestead Picnic Area within Oolambeyan National Park is located more than eight (8) km from the WTGs and is therefore not expected to have any 60° sector views.

Figure 6.3 Multiple Wind Turbine Tool



6.2.1.3 Landscape Visual Impact Assessment

The detailed LVIA will be prepared in accordance with the requirements of the Visual Bulletin which comprises three main steps:

- preparation of visual baseline study inputs, including consulting the community on aspects of the baseline study
- establishing visual influences zones from viewpoints using data collected in the baseline study
- visual performance evaluation requiring application of visual performance objectives to the proposed WTG layout.

The detailed LVIA will also include:

- a detailed assessment of the Project layout with consideration to all influencing factors such as topography, relative distance, perspective, orientation and existing vegetation that may obscure views of the Project
- an assessment of cumulative visual impacts associated with other approved and proposed renewable energy projects in the surrounding locality
- consultation with potentially impacted landholders
- ground truthing, photography and photomontages of the Project
- a description of the proposed mitigation measures to reduce visual impacts.

Potential mitigation measures to reduce visual impacts may include, but will not necessarily be limited to:

- removal of WTGs from the Project or relocation of WTGs
- screening and/or supplementary planting
- night lighting of ancillary infrastructure being limited to low-level lighting for security, night time maintenance and emergency purposes
- consideration of WTG and Project infrastructure colour and design during final commercial tender process to minimise visibility and contrast
- entering into negotiated agreements with impacted landholders.

6.2.2 Noise and Vibration

A preliminary noise assessment has been undertaken by Marshall Day Acoustics Pty Ltd (Marshall Day) in accordance with the Noise Bulletin. The results of the preliminary noise assessment are summarised below, with the full report provided in **Appendix 4**.

As a wind turbine model with the proposed Project specifications is not yet commercially available, an alternative turbine model with slightly altered dimensions (for which manufacturer's noise data is currently

available) was used for the purposes of the preliminary noise assessment. [1] A candidate turbine model (or models) with specifications consistent with the Project design would be used for the purposes of the detailed noise assessment in the EIS.

6.2.2.1 Potential Noise and Vibration Impacts

The Noise Bulletin provides a baseline noise criterion of 35 dB(A) or 5 dB(A) above the background noise level at each integer wind speed for non-associated dwellings (whichever is greater). The Noise Bulletin enables the baseline criteria to be higher for host or associated dwellings. It is noted that background noise level monitoring conducted as part of the detailed EIS process may result in an increase in the noise assessment criteria for the Project above that of the 35 dB(A) baseline noise criterion, however this is unlikely given the remoteness of the Project Area.

The preliminary noise assessment assumes a turbine sound power level of 107.3 dB(A), including 1 dB for test uncertainty, which is considered typical of noise emissions from comparable multi-MW WTG models. The preliminary noise assessment includes modelled noise predictions for all dwellings within 12 km of a proposed WTG. The modelling adopted a single worst-case scenario with emission source values being based on wind speeds of 15 m per second (m/s) at hub height, with wind direction travelling from the WTG to the dwelling. The results of the preliminary noise modelling are summarised below:

- Modelled noise levels remained below 35 dB(A) at all non-associated dwellings (refer to **Figure 6.4**). The highest noise level at any non-associated dwelling would occur at R4, a non-habitable structure, where noise levels of up to 32.7 dB(A) were predicted. Noise predictions were below 30 dB(A) at all other non-associated dwellings.
- Modelled noise levels remained below 45 dB(A) at all Host dwellings. The highest noise level would occur at R1, where noise levels of up to 43.0 dB(A) were predicted (refer to **Figure 6.4**).

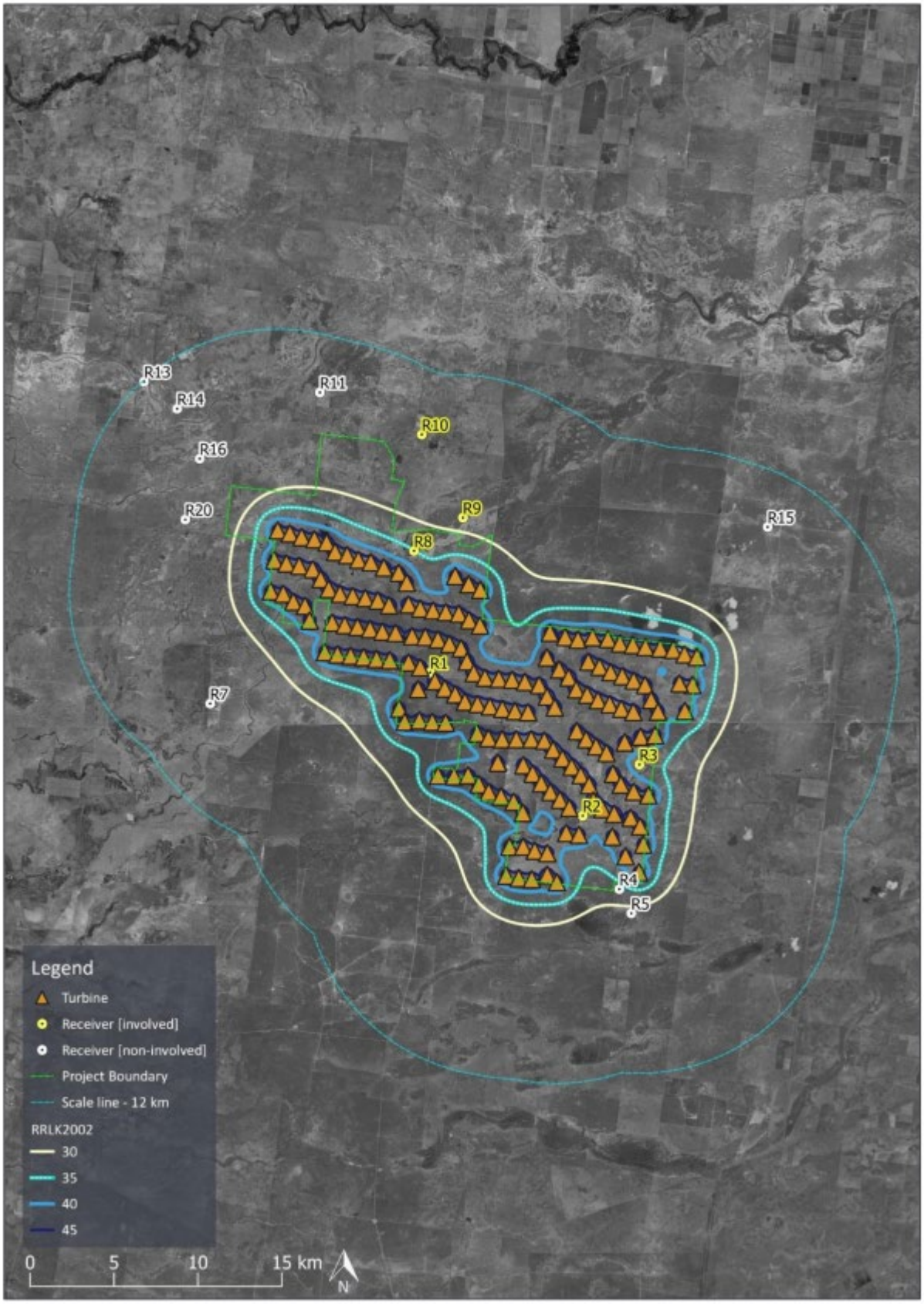
The preliminary noise assessment also indicates that as calculated low frequency noise levels remain below the applicable thresholds for both Host and non-associated dwellings, no adjustments for special noise characteristics are applicable under the Noise Bulletin.

This preliminary analysis and the further detailed assessment to be undertaken as part of the EIS will help inform the detailed design of the Project and seek to minimise any significant noise impacts. This may include measures such as modifications to the WTG layout or the development of a mitigation strategy for affected non-associated dwellings.

The EIS assessment will also assess construction phase impacts including on-site construction noise sources and road traffic noise impacts.

[1] The candidate turbine model utilised in the preliminary noise assessment has a rotor diameter of 162 m and a blade tip height of 281 m, while the indicative WTG dimensions for the Project include a rotor diameter of 200 m and a blade tip height of 300 m. Both have a hub height of 200 m.

Figure 6.4 Highest predicted noise levels (hub height wind speed of 15 m/s or greater)



6.2.2.2 Noise and Vibration Impact Assessment Methodology

A detailed Noise and Vibration Impact Assessment (NVIA) will be prepared as part of the EIS in accordance with the Noise Bulletin (DPE, 2016c), NSW EPA Noise Policy for Industry (NPfI) (EPA, 2017), Interim Construction Noise Guideline (DECC, 2009), NSW Road Noise Policy (DECCW, 2011) and Assessment Vibration: A technical Guideline (DECC, 2006).

The NVIA will:

- establish the relevant level of background noise
- provide predictive noise modelling of the Project's construction and operational activities
- assess the road traffic noise during construction and operational activities
- assess any vibration impacts at sensitive receivers, and
- identify any reasonable and feasible mitigation and management measures.

Reasonable and feasible mitigation and management measures for noise will be considered as part of the NVIA process and may include, but will not necessarily be limited to:

- deletion of WTGs from the Project or repositioning of WTGs
- fixed construction noise sources such as concrete batching plant, generators and compressors being located at the maximum practicable distance to the nearest non-associated dwellings, where practicable
- investigate alternative construction processes where feasible and reasonable to reduce noise
- implement a Construction Environmental Management Plan (CEMP), including regular updates to the local community
- entering into negotiated agreements with impacted landholders.

6.2.3 Biodiversity

Biodiversity is a key consideration of the Project design and assessment work that commenced in mid-2022 aiming to progressively gather information to inform the Project design process, assisting to avoid and minimise impacts.

A Biodiversity Constraints Assessment (BCA) was undertaken in May/June 2022 incorporating desktop analysis, vegetation mapping and a preliminary site inspection. The BCA identified potential ecological constraints present within the Project Area listed under the BC Act and the EPBC Act including Plant Community Types (PCTs), threatened species, populations or threatened ecological communities (TECs). The BCA also outlines potential direct, indirect, SAII and prescribed impacts that may result from the Project.

The BCA is provided in **Appendix 5** of this Scoping Report, with the key aspect summarised in the subsequent sections below.

6.2.3.1 Potential Vegetation Communities

Plant Community Types

A review of baseline NSW vegetation mapping of the Riverina region was undertaken as part of the BCA, which identified 20 PCTs within the Project Area. The site visit confirmed the likely occurrence of these PCTs, however their distribution across the Project Area differed to that depicted in the baseline mapping. The presence and extent of PCTs within the Project Area is outlined in **Table 6.1**.

Table 6.1 Preliminary Plant Community Types and their Extent in the Project Area

Plant Community Type		BC Act	EPBC Act	Area within the Project Area (ha)
-	Non-native vegetation	-	-	861.70
1	PCT: 7 – River Red Gum – Warrego Grass – herbaceous riparian tall open forest wetland mainly in the Riverina Bioregion	-	-	4.50
2	PCT: 9 – River Red Gum – wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion	-	-	0.60
3	PCT 10: River Red Gum – Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	319.78
4	PCT: 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	9.20
5	PCT 13: Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	233.70
6	PCT: 15 - Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in southwestern NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	3.47
7	PCT 17: Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	1,726.22
8	PCT: 24 - Canegrass swamp tall grassland wetland of drainage depressions: lakes and pans of the inland plains	-	-	137.89

Plant Community Type		BC Act	EPBC Act	Area within the Project Area (ha)
9	PCT: 26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Weeping Myall Woodlands	473.58
10	PCT: 28 - White Cypress Pine open woodland of sand plains: prior streams and dunes mainly of the semi-arid (warm) climate zone	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion	-	3,307.40
11	PCT: 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	-	Natural Grasslands of the Murray Valley Plains	6,562.32
12	PCT: 45 - Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	-	Natural Grasslands of the Murray Valley Plains	39.92
13	PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	-	Natural Grasslands of the Murray Valley Plains	10,545.13
14	PCT: 70 - White Cypress Pine woodland on sandy loams in central NSW wheatbelt	-	-	1,030.08
15	PCT: 153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	*Acacia loderi* shrublands	-	1.68
16	PCT 160: Nitre Goosefoot shrubland wetland on clays of the inland floodplains	-	-	174.35
17	PCT 164: Cotton Bush open shrubland of the semi-arid (warm) zone	-	-	7,161.24
18	PCT 165: Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone	-	-	329.55
19	PCT: 182 - Cumbungi rushland wetland of shallow semi-permanent water bodies and inland watercourses	-	-	0.34
20	PCT 216: Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion	-	-	69.21

Threatened Ecological Communities

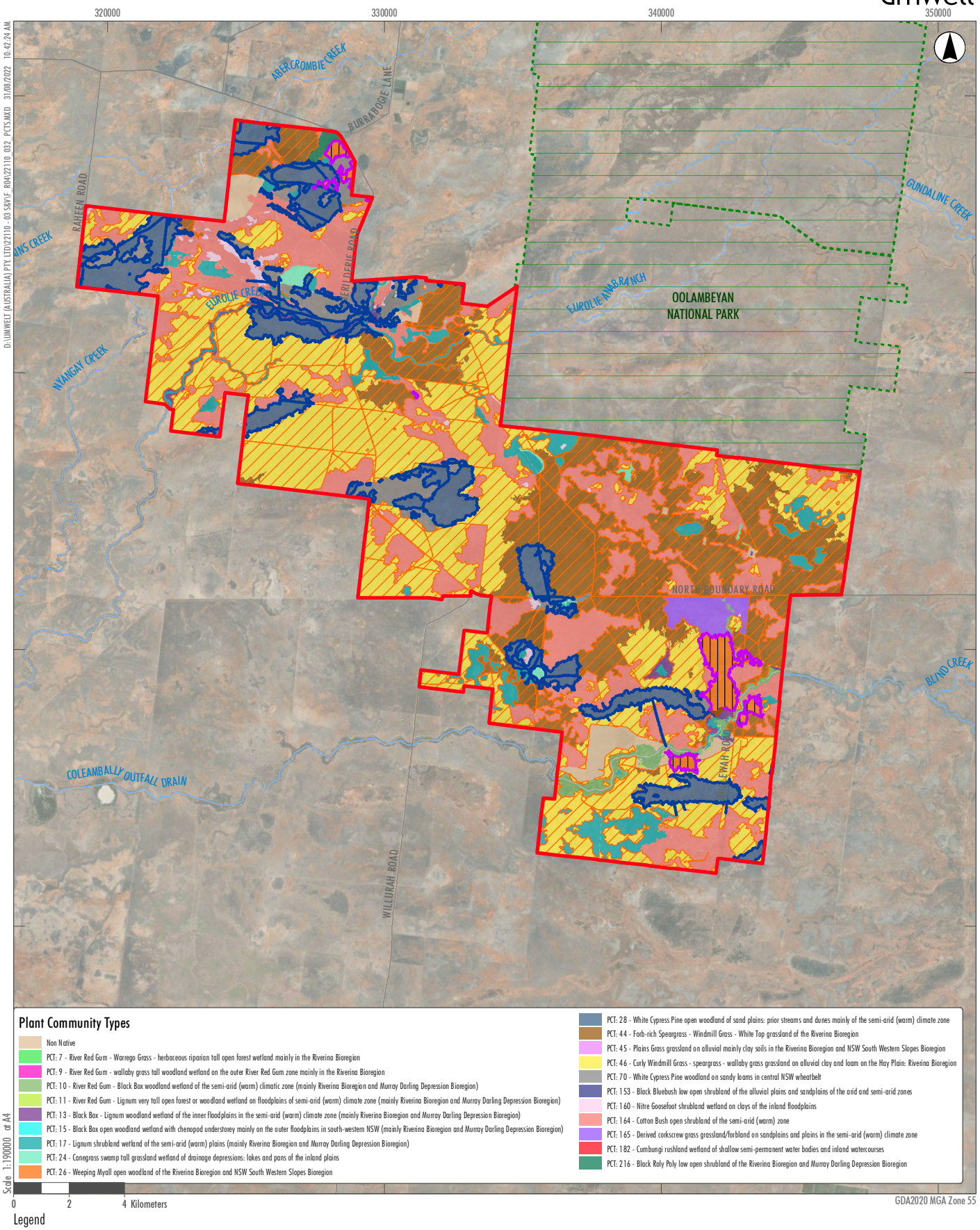
Prior to the site visit, the desktop assessment identified nine (9) TECs with a moderate or higher likelihood of occurring within a 30 km radius of the Project Area. After the site visit, four (4) were determined as having a high likelihood of occurrence within the Project Area. The nine (9) TECs identified in the desktop assessment as potentially occurring within the Project Area are replicated from Table 3.3 of the BCA as **Table 6.2**. Further information regarding each of the four (4) TEC determined as having high likelihood of occurrence is provided in Section 3.4.2.1 of the BCA.

Table 6.2 Potential Threatened Ecological Communities in the Project Site

Threatened Ecological Community	BC Act Listing	EPBC Act Listing	Entity with the potential for Serious and Irreversible Impact (SAII)	Likelihood of Occurrence
Acacia loderi shrublands	Endangered	Not listed	No	Moderate
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Endangered	Not listed	No	Moderate
Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions	Endangered	Not listed	Yes	Moderate
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Not listed	Endangered	No	Moderate
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Not listed	Endangered	No	Moderate
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Endangered	Not listed	No	Moderate
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered	Not listed	No	High
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion	Endangered	Not listed	No	High
Weeping Myall Woodlands	Not listed	Endangered	No	High
Natural Grasslands of the Murray Valley Plains	Not listed	Critically endangered	No	High

The desktop assessment and vegetation mapping undertaken as part of the BCA is preliminary and will require further surveys as part of future biodiversity assessment carried out to support the EIS. As detailed vegetation surveys and analysis across the Project Area has not been carried out to date, the presence of other TECs occurring within the Project Area cannot be discounted.

Figure 6.5 below illustrates the PCTs and TECs within the Project Area.



Legend

- Project Boundary
- Road
- Watercourse
- National Parks (NPWS Estate)

BC Act

- Acacia loderi shrublands
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion

EPBC Act

- Natural Grasslands of the Murray Valley Plains
- Weeping Myall Woodlands

FIGURE 6.5

Plant Community Types and Threatened Ecological Communities within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019),

6.2.3.2 Indicative Clearing of Native Vegetation

Based on the information above and the indicative Project layout (incl. ancillary infrastructure) represented in **Figure 3.1** of this report, the estimated area of native vegetation that would be cleared as a result of the Project is 1012.6 ha. This value is indicative only, and subject to change as Project designs progress and biodiversity assessment works continue. The disturbance footprint and hence the likely area of native vegetation that would be cleared as a result of the Project will be confirmed during the EIS.

6.2.3.3 Matters of National Environmental Significance

The EPBC Act provides protection of the environment from actions proposed to 'have the potential to significantly impact on MNES or the environment of Commonwealth land'. A search of the Commonwealth PMST was undertaken as part of the BCA on 16 June 2022. The search included a 30 km buffer from the indicative Project Area as at June 2022. The search results are summarised below in **Table 6.3** and a record of the PMST report is provided in Appendix A of the BCA.

It is noted that the Project Area was subsequently reduced as part of the avoidance and minimisation strategy outlined in **Section 3.9**. As such, **Table 6.3** and Appendix A of the BCA provide a precautionary summary of MNES of potential relevance to the Project.

Table 6.3 Matters of National Environmental Significance

MNES	Relevance to Development
World Heritage Properties	0
National heritage properties	0
Wetlands of international importance	4 (tributaries only located within buffer area)
Threatened ecological communities	5
Threatened species	27
Migratory species	10
State and territory reserves	4
Commonwealth marine area	0
Commonwealth Land	6
The Great Barrier Reef Marine Park	0

Surveys to determine the presence and likelihood of impacts to MNES would be undertaken during the preparation of the EIS. Regardless, it is understood that the Project would be referred to the Commonwealth DCCEEW. The purpose of this referral to DCCEEW is to determine whether the proposed action (i.e. the Project) will need formal assessment and approval under the EPBC Act. The referral provided to DCCEEW would be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be taken. In this case, the referral would be made even though the action may not have a significant impact, and potential impacts are uncertain.

6.2.3.4 Threatened Species Survey Requirements

All BAM assessments require extensive field surveys including the collection of floristic data, vegetation mapping and targeted seasonal species-credit species surveys. As outlined in Section 4 of the BCA, the Biodiversity Assessment Method Calculator (BAMC), BioNet Atlas records, and EPBC Protected Matters Search Tool (PMST) were used to derive a list of candidate species that would likely require survey and assessment in accordance with the BAM.

Threatened flora and fauna species-credit-species which would likely require survey and assessment for the Project are detailed in **Table 6.4** and **Table 6.5** respectively.

Table 6.4 Threatened Flora Species Credit Species Likely Requiring Survey

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flora																	
Austrostipa wakoolica	E	E	Alluvial plains and plains	South of the Murrumbidgee River	No												
Claypan Daisy *(Brachyscome muelleroides)*	V	V	Floodplains or wetland - grassland communities on grey-brown or red-brown clays and claypans	East of the Cobb Highway and south of Griffith	Yes												
Mossgiel Daisy *(Brachyscome papillosa)*	V	V	-	-	No												
Calotis moorei	E	E	NA	NA	Yes												
Bindweed *(Convolvulus tedmoorei)*	E	-	-	-	Yes												
Spike-Rush *(Eleocharis obicis)*	V	V	NA	NA	No												
Yellow Gum *(Eucalyptus leucoxylon subsp. pruinosa)*	V	-	-	-	No												
Winged Peppercress *(Lepidium monoplocoides)*	E	E	-	-	No												
Lanky Buttons *(Leptorhynchos orientalis)*	E	-	-	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chariot Wheels *(Maireana cheelii)*	V	V	Heavy grey clay soils and claypans or shallow depressions	West of Darlington Point, west of Jerilderie	No												
Austral Pillwort *(Pilularia novae-hollandiae)*	E	-	-	East of Deniliquin	Yes												
Turnip Copperburr *(Sclerolaena napiformis)*	E	E	-	Hay Plain	No												
Slender Darling Pea *(Swainsona murrayana)*	V	V	-	-	No												
Red Darling Pea *(Swainsona plagiotropis)*	V	V	-	Hay Plain	No												
Silky Swainson-pea *(Swainsona sericea)*	V	-	-	-	No												

Table 6.5 Threatened Fauna Species Credit Species Likely Requiring Survey

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Australian Bustard (*Ardeotis australis*)	E	-	-	-	No												
Bush Stone-curlew (*Burhinus grallarius*)	E	-	Fallen/standing dead timber including logs	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
White-Bellied Sea-Eagle (*Haliaeetus leucogaster*)	V	-	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	-	No												
Little Eagle (*Hieraaetus morphnoides*)	V	-	Nest trees - live (occasionally dead) large old trees within vegetation)	-	No												
Southern Bell Frog (*Litoria raniformis*)	E	V	NA	NA	No												
Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)	V	-	Living or dead tree with hollows greater than 10cm diameter	-	No												
Square-tailed Kite (*Lophoictinia isura*)	V	-	Nest trees	-	No												
Southern Myotis (*Myotis macropus*)	V	-	Hollow bearing trees Within 200 m of riparian zones or waterbodies Bridges, caves or artificial structures within 200 m of riparian zone or waterbodies	-	No												
Barking Owl (*Ninox connivens*)	V	-	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground	-	No												
Plains-wanderer (*Pedionomus torquatus*)	E	CE	Important Habitat Mapping	-	Yes												
Koala (*Phascolarctos cinereus*)	E	E	Areas identified via survey as important habitat	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Regent Parrot (*Polytelis anthopeplus monarchoides*)	E	V	Living or dead *E. camaldulensis* with hollows greater than 5 cm diameter, greater than 5 m above the ground OR trees with DBH of greater than 40 cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee	Within 10 km of the junction of the Murray River	No												
Superb Parrot (*Polytelis swainsonii*)	V	V	Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5 cm diameter	-	No												
Masked Owl (*Tyto novaehollandiae*)	V	-	Living or dead trees with hollows greater than 20 cm diameter	-													

6.2.3.5 Potential Impacts

The BAM requires the assessment of discrete types of impacts on biodiversity values resulting from proposed development during both construction and operational phases. Based on the findings of the desktop assessment and site inspection undertaken as part of the BCA, the potential impacts to biodiversity from the Project are detailed in **Table 6.6** below. The purpose of **Table 6.6** is to provide a preliminary overview of direct, indirect, prescribed and SAII that could theoretically occur as a result of the Project, and which will therefore require detailed assessment in the BDAR.

Table 6.6 Potential impacts associated with the Project

Impact Type	Potential Impact	Details
Direct impact	Removal of native vegetation	• The Project may result in the removal of native vegetation, including TEC listed under both the BC Act and EPBC Act. Vegetation removal that may be required for the proposed works would likely contribute to further fragmentation of native vegetation communities within the locality. • Removal of grassland habitat may impact suitable habitat for Plains-wanderer known to occur within the Project Area. • Hollow-bearing trees provide habitat for threatened species such as forest owls, woodland and forest birds and microbats, which may occur within the Project Area. As such, the proposal has the potential to remove these tree hollows impacting on threatened species that may utilise them as habitat. • Construction of wind turbines and other infrastructure may clear logs and debris used by threatened flora and fauna species predicted to occur within the Project Area.
	Removal of threatened species and their habitat	
	Fauna mortality	
Indirect impacts	Inadvertent impacts on adjacent habitat or vegetation	• Inadvertent disturbance to native vegetation and threatened species habitat may occur during construction and operational phases of the Project. • Priority weeds are likely to occur in parts of the Project Area. Continued weed invasion and encroachment could have potentially severe consequences for the habitat of flora and fauna occurring in the area. • Potential sediment, nutrient and pollutant run-off into adjacent vegetation and fauna habitat. • Noise and vibration disturbances to fauna. • Fire mitigation strategies may result in changes to fire regime across the Project Area. Changes to fire regime is known to negatively impact Plains-wanderer and its habitat.
	Reduced viability of adjacent habitat due to edge effects	
	Reduced viability of adjacent habitat due to noise, dust, or light spill	
	Transport of weeds and pathogens from the site to adjacent vegetation	
	Changed fire regimes	
Prescribed impacts	Impacts from wind turbine strike	• The operation of wind turbines has the potential to directly impact upon threatened birds and bats. Direct impact would take the form of birds and bats being struck by the turbine blades when moving within or through the wind farm. • The Project may create a barrier to movement across the landscape.
	Impacts to water bodies, water quality and hydrological processes	
	Impacts to habitat connectivity	

Impact Type	Potential Impact	Details
	Impacts from vehicle strike	• The Project may create a barrier to movement longitudinally for some threatened bird species. • Increased vehicle movement during construction may increase risk of vehicle strike on ground-dwelling species such as Plains-wanderer, as well as protected species such as emus and kangaroos. • Construction of the wind farm may require the removal of natural or made-made waterbodies, or could alter subterranean or overland waterflows across the Project Area.
Serious and Irreversible Impacts (SAII)	As per examples listed above	• A number of entities with the potential for SAII could be present within the Project Area. • Important habitat mapping for the Swift Parrot, Regent Honeyeater and Migratory Shorebirds are not present within the Project Area. Important habitat mapping for the Plains-wanderer is also present within the Project Area. Mapped important habitat for Plains-wanderer is considered an SAII. • Notably, Plains-wanderer was also recorded onsite during recent bird and bat utilisation surveys. • The BAM assessment will likely require an assessment of SAII on Plains-wanderer, if not additional SAII entities.

6.2.3.6 Bird and Bat Utilisation Surveys (BBUS)

A bird and bat strike utilisation survey and assessment methodology (BBUSAM) has been developed to detail an appropriate bird and bat survey methodology that meets the requirements of the standard SEARs and NSW BAM, and to inform consultation with Government agencies including DPE and DCCEEW as part of the broader Environmental Impact Assessment (EIA) for the Project.

The BBUSAM was developed with reference to the standard SEARs for wind farm developments, the NSW BAM, and the Australian Wind Energy Association Wind Farms and Birds: Interim Standards for Risk Assessment (AusWea, 2005), has been developed to provide detailed information to inform a more refined estimate of the level of risk of blade strike to certain birds and bats within the Project Area, to meet the survey requirements of the abovementioned legislation and guidelines.

A desktop review was undertaken as a component of the BBUASM utilising a range of online resources which identified two threatened bat species (Southern Myotis - *Myotis macropus* and Corben's Long-eared Bat - *Nyctophilus corbeni*), and 31 threatened bird species as potentially being present within the Project Area. The recommended survey methods outlined in the BBUSAM would be adopted to ensure the appropriate assessment of these species is undertaken during the EIA for the Project.

Consultation with the Department of Planning and Environment - Biodiversity and Conservation Division (BCD) – South West Branch occurred during the Scoping stage of the project and to inform the development BBUSAM. Consultation with BCD and other relevant agencies will continue during the EIS.

Two rounds of bird and bat survey were undertaken in Autumn and Winter of 2022, which have been summarised below.

Autumn BBUS Results

A total of 10 vantage survey points were identified within the Project Area during the autumn bird and bat survey, conducted from 23-30 May 2022. Two vantage point (VP) surveys were completed at each of the VP location for each survey period.

Several threatened bird species were recorded during the surveys, including:

- White-fronted chat
- Black falcons
- Grey-crowned babbler
- Spotted harrier (outside of VP surveys)
- Plains wanderer (outside of VP surveys).

Additional non-listed raptor species were also identified during the surveys, including:

- Nankeen kestrel
- Black-shouldered kite
- Whistling kite
- Black kite
- Wedge-tailed eagle
- Brown goshawk
- Brown falcon
- Australian hobby.

A total of six bat acoustic monitoring devices (i.e. anabats) were also deployed at selected locations within the Project Area that comprised of ideal monitoring conditions to detect bat species. The results of the bat surveys are pending analysis, which will occur during the EIS.

Winter BBUS Results

A total of 10 vantage survey points were identified within the Project Area during the autumn bird and bat survey, conducted from 9-13 July 2022. Two vantage point (VP) surveys were completed at each of the VP location for each survey period.

Several threatened bird species were recorded during the surveys, including:

- White-fronted chat
- Black falcons
- Plains wanderer (in the vicinity of May sighting).

A total of three anabats were also deployed at selected locations within the Project Area that comprised of ideal monitoring conditions to detect bat species. [2] The results of the bat surveys are pending analysis, which will occur during the EIS.

Additional BBUS Surveys

Additional biodiversity surveys will be undertaken building on the survey effort undertaken to date throughout the EIS, in accordance with the BAM and EPBC Act. Details of the proposed additional biodiversity assessment is provided in **Section 6.2.3.7** below.

6.2.3.7 Additional Biodiversity Assessment

Additional detailed biodiversity surveys will be undertaken within the Project Area with a focus on the proposed development area and in the vicinity of proposed WTG and infrastructure locations. Following the completion of the surveys, a BDAR will be prepared. The BDAR will include:

- field surveys and GIS mapping:
    - PCT survey and GIS mapping
    - targeted species-credit survey
    - bird and bat utilisation survey
- results of the literature review
- methods and results of vegetation surveys including a vegetation community map (based on PCTs and including TECs)
- methods and results of surveys targeting species-credit species
- assessment of prescribed impacts
- outcomes of the calculator assessment identifying the credits generated by the PCTs (and ecosystem-credit species) and species-credit species
- relevant data and mapping for Agency submission including field sheets, figures and associated GIS files.

Potential mitigation measures to reduce biodiversity impacts may include, but will not necessarily be limited to:

- removal of WTGs from the Project or relocation of WTG to avoid areas of high value native vegetation (including TECs) as far as practicable
- implementation of a comprehensive biodiversity mitigation and management strategy to minimise the unavoidable impacts of the Project on biodiversity values, including:

[2] Fewer acoustic monitoring devices were deployed during the Winter survey, relative to other survey periods, due to reduced bat activity during colder months

- salvage of biodiversity features, including habitat resources (e.g. hollow logs, tree hollows, fallen timber and rocks/boulders) from areas to be cleared
- implementation of a pre-clearing procedures
- weed management
- bushfire management
- erosion and sedimentation control

- a biodiversity offset strategy.

6.2.4 Heritage

6.2.4.1 Aboriginal Heritage

A Preliminary Heritage Constraints Assessment (PHCA) has been prepared for the Project and is included in this Scoping Report as **Appendix 6.** A summary of the PCHA is provided below.

The Project Area encompasses lands within both the Hay and Griffith Local Aboriginal Land Council (LALC), and the Deniliquin LALC is in close proximity to the southwest of the Project. There are no known native title schedule, applications, determinations, or Indigenous Land Use Agreements over the Project Area. AHIMS database searches undertaken within the PHCA indicated that a total of 115 AHIMS registered sites were identified within 10 km of the Project Boundary, including:

- three (3) Aboriginal Resource and Gathering
- seven (7) Artefacts
- two (2) combinations of Artefact, Earth Mound
- five (5) combinations of Artefact, Hearth
- one (1) combination of Artefact, Hearth, Modified Tree (Carved or Scarred)
- one (1) Grinding Groove
- 85 Hearths
- two (2) combinations of Hearth, Aboriginal Resource and Gathering
- eight (8) Modified Tree (Carved or Scarred)
- one (1) Water Hole.

The majority of the sites listed above (96 in total) were identified in the vicinity of waterways within the Oolambeyan National Park. As the Project will avoid the Oolambeyan National Park and has applied a 300 m buffer to it, direct (and indirect) impacts are unlikely. Direct and indirect impacts to the remaining sites outside the Project Boundary are also unlikely but these matters would be further investigated during preparation of the EIS.

AHIMS Sites Within the Project Boundary

The results of the AHIMS search indicated that there are 13 Aboriginal sites registered within the Project Boundary. No Aboriginal places were identified within the Project area. A copy of the extensive AHIMS search results is provided in the PHCA, and a summary of registered AHIMS sites is presented in **Table 6.7**.

Table 6.7 AHIMS Sites within the Project Boundary

Name	ID	Site Type	Site Features
South Burrabogie 1.4	48-6-0134	Open Site	Artefact, Hearth
South Burrabogie 2	48-6-0139	Open Site	Artefact, Hearth
South Burrabogie 1.5	48-6-0135	Open Site	Artefact
CC5 (CORKILL 1994)	48-6-0130	Open Site	Grinding Groove
South Burrabogie 1.2	48-6-0132	Open Site	Artefact, Earth Mound
South Burrabogie 1.7	48-6-0137	Open Site	Water Hole
PEC-E-39	48-6-0161	Open Site	Artefact
South Burrabogie 1.3	48-6-0133	Open Site	Artefact, Hearth
South Burrabogie 1.1	48-6-0131	Open Site	Artefact, Earth Mound
South Burrabogie 3	48-6-0140	Open Site	Hearth
South Burrabogie 1.6	48-6-0136	Open Site	Artefact, Hearth
PEC-E-38	48-6-0160	Open Site	Artefact
South Burrabogie 1.8	48-6-0138	Open Site	Hearth

Site cards have been obtained for two (2) of these 13 AHIMS sites within the Project Boundary to gain an understanding of the nature and extent of each site, which are provided In the PHCA. Digital copies of site cards are not available for the other 11 AHIMS sites within the Project Boundary i.e. of the 13 sites, only two (2) digitised site cards were available.

In the absence of multiple digital site cards for AHIMS sites within the Project Boundary, three (3) additional site cards were obtained for AHIMS sites within 4 km of the Project Boundary (again the extent of digital copies of site cards available). These include sites 48-6-0162, 48-6-0163 and 48-6-0166, which were reviewed to provide more context around the Aboriginal cultural heritage for the Project Area and surrounding environment. Refer to the PHCA for these site cards.

The presence of these sites also indicates that an Aboriginal cultural heritage assessment or survey may have been undertaken in the area and this will be reviewed during the EIS phase. This information will assist to inform the pattern and distribution of the sites and will have implications for providing advice regarding the potential for other sites, at that later time. It is noted that the currently proposed wind turbine locations are at least 400 m from the identified AHIMS sites.

The AHIMS sites within the Project Boundary (and those recorded more broadly, as shown in the PHCA) demonstrate the presence of Aboriginal objects within the Project Area and the local area, and suggest that additional Aboriginal objects/sites may be present within the Project Area.

The abovementioned potential is normal for a development of this scale and locality. Direct and indirect impacts would be further investigated during the EIS phase of works following normal Aboriginal cultural heritage assessment practices. It is noted that the presence of Aboriginal objects (including registered AHIMS sites) does not preclude any impact occurring in the vicinity of these sites. Rather, impacts to heritage sites (including total or partial loss of a site) would require detailed assessment and mitigation (e.g. surface collection or salvage excavation prior to works occurring).

Given the known presence of Aboriginal sites within the Project Area, a detailed Aboriginal Cultural Heritage Assessment (ACHA) will be undertaken to assess potential impacts in accordance with the registered Aboriginal parties for the Project.

The ACHA will be undertaken in accordance with the following key guidelines:

- the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011)
- the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010a).

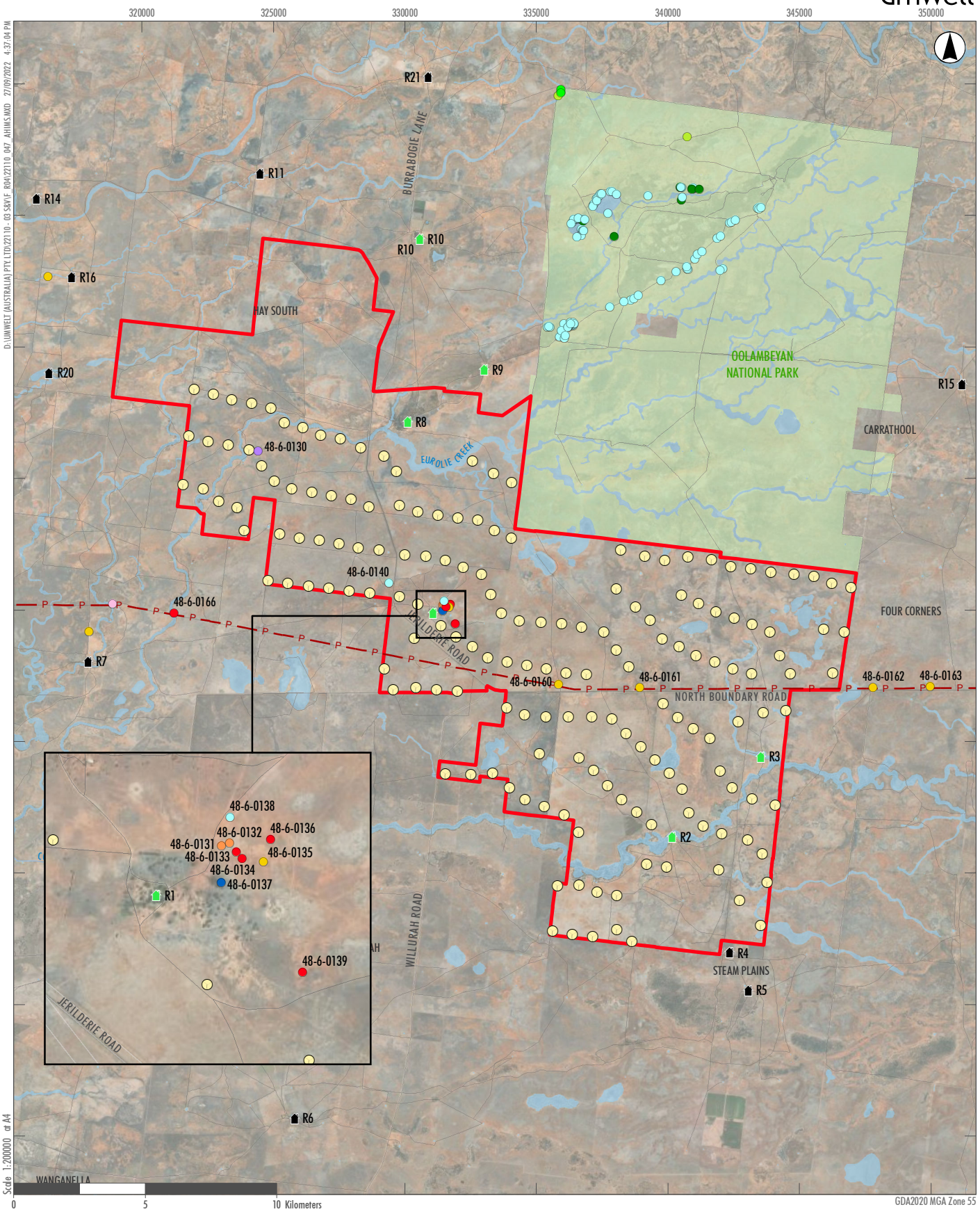
The ACHA will include consultation with the registered Aboriginal parties for the Project in determining and assessing impacts, developing and selecting options and mitigation measures, having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010b).

A range of management strategies may be available in relation to the Project that include varying levels of mitigation of identified sites or potential harm to Aboriginal cultural heritage. The micro-siting of infrastructure will allow for some flexibility in the management of Aboriginal cultural heritage. When impacts to sites or areas of archaeological potential are unavoidable, a strategy will be developed that involves implementing appropriate measures to manage and mitigate these impacts with reference to the archaeological and Aboriginal cultural significance of the sites/areas of potential.

6.2.4.2 Historic Heritage

Searches of the Hay LEP 2011, Conargo LEP 2013, Murrumbidgee LEP 2013 and NSW State Heritage Inventory were undertaken as part of the PHCA and no listed heritage items were identified within 10 km of the Project. Additionally, there are no heritage items within the Project Area listed on World, National or Commonwealth heritage registers. There are a number of local heritage sites located in the broader area surrounding the Project Area, however none of these identified local heritage sites are anticipated to be impacted by the Project.

Despite no registered non-Aboriginal heritage items being located within the Project Area, it is likely that a Historic Heritage Assessment (HHA) would be conditioned within the SEARs to support the EIS. The historic heritage assessment would assess the potential for unlisted heritage items and non-Aboriginal archaeological remains to be present within the Project area and evaluate the potential direct and indirect impacts of the Project. The HHA will be prepared with regard to the NSW Heritage Manual, relevant Heritage Council of NSW guidelines and with consideration of the principles contained in The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance (ICOMOS, 2013).



Legend

- Project Boundary
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- P Existing 220kV Electricity Transmission Line
- NPWS Estate
- Road
- Watercourse

AHIMS

- Aboriginal Resource and Gathering
- Artefact
- Artefact, Earth Mound
- Artefact, Hearth
- Artefact, Hearth, Modified Tree (Carved or Scarred)
- Grinding Groove
- Hearth
- Hearth, Aboriginal Resource and Gathering
- Modified Tree (Carved or Scarred)
- Water Hole

FIGURE 6.6

Heritage Sites

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

6.2.5 Traffic and Transport

Access to the Project Area is proposed via the existing road network. Primary access will likely be via the Sturt Highway, and/or Cobb Highway and then Jerilderie Road. Secondary access is proposed for North Boundary Road. The Sturt Highway (which goes through Hay) is directly north of the Project Boundary at a distance of >20 km. The Cobb Highway is situated ~20 km west of the Project Boundary (western most extent) while Jerilderie Road traverses the Project Area (north to south direction), until the intersection of North Boundary Road and Willurah Road. North Boundary Road crosses the middle section of Project Area (east to west direction). Additional access via Willurah Road is not planned but may be proposed as it is adjacent to the western side of the southern extent of the Project Boundary, running parallel in a north to south direction.

The preferred transport route of WTG components and other Project related materials will be confirmed via port and transport route assessment, to be prepared as part of the EIS. As noted in **Section 3.5**, a preferred port and transport route have not yet been established but several options are available as previously indicated in **Figure 3.2**.

It is expected that upgrades to local roads (secondary access routes) will be required to allow access for heavy vehicles (where considered suitable) prior to any deliveries occurring as part of the construction phase of the Project. There may also be some minor works required along the primary transport route from the selected port to facilitate the path of OSOM vehicles. However, it is noted that several other renewable energy developments within the South-West REZ may occur prior to the Project and routes used by those preceding projects utilised, with the required works being completed prior to this Project commencing.

Access tracks will be constructed on site to provide access to the proposed WTG locations (refer to **Figure 3.2**). The proposed delivery route, access tracks and level of construction/maintenance required will be confirmed and assessed during the preparation of the EIS. Existing access tracks within the Project Area will also be upgraded (where appropriate) to facilitate delivery of the WTGs and other heavy-duty equipment. All access tracks will be maintained during the construction phase of the Project.

The construction phase of the Project will result in increased traffic movements by both light vehicles transporting construction personnel and minor light construction materials, and also heavy vehicle movements (including OSOM vehicles) transporting the WTGs, blades and other heavy-duty equipment required for construction purposes. Traffic increases associated with the operational phase of the Project will be minimal and will generally only involve the movement of light vehicles transporting operational staff around the site intermittently.

A Traffic and Transport Impact Assessment (TTIA) and route assessment will be undertaken to assess the potential transport routes required for the construction of the Project and any potential impact to the road network. The assessments will be undertaken following relevant NSW Government guidelines and assessment standards including Guide to Traffic Generating Developments (RTA, 2002), Road Design Guide and relevant Austroads Standards and Austroads Guide to Traffic Management.

The TTIA will be include:

- a review and assessment of the existing road network
- a review of any previous traffic impact assessments undertaken for the surrounding area

- traffic counts in selected areas along the proposed traffic routes (if data is not readily available)
- a detailed assessment of the likely Project-specific and cumulative traffic impacts during the construction and operational phases of the Project (including intersection performance, capacity, and safety) and
- identification of any mitigation and management measures that may be required.

Potential mitigation measures to reduce traffic impacts may include, but will not necessarily be limited to:

- preparation of a Construction Traffic Management Plan (CTMP) that will outline the controls required during the construction phase and will be prepared in consultation with relevant roads authorities
- undertaking any necessary road upgrade works to facilitate access to the site and along the proposed transport route
- undertake consultation with relevant Councils regarding an infrastructure or maintenance agreement to cover any required mitigation works to manage the expected pavement impacts of the Project on the lower order, local government-controlled road links.

It is reiterated that other approvals would be required for the transport of wind turbines and associated infrastructure by OSOM vehicles, under National Heavy Vehicle Law. These requirements will be assessed via a route analysis study as part of the EIS.

6.2.6 Socio-Economic Impacts

A SISR has been undertaken by Umwelt in accordance with the scoping phase requirements of the SIA Guideline (DPIE, 2021e). The SISR has been provided in **Appendix 2** and is summarised in the subsequent section below.

6.2.6.1 Regional Setting

The Project is located within the Riverina Region of south-western NSW within the Hay Shire, Murrumbidgee, and Edward River LGAs. The Riverina Murray Region is a productive agricultural area characterised by highly valued rural and biodiversity lands, the Murray and Murrumbidgee rivers, and an interdependent network of distinctive communities.

The Project Area is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km southwest of the Project area, population 7,862) and Griffith (88 km northeast of the Project area, population 27,300). The closest townships are Conargo (50 km, population 188), Jerilderie (112 km, population 1,029), Coleambally (80 km, population 1,331) and Darlington Point (100 km, population 1016). Beyond these townships, isolated rural residential properties surround the Project Area to the north, south, east, and west.

Agriculture, forestry and fishing is currently the industry sector with the largest output for the Riverina and Murray Region, accounting for 23.7% of all output (worth $4,451.6m). In 2016, cereal crops (worth $746.3m) were the greatest agricultural commodity of the region, followed by livestock slaughterings (worth $571.9m).

6.2.6.2 Perceived and Likely Social Impacts

Feedback from the community and other stakeholders' engagement activities outlined in **Section 5.0** identified perceived social impacts from the Project. These social categories and perceived impacts are summarised in **Table 6.8** and will be subject to assessment as part of the SIA.

Table 6.8 Perceived Social Impacts

Category	Perceived Social Impact
Community and Way of Life	Changing land use and how people work
Community Cohesion	Change in community character and composition, causing division or conflict
Accessibility	Physical access to property and the transportation network, as well as access to reliable energy
Culture, Health, and Wellbeing	Impacts to connection to Country, as well as physical stress and anxiety resulting from uncertainty around Project commencement
Surroundings	Impacts on flora and fauna, particularly the Plains-Wanderer Fire management Visual amenity and views
Livelihoods	Continuity of agricultural productivity in the region Impacts to land value and the potential inability for people to continue to use their land as working properties
Decision Making Systems	Inability to meaningfully influence decision making process
Cumulative	Impacts caused by multiple concurrent projects, and the potential change in community dynamic

A key part of addressing the perceived social impacts identified in **Table 6.8** will be the stakeholder engagement program. BayWa r.e., with the support of Umwelt, will continue to implement the stakeholder engagement program to engage the community throughout the environmental assessment and approval process, and the operational life of the Project. This early engagement will inform the assessment of the social and economic impacts associated with the Project. The program has been designed in line with the following objectives:

- keep the community informed about the Project, its likely impacts and likely benefits, through the provision of accurate and timely information
- provide multiple opportunities and mechanisms for meaningful information exchange with stakeholders
- ensure that the team developing the Project fully understands the local context, including any local impacts that it may have or opportunities that it could provide
- integrate feedback received into the Project planning and design as far as possible
- build and maintain positive, trust-based relationships with the local community.

An SIA will be submitted with the EIS and will be prepared in accordance with the NSW SIA Guideline (DPIE, 2021e). Subsequent phases of the SIA program will involve the following key activities:

- A detailed update of the baseline social profile to ensure that any further baseline data relevant to the impacts identified is obtained.
- Further validation of the area of social influence and identification of affected communities and vulnerable groups.
- Provision of feedback to those consulted during the scoping phase on the outcomes and issues raised and communication of the Project SEARs (once issued), including an outline of the next steps in the assessment process and opportunities for community input.
- Further engagement with a range of community and stakeholder groups, including but not limited to near neighbours, host property owners, local government, community members, interest groups, local businesses and service providers. This consultation will focus on the detailed investigation into social impacts associated with the Project. Further, it will involve the provision of feedback on the outcomes of EIS technical studies and will provide opportunities for community input to the development of appropriate mitigation and enhancement measures to address impacts and residual effects.
- A comprehensive assessment and evaluation of social impacts against existing baseline conditions.

6.2.7 Hazards and Safety

The following section addresses the proposed approach to assessing potential hazards and safety impacts associated with the Project including aviation safety, electromagnetic fields (EMF), impacts to telecommunications, blade throw, shadow flicker, blade glint, bushfire threat, and potential hazards associated with the introduction of BESS facilities.

6.2.7.1 Aviation Safety

The Project, like all wind farms, will need to consider the potential for interaction with air services. WTG height and placement will consider potential safety hazards for aircraft including intrusion into the airspace and potential for effects on navigation instruments. Hay Airport is located approximately 36 km north west of the Project Area. There are also a number of small private airstrips and runways located within the vicinity of the Project Area which will be considered in the assessment.

The EIS will include an Aviation Impact Assessment (AIA) which will include the following specific requirements as advised by Airservices Australia:

- Aerodromes:
    - specify all registered/certified aerodromes that are located within 30 nautical miles (55.56 km) of the Project Area
    - nominate all instrument approach and landing procedures at these aerodromes
    - review the potential effect of the Project on the operational airspace of the aerodromes.
- Air Routes: nominate published air routes which are located near/over the Project Area and review potential impacts of the Project on aircraft using those air routes.

- Airspace: nominate the airspace classification where the Project Area is located.
- Navigation/Radar: nominate radar navigation systems with coverage overlapping the Project Area.

A risk assessment in relation to night lighting of the WTGs will also be undertaken in accordance with Australian Standard AS/NZS ISO 31000:2018 Risk Management – Guidelines.

During the development of the AIA, consultation will be undertaken with Airservices Australia, the Department of Defence, relevant local Councils and aerodrome operators.

6.2.7.2 Electromagnetic Fields

EMF are present where electric current flows, including overhead and underground transmission lines and substations and electrical appliances. The standard SEARs for wind farm developments require proponents to *"consider and document any health issues having regard to the latest advice of the National Health and Medical Research Council, and identify potential hazards and risks associated with electric and magnetic fields and demonstrate the application of the principles of prudent avoidance."*

The EIS will include an EMF assessment which will consider potential health issues and risks associated with EMF produced by the wind farm and associated electrical infrastructure within the Project Site in accordance with the ICNIRP Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (1998).

6.2.7.3 Telecommunications

Telecommunications and radar services (civil and meteorological) can be impacted by WTGs through electromagnetic interference (EMI).

As part of the preliminary constraint assessments undertaken to inform the design of the Project, a review of telecommunications services in the area was undertaken. This included point to point microwave links, meteorological radar, mobile voice-based communications, wireless and satellite internet services, broadcast and digital radio, and broadcast, digital and satellite television.

Appropriate buffer distances have been applied in the current Project layout to avoid potential interference from WTGs with these communication links.

The EIS will include an EMI Assessment which will address any impact to radiocommunication services within and surrounding the Project Site, as a result of the Project and identify any required mitigation measures.

6.2.7.4 Blade Throw

Blade throw typically involves the failure of the turbine rotor which has the potential to result in the turbine blade becoming detached from the turbine. This risk is addressed by the WTG design; however, an assessment will be undertaken for the Project. The blade throw assessment will consider the potential risk of blade throw associated with the proposed WTG layout.

The assessment will include:

- general review and assessment of the likelihood of blade throw occurring and typical blade throw distances

- calculation of the separation distance between WTGs and neighbouring dwellings and property boundaries
- consideration of mechanisms to reduce the likelihood of blade throw occurring, including:
    - relevant standards against which WTGs should be certified
    - typical overspeed and failsafe protection mechanisms
    - management and maintenance procedures, including regular inspections
    - provisions for blade replacement.

6.2.7.5 Shadow Flicker and Blade Glint

Shadow flicker is a moving shadow cast by the blades of a WTG from the sun which can cause a nuisance at surrounding dwellings and in rare cases can cause health impacts such as photosensitive epilepsy or motion sickness. Blade glint can result from sunlight reflecting off the white components of the WTGs. The risk of blade glint from WTG is low given majority of manufacturers treat the WTGs with non-reflective finishes to reduce the risk of this occurring.

The EIS will include a Shadow Flicker Assessment which will:

- review sensitive receiver locations
- estimate the annual hours of shadow flicker received at each dwelling
- identify any dwellings where there is potential for the shadow flicker duration to exceed the limits specified in the relevant guidelines
- identify the specific WTGs contributing to the shadow flicker for each dwelling
- assess the likely reduction in shadow flicker duration due to WTG orientation and cloud cover
- generate maps of theoretical and predicted actual shadow flicker duration
- consider the potential sources of conservatism in the assessment.

The Shadow Flicker Assessment will also include an assessment of blade glint.

As discussed in **Section 6.2.1**, a number of visual mitigation measures will be considered for the Project.

6.2.7.6 Preliminary Hazard Analysis

The Project will result in the introduction of a limited number of hazardous materials, including lithium ion batteries (LIBs), that present potential risks to the environment and public safety. Hazardous materials that are likely to be transported to the Project Area, stored and used at the Project Area and transported from the Project Area are presented in **Table 6.9** below.

Table 6.9 Project Hazardous Materials

Material	Dangerous Goods Class/Division and (Packing Group)	Phase(s) of Project
Lithium-Ion Batteries (LIBs)	9 (II)	Construction, Operations and Decommissioning
Unleaded Petrol	3 (II)	Operations
Diesel Fuel	C1	Construction, Operations and Decommissioning
Herbicides	9 (II)	Operations
Transformer Oil	-	Construction, Operations and Decommissioning
Aerosols	Class 2.1	Construction, Operations and Decommissioning
Solvents	3 (II)	Construction, Operations and Decommissioning

A preliminary risk screening for all hazardous materials and dangerous goods to be stored and transported to/from the Project will be undertaken during the EIS in accordance with Chapter 3 (Hazardous and Offensive Development*)* of *State Environment Planning Policy (Resilience and Hazards)* 2021 (Resilience and Hazards SEPP) to determine the requirement for a Preliminary Hazard Analysis (PHA).

Notwithstanding the preliminary risk screening process, it is anticipated that a PHA incorporating a Level 1 Qualitative Risk Analysis and Level 2 Semi-quantitative will be required to estimate the level of risk posed to surrounding off-site land users due to the large capacity of the proposed BESS.

During normal use LIBs are sealed and, unlike lead acid batteries, do not vent to the atmosphere during normal operation. However, if subject to abnormal heating (external or internal) or other abuse, flammable electrolyte and electrolyte decomposition products can vaporise, rupture the battery cell and be vented. Vented electrolyte and electrolyte decomposition products may ignite (resulting in fire or explosion) if exposed to an ignition source including sparks, open flames and LIB cells undergoing thermal runaway.

Thermal runaway occurs when the internal temperature of a LIB cell increases beyond its operating range leading to exothermic decomposition reactions generating additional heat. If the additional heat is not dissipated, the cell temperature is further elevated accelerating the process of decomposition and heat generation. LIBs are susceptible to thermal runaway which can be initiated by a range of mechanisms including electro-chemical abuse (e.g. from overcharging, over-discharging and over voltage charging), mechanical abuse (e.g. physical damage to cell causing a short circuit), thermal abuse (overheating from an external source), manufacturing defects (e.g. internal short circuits) and design faults (e.g. inadequate clearance between cells or modules to allow heat dissipation).

The vented gases from LIBs during thermal runaway can exceed 600ºC and are likely to include flammable (alkyl-carbonates, methane, ethylene, ethane, hydrogen gas) and toxic species (carbon monoxide, hydrogen fluoride), soot and particulates containing oxides of nickel, aluminium, lithium, copper and cobalt. The PHA will involve:

- A preliminary risk screening for all hazardous materials and dangerous goods to be stored and transported to/from the Project will be undertaken in accordance with Chapter 3 of the Resilience and Hazards SEPP.

- Risk classification and prioritisation and estimation of societal risk in accordance with Multi Level Risk Assessment (NSW Department of Planning, 2011).
- A qualitative risk assessment (for the Level 1 analysis) workshop to identify Project hazards that pose an off-site risk.
- Consequence (e.g. fire, explosion, toxic release) and frequency analysis (Level 2 analysis) for hazard scenarios identified as requiring further assessment in the qualitative risk assessment.
- Assessment of the Level 2 analysis results with respect to Hazardous Industry Planning and advisory Paper No 4 Risk Criteria for Land Use Planning (NSW Department of Planning, 2011).
- Consultation with Fire and Rescue NSW regarding fire and life safety systems as well as the unique challenges posed by BESSs during incident response.

The PHA will consider relevant contemporary standards and guidelines with respect to BESSs including:

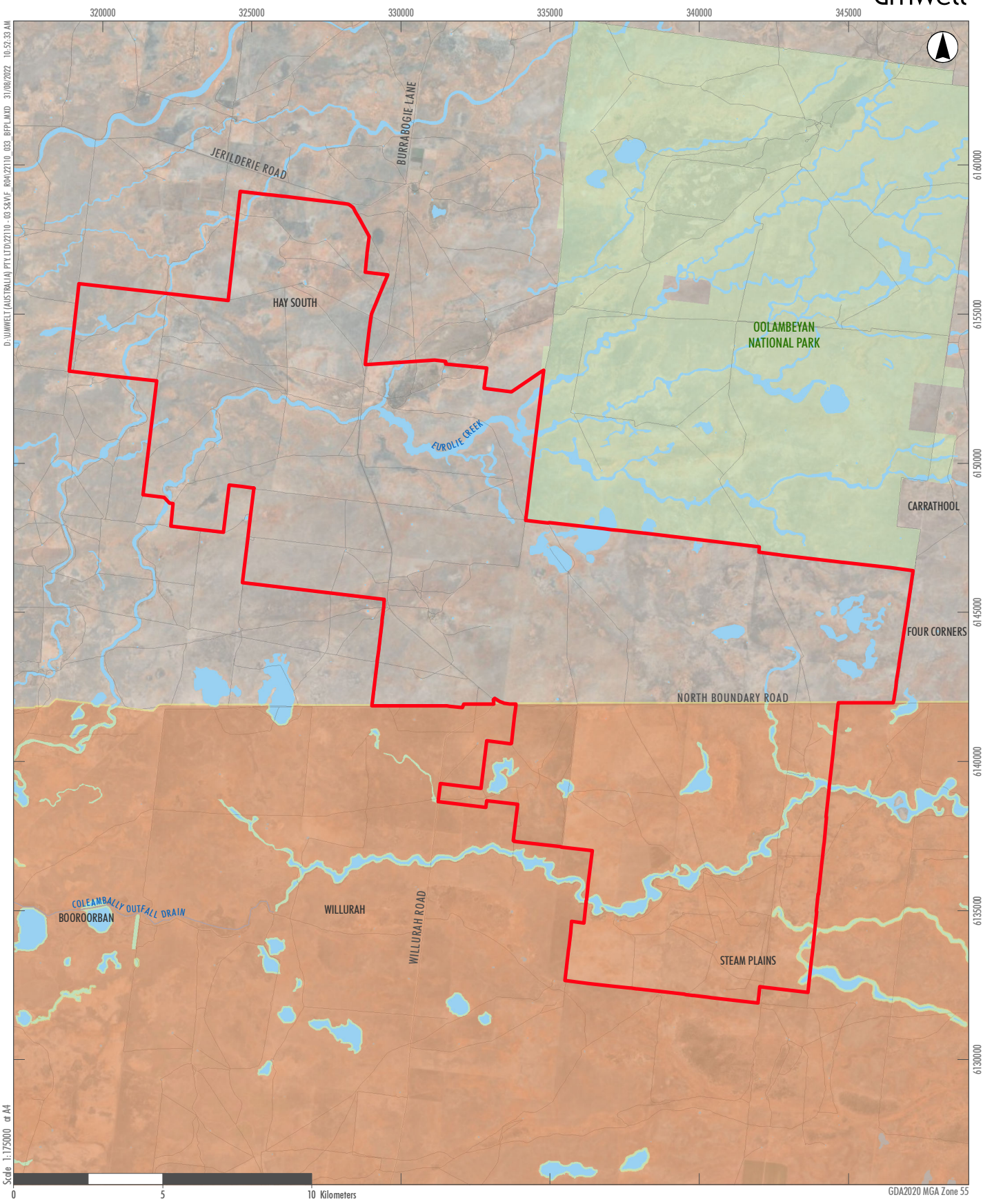
- UL 9540 Standard for Safety of Energy Storage Systems and Equipment, Underwriters Laboratory, 2020.
- UL 9540A Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems, Underwriters Laboratory, 2019.
- NFPA 855 Standard for the Installation of Stationary Energy Storage Systems, National Fire Protection Association, 2020.
- AS/NZS 5139:2019 Electrical Installations – Safety of battery systems for use with power conversion equipment, Standards Australia, 2019.
- Property Loss Prevention Data Sheet 5-33, Electrical Energy Storage Systems, FM Global, 2020.

6.2.7.7 Bushfire Hazard

The southern portion of the Project Area is identified as 'Vegetation Category 3' bushfire prone land under the NSW RFS Bushfire Prone Land Mapping Tool (refer to **Figure 6.7**).

Although portions of the Project Area have been subject to extensive clearing associated with agricultural land use there are areas of remnant vegetation, which form a potentially significant fuel load capable of sustaining and spreading bushfire. Areas of vegetation within the Project Area also represent a potential linkage between vegetated areas within and adjoining the Project Area, with the potential to support the spread of bushfire.

A bushfire threat assessment will be undertaken in accordance with the requirements of Planning for Bushfire Protection 2019 (PBP) (NSW Rural Fire Service, 2019). Consultation with the NSW RFS will also be undertaken during the preparation of the EIS.



Legend

- Project Boundary
- NPWS Estate
- Road
- Watercourse

Bushfire Prone Land Vegetation Category Mapping

- Vegetation Buffer ((100m to Category 1 Vegetation and 30m to Category 2 Vegetation)
- Vegetation Category 3

FIGURE 6.7

Bushfire Prone Land

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021); NSW RFS (2021)

6.2.8 Water and Soil Resources

6.2.8.1 Surface Water and Flooding

The Project Area falls within the Murrumbidgee River Catchment and is located on an alluvial floodplain between the Murrumbidgee River (more than 20 km to the north) and the Billabong Creek (approximately 40 km to the south). The principal watercourse networks that traverse the Project Site include Eurolie Creek (a fourth order stream), as well as Abercrombie Creek, Nyangay Creek and the Coleambally Outfall Drain (all fifth order streams or higher) as shown in **Figure 6.8**.

The generally flat topography in and around the Project Area provides for a broad floodplain with numerous watercourses with streamflow contributions emanating from local catchment runoff and potential flood breakouts from the major river systems in flood events. The Project Area also has topographical depressions which are likely to accumulate surface water under local catchment flooding conditions.

As no flood studies have been undertaken within the Project Area, it is not mapped as flood prone. However, it is noted that the Murrumbidgee River has been subject to eleven major historical flooding events between 1891 and 2018 (BMT, 2018). There may be the potential for flows from the Murrumbidgee River to be conveyed through the interconnected floodway network in major flood events.

6.2.8.2 Soils and Land Capability

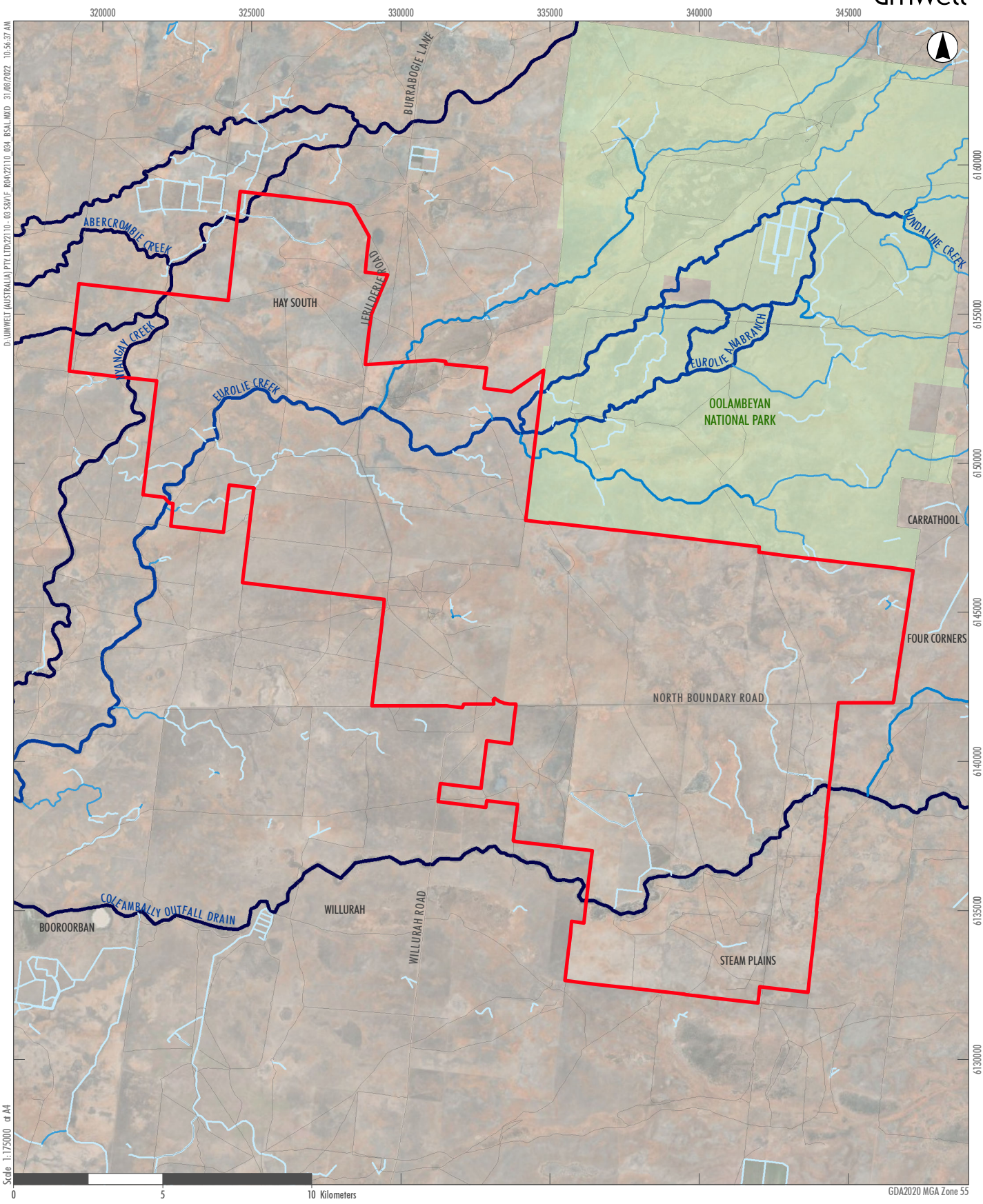
There is no BSAL present within or in the vicinity of the Project Area. Additionally, there are no mapped Class 1-3 soils under the Land and Soil Capability Assessment Scheme (LSC) present within the Project Area (refer to **Figure 6.9**). All land within the Project Area is mapped as Class 4 or Class 6. Existing agricultural activities within the host properties will continue and co-exist with the Project.

There are no mapped high risk areas for acid sulfate soils within the Project Area.

6.2.8.3 Groundwater

There are 34 registered groundwater bores located within the Project Area (BoM, 2022) as shown in **Figure 6.10**. Of these, three are identified as water supply bores, 14 are stock and domestic supply bores and the remainder are for exploration, monitoring or unknown purposes. The drilled depth of water supply and stock and domestic bores ranges between 24.4 m and 104.4 m and only four of these bores are listed as currently functional (GW415943 (water supply) and GW050414, GW052479, GW048908 (stock and domestic).

According to the Groundwater Dependent Ecosystem (GDE) Atlas (BoM, 2017), the Project Area is mapped as containing both aquatic and terrestrial GDEs (refer to **Figure 6.10**). Vegetation surrounding the Coleambally Outfall Drain is identified as a high potential terrestrial GDE (River Red Gum - Black Box Woodland wetland of the semi-arid (warm) climatic zone), based on regional studies. Additionally, Eurolie Creek is identified as a low potential aquatic GDE. Further details are provided in the BCA (refer to **Appendix 5**).



Legend

- Project Boundary
- NPWS Estate
- Road

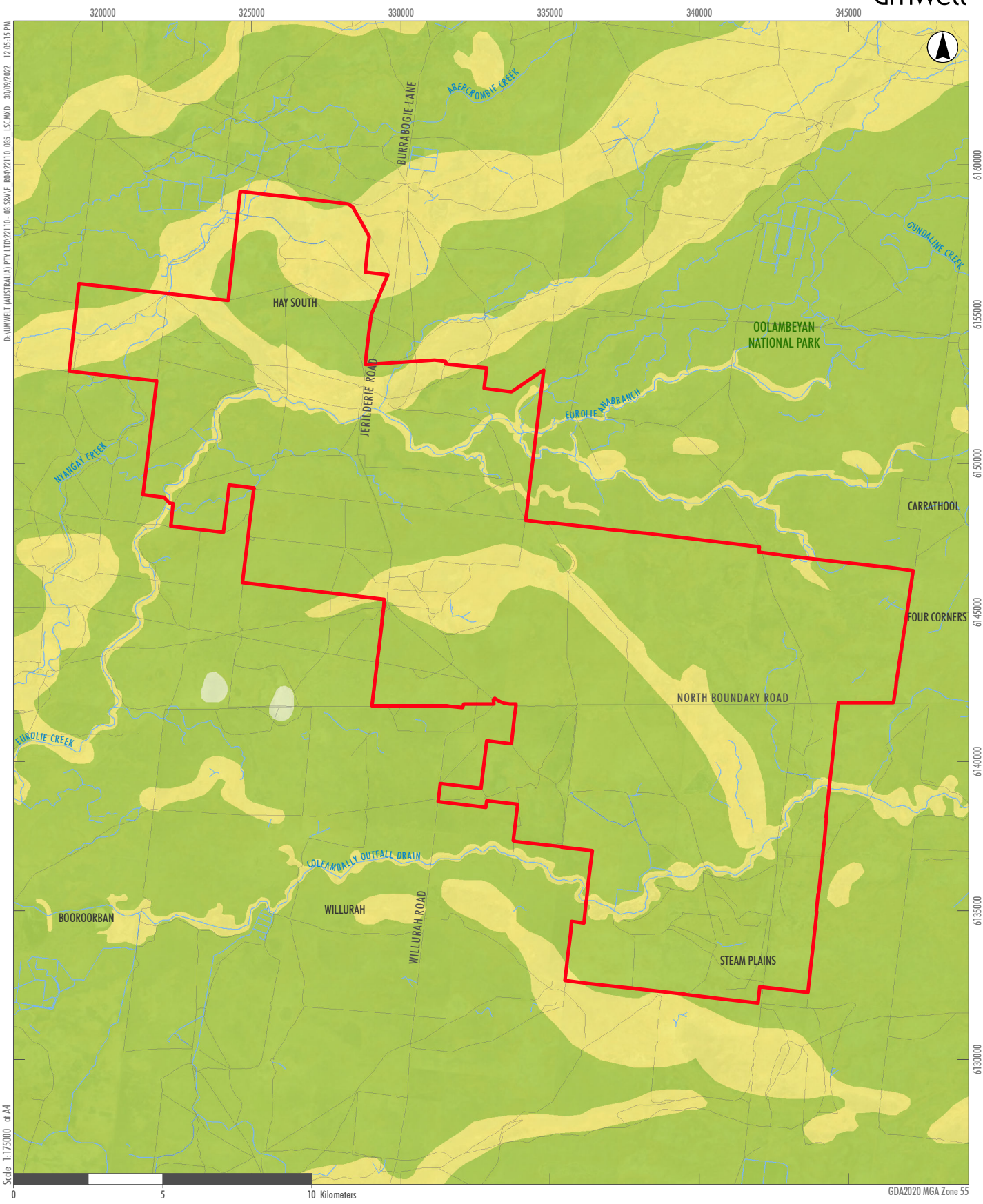
Strahler Stream Ordering

- 1
- 2
- 3
- 4
- ≥ 5

FIGURE 6.8

Strahler Stream Order

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021); NSW DPI (2013)



Legend

- Project Boundary
- Road
- Watercourse

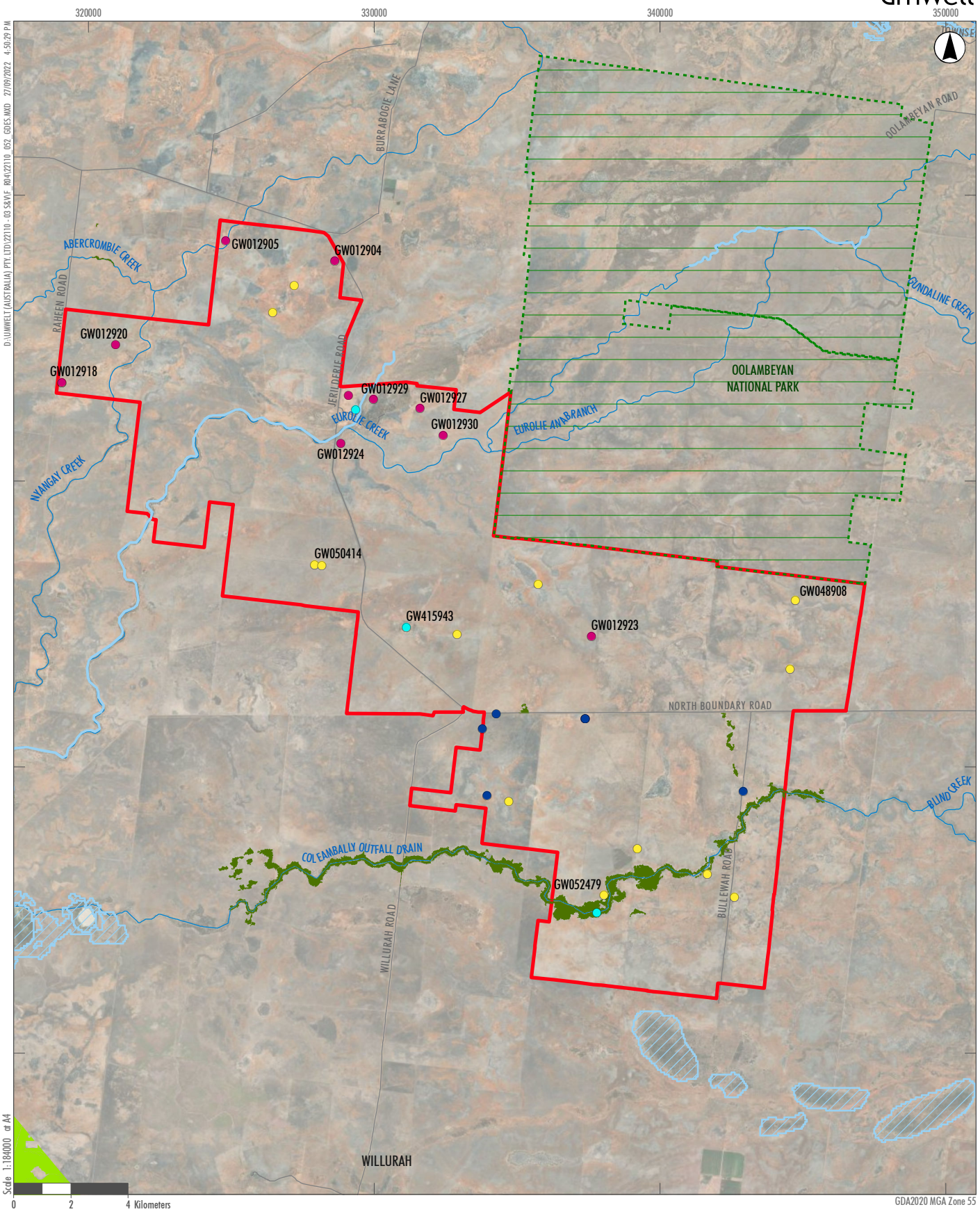
Land and Soil Capability

- 4
- 5
- 6

FIGURE 6.9

Land and Soil Capability

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021); NSW RFS (2021)



Legend

- Project Boundary
- Road
- Drainage Line
- National Parks (NPWS Estate)

Aquatic GDE

- Low potential GDE - from national assessment

Terrestrial GDE

- High potential GDE - from regional studies
- Low potential GDE - from regional studies

Monitoring Bore Types

- Monitoring
- Stock and Domestic
- Water Supply
- Unknown

FIGURE 6.10

Groundwater Usage Within Project Area

6.2.8.4 Potential Impacts and Matters Requiring Further Assessment

An overview of potential impacts on water and soil resources associated with the Project is provided in **Table 6.10** below. **Table 6.10** also provides a preliminary overview of impacts that may occur as a result of the Project, and will therefore require further assessment in the EIS.

A Water Resources Impact Assessment (WRIA) will be undertaken as part of the EIS that will consider potential impacts on both surface water and groundwater resources and the catchment, including flooding, erosion and sediment control, water quality, water users, water sourcing and licensing, and any required management and mitigation measures to minimise the potential impacts of the Project on water and soil resources. **Table 6.10** provides an overview of matters requiring specific consideration in the WRIA, including a summary of potential mitigation measures to address these impacts.

Table 6.10 Potential impacts associated with the Project

Aspect	Nature of Potential Impact	Matters Requiring Further Assessment/Consideration in EIS	Potential Mitigation Measures
Surface Water	• Potential changes to surface water runoff quantity and distribution associated with localised earthworks, including obstruction of overland flows and increased runoff potential due to vegetation removal and the establishment of hardstand and compacted areas • Potential erosion and sedimentation associated with vegetation clearing and earthworks (including the establishment/upgrading of creek crossings) • Potential fish passage obstruction and impacts to downstream riparian ecology associated with erosion and sedimentation and establishment/upgrading of creek crossings • Potential water quality impacts associated with accidental spills or leaks from sources such as construction machinery, stored construction and waste materials, fertilisers used for revegetation	The WRIA would include: • A baseline assessment of regional catchments, existing hydrological regimes, geomorphic character and condition • A qualitative assessment of potential surface water impacts (including impacts to downstream water users and riparian ecosystems) over the life of the Project and detailed measures to mitigate potential impacts	• Implementation of appropriate erosion and sediment control measures, developed in accordance with relevant guidelines • Minimising the number of new creek crossings and ensuring that any new/upgraded creek crossings are appropriately sited and constructed to minimise impacts to stream flows in accordance with relevant guidelines • Implementation of spill containment measures, including bunding where appropriate

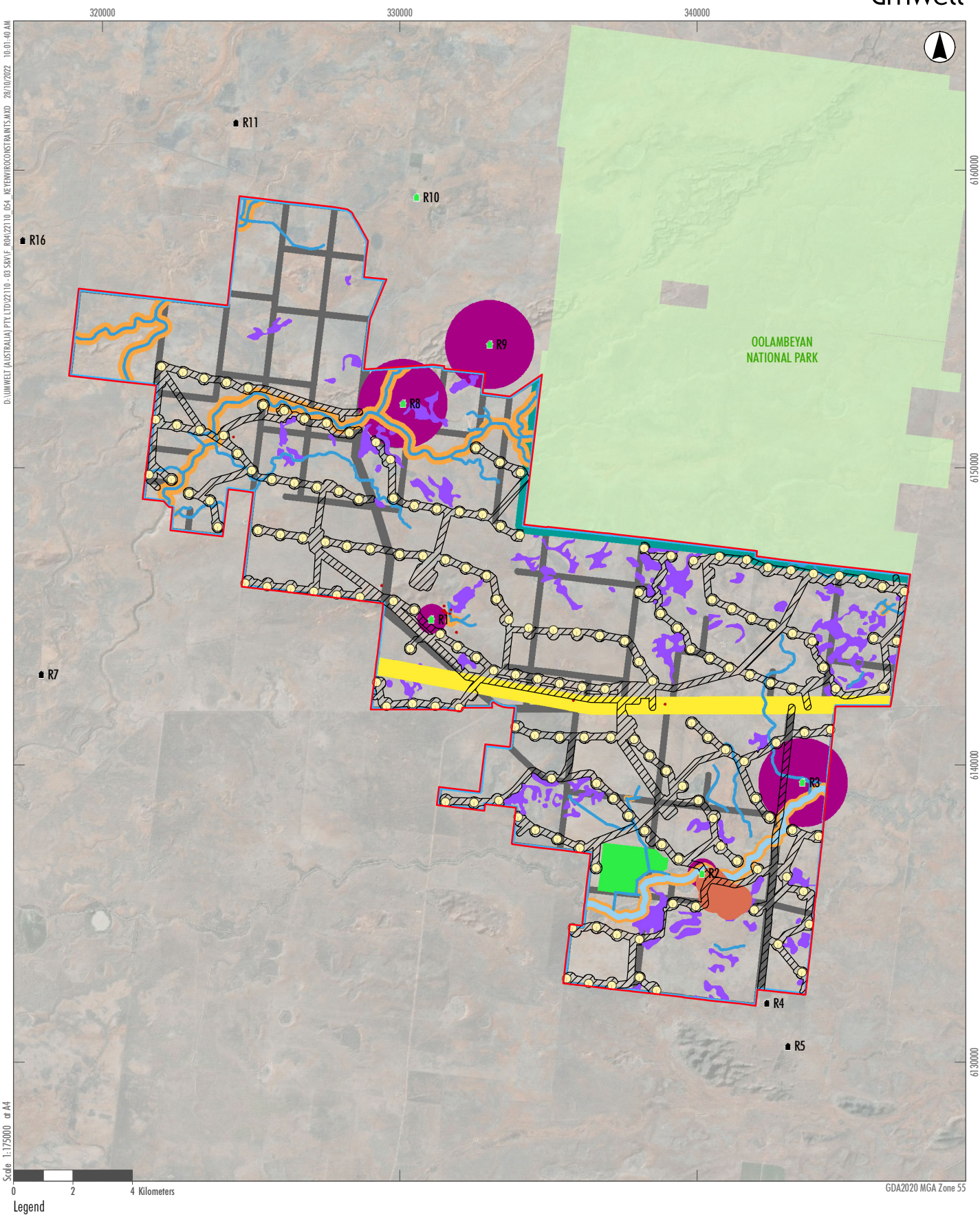
Aspect	Nature of Potential Impact	Matters Requiring Further Assessment/Consideration in EIS	Potential Mitigation Measures
Flooding	• Potential loss of floodplain storage and/or flow obstruction and associated changes to flood behaviour/risk	The WRIA would include a Flood Impact Assessment, which would comprise: • A review of existing flood information, including historical studies for the Murrumbidgee River and Billabong Creek • Additional flood modelling (e.g. direct rainfall coarse grid TUFLOW 2D) to define local flood conditions in where no existing information is available • An assessment of likely impacts on low flow and high flow regimes, with consideration of potential changes to flood depth, velocity and hazard classification, and an overview of avoidance and mitigation measures	• Minimising the disturbance footprint and rehabilitating areas impacted during the construction phase that are not required for ongoing operations • Minimising works within protected lands along waterways • Refinement of Project design (e.g. re-siting of Project infrastructure, where required) based on preliminary modelling
Water Supply	• Project-related demands on local water supply, particularly during drought periods	The WRIA would include: • A high level assessment of water demands over the life of the Project • Identification of suitable water sources and transport arrangements to meet the demands of the Project, informed by stakeholder consultation • Identification of any relevant water licensing requirements under the WM Act, and a strategy for meeting those requirements.	• Identification of potential water sources in consultation with key stakeholders (e.g. the local Councils) and having regard to cumulative water demand associated with other renewable energy projects in the locality
Groundwater Resources	• Impacts to the quantity and quality of groundwater and associated impacts to GDEs	The WRIA would include a qualitative assessment of impacts to groundwater resources and GDEs, including consideration of potential cumulative impacts, and detailed measures to mitigate potential impacts	• Minimising the extent and depth of ground disturbance, particularly in proximity to the Coleambally Outfall Drain and associated terrestrial GDE

6.2.9 Summary of Key Constraints

The key constraints currently mapped or known to be within the Project Area are presented in **Figure 6.11** and **Figure 6.12** below. They are based on the:

- existing BayWa r.e. strategies to avoid and/or minimise impacts i.e. the 'buildable area' discussed in Section 3.9 of this Scoping Report, and
- the environmental matters discussed in **Section 6.2** above.

Figure 6.12 is reproduced from the Biodiversity Constraints Assessment (refer **Appendix 5** of this Scoping Report) and shows mapped PCT and TEC across the Project Area. It is provided separately to **Figure 6.11** to improve readability but these environmental constraints, have been to date, and will continue to be considered collectively during the EIS.



Legend

- Project Boundary
- Indicative Wind Turbine Locations
- Indicative Development Area

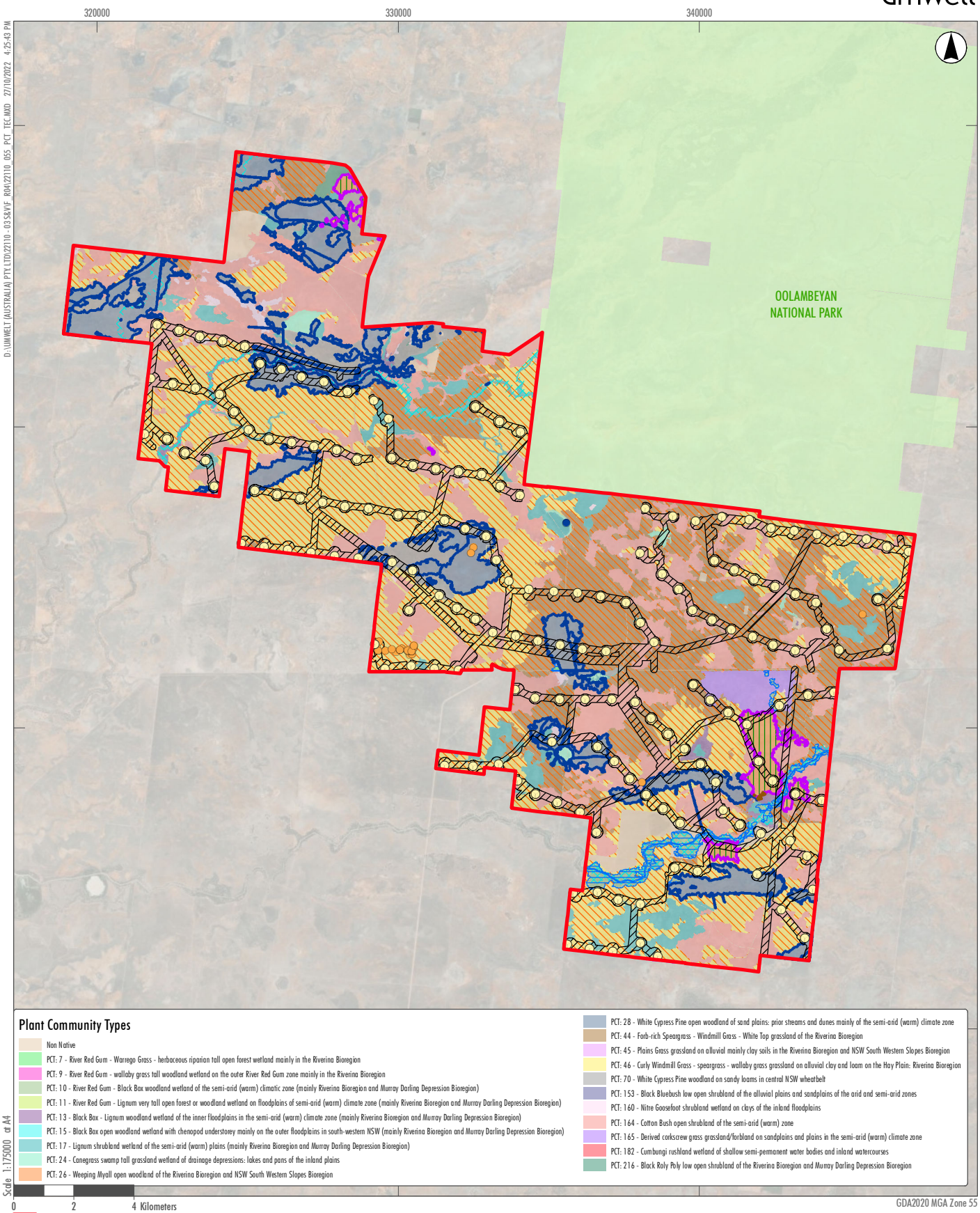
Constraining Considerations

- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Dwelling Setback Constraint
- Private Airstrip Constraint Buffer (500m)
- Internal Project Boundary Constraint Buffer (80m)
- Colleambally Drain Constraint Buffer (100m)
- Waterbody Constraint Buffer (50m)
- AHIMS Site Constraint Buffer (50m)
- Archaeology Watercourse Constraint Buffer
- Existing 220kV Transmission Line Constraint Buffer (300m)
- Oolambeyan National Park Constraint Buffer (300m)
- Irrigated Cropping Avoidance Constraint
- Threatened species or communities with potential for serious and irreversible impacts (Plains Wanderer)
- Road Corridor Constraint Buffer (100m)

FIGURE 6.11

Key Environmental Constraints (General)

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019),



Project Boundary
Indicative Wind Turbine Locations
Indicative Development Area
Biodiverse Riparian Land

Terrestrial GDE

High potential GDE - from regional studies

NSW Bionet Atlas Threatened Species Records

Swainsona murrayana
Grey-crowned Babbler (eastern subspecies)
Plains-wanderer

BC Act

Acacia loderi shrublands
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion

EPBC Act

Natural Grasslands of the Murray Valley Plains
Weeping Myall Woodlands

FIGURE 6.12

Key Environmental Constraints (PCT & TEC)

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019),

6.2.10 Cumulative Impacts

The NSW Wind Energy Guideline (DPE, 2016a) identifies the requirement to address cumulative impacts in relation to any other proposed, approved or operating wind energy projects in the vicinity particularly with regard to landscape, noise, biodiversity and traffic impacts. The NSW CIA Guidelines (DPIE, 2021g) are also applicable to the Project.

As discussed in **Section 2.3**, the Project is located within the South-West REZ and there are a number of other existing and proposed renewable energy projects within the region (refer to **Section 2.1.1.2** and **Figure 2.1**). The relevant detailed environmental assessments will include an assessment of the potential cumulative impacts associated with the Project and will follow the relevant guidelines.

Appendix 1 outlines where a CIA will be undertaken for the relevant matters including the level of assessment and engagement. **Table 6.11** below provides a summary of the key considerations in relation to CIA for the Project.

Table 6.11 Cumulative Impact Assessment Considerations

Scoping Cumulative Impact Assessment	Detail
What to assess?	As outlined in **Appendix 1**, the following key matters will require consideration of CIA: • visual amenity • noise and vibration • biodiversity • traffic and transport • socio-economic.
What study area?	The study area will vary depending on the specific characteristics of the assessment matter and the scale and nature of the potential impacts on the matter resulting from the Project with other relevant future projects. Each CIA will be undertaken in accordance with the relevant guidelines, where applicable, and broad enough to capture all relevant cumulative impacts.
Over what time period?	Life of the Project including construction, operation and decommissioning.
What projects to include?	The effects of past developments and actions, as well as currently operating projects will be captured in the baseline environmental studies for the Project. The CIA will consider the cumulative impacts of the Project on key matters with other proposed developments, including those outlined in **Table 2.1**, as relevant. This includes changes to existing projects, approved projects or projects under assessment.
What is the approach to assessment?	All CIAs will be undertaken in accordance with approved assessment methods for relevant matters (e.g. the NPfI and the BAM).
What are the key uncertainties?	Key uncertainties to undertaking the CIAs will include availability and quality of data on proposed future projects at the time of preparation of assessments. Relevant CIAs will identify realistic development scenarios with the relevant future projects over the life of the Project.

6.2.11 Other Matters

The EIS will also address other issues relating to:

- Land use – the EIS will assess the potential interactions of the Project with other land uses, including agricultural land uses. This assessment will draw on the findings of other related assessments including impacts on visual amenity, water, soil, noise, air quality, traffic, hazards and safety.
- Waste – the EIS will describe the likely waste streams to be generated during construction and operation and describe measures to manage, reuse, recycle and dispose of this waste in accordance with relevant guidelines.
- Air quality – in accordance with relevant NSW guidelines in relation to construction via a qualitative assessment, including specifying relevant construction phase air quality controls.
- Decommissioning and rehabilitation.

Whilst these matters will be appropriately assessed in the EIS, detailed assessments are not proposed as the issues can be readily defined, assessed and mitigated using well recognised approaches.

6.3 Matters Requiring No Further Assessment in the EIS

Table 6.12 outlines the matters that are considered to not require further assessment in the EIS based on the scoping phase assessment along with a comment justifying why no further assessment is required.

Table 6.12 Matters Requiring No Further Assessment in the EIS

Issue	Comment
Greenhouse gas and energy	As the Project will generate renewable energy, the emissions resulting from the construction, operation or decommissioning will be readily offset by the reduction in energy generation emissions. GHG emissions will be addressed in the justification for the Project as part of the EIS.
Port and airport facilities	The Project does not result in any change to port or airport facilities. Other than the delivery of Project components to the port, the transportation of Project components to the Project Site will be assessed as part of the TIA.
Rail facilities	The Project does not propose to utilise any rail facilities.
Odour	The Project is not anticipated to cause any odour.
Coastal hazards	The Project is not located within a coastal zone and will not result in any impacts to coastal zones.
Dam safety	The Project does not require the construction or maintenance of a dam.
Land movement	The Project is not anticipated to result in any land movement. The Project results in relatively minor excavation works only.

7.0 References

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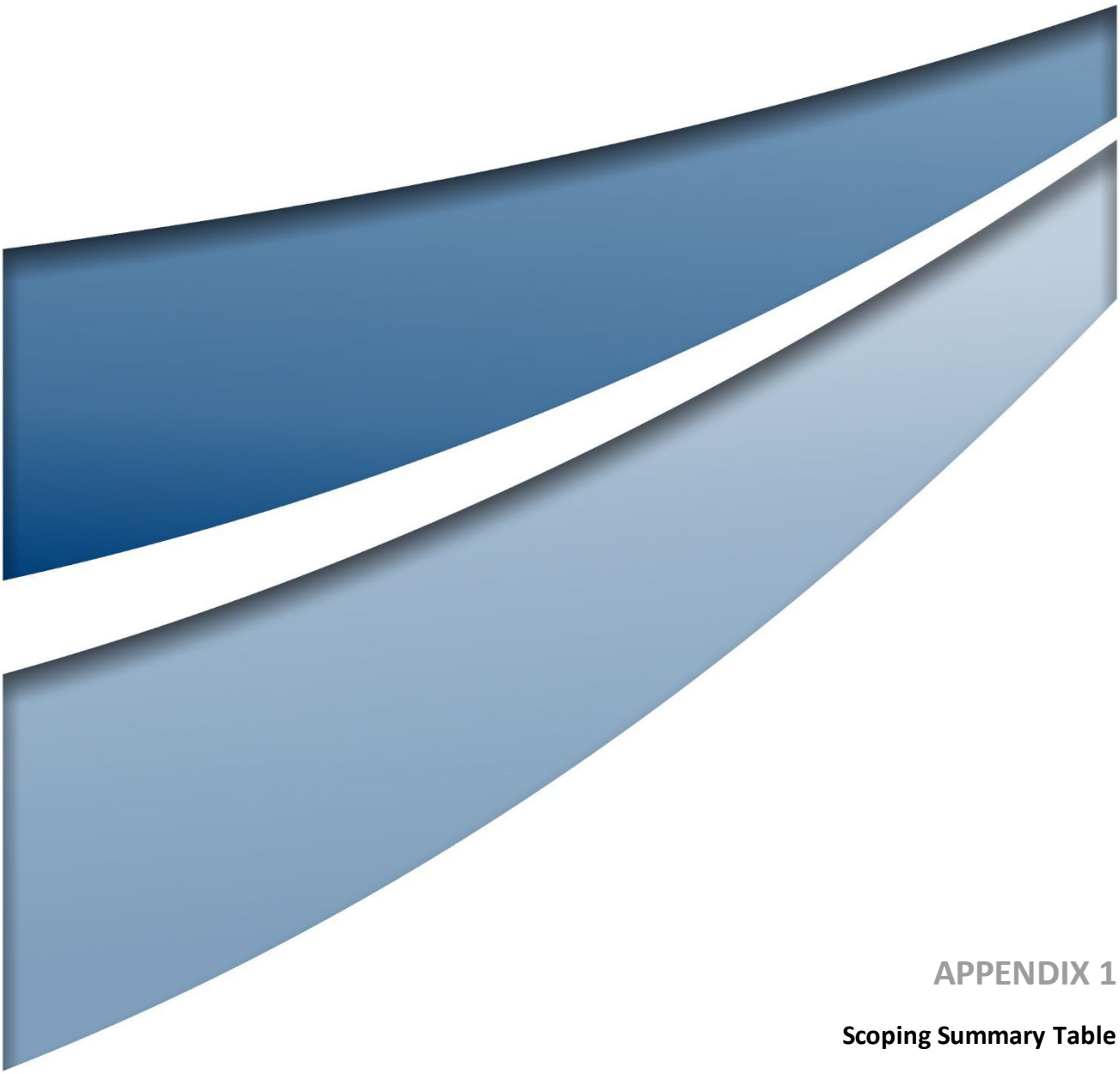


APPENDIX 1

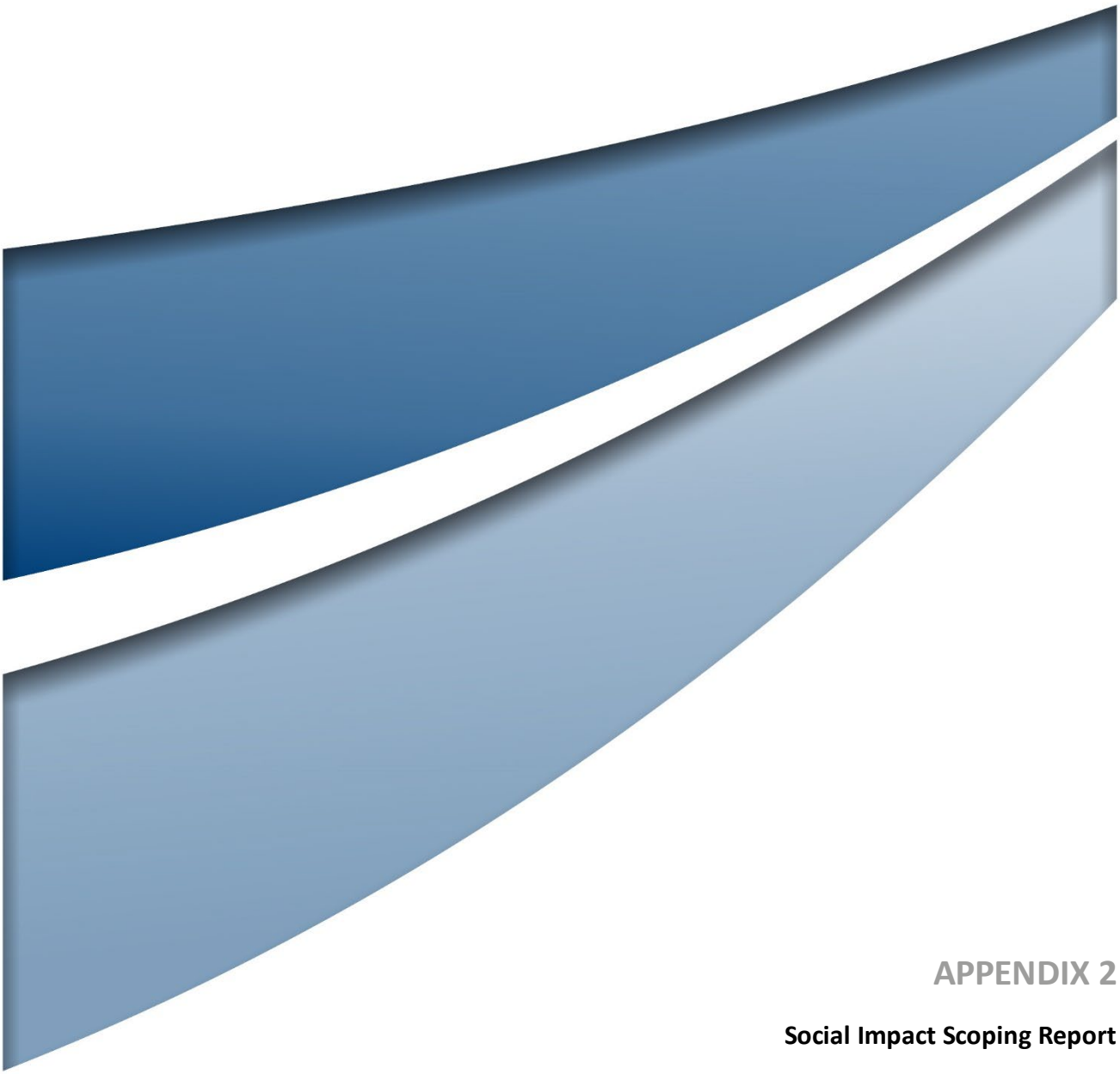
Scoping Summary Table

Scoping Summary Table

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
Access	Traffic Port facilities Road facilities	Moderate	Direct Indirect Cumulative	Sensitive (change in road usage/ amenity, nearby dwellings, townships and land uses)	Detailed	Likely	Yes	Specific	• Austroads – Guide to Road Design (Austroads) – Part 1 to 7 • Austroads - Guidelines for Traffic Management (Austroads) • Guide to Traffic Management – Part 3 Traffic Studies and Analysis (Austroads, 2013)	**Section 3.6**
Air	Atmospheric emissions Gases Particulate matter	Low	Direct Indirect	Sensitive (local and regional air quality)	Standard	Likely	No	General	• NSW Climate Change Policy Framework – Office of Environment and Heritage (OEH), dated 2016 • National Greenhouse Accounts Factors – Australian Government, dated 2021	**Section 6.2.10**
Amenity	Noise	High	Direct Cumulative Perceived	Sensitive (change in noise amenity, nearby dwellings, townships and land uses)	Detailed	Likely	Yes	Specific	• Noise Bulletin (DPE, 2016c) • NSW Government – Environment Protection Authority (EPA) – Noise Policy for Industry, dated 2017 (NPfI, 2017) • NSW Government – Department of Environment, Climate Change – Interim Construction Noise Guidelines, dated 2009 (ICNG, 2009) • NSW Government – Department of Environment, Climate Change and Water (DECCW) – Road Noise Policy, dated 2011 (RNP, 2011) • NSW Government – Department of Environment and Conservation – Assessing Vibration: A Technical Guideline, dated 2006 (vibration guideline, 2006).	**Section 6.2.2**
Amenity (cont'd)	Visual	High	Direct Cumulative Perceived	Sensitive (change in visual amenity, nearby dwellings, townships and public viewpoints)	Detailed	Likely	Yes	Specific	• Wind Energy: Visual Assessment Bulletin for State Significant Wind Energy Development, 2016.	**Section 6.2.1**
Biodiversity	Conservation areas Aquatic flora and fauna Terrestrial flora and fauna	High	Direct Indirect Cumulative	Sensitive (potential high sensitivity for select flora and fauna species, some being endangered and critically endangered)	Detailed	Likely	Yes	Specific	• NSW Biosecurity Strategy 2013-2021 – NSW Department of Primary Industries, dated 2013 • Biodiversity Assessment Method (BAM) – NSW Government, dated 2020.	**Section 6.2.3**
Economic	Livelihood	Low	Indirect Perceived Cumulative	Sensitive (potential resource sterilisation, reduced agricultural land uses)	Standard	Likely	Yes	General	• Social Impact Assessment Guidelines for State Significant Projects (DPIE, 2021b) • Undertaking Engagement Guidelines for State Significant Projects (DPIE, 2021d).	**Section 6.2.6**
Hazards and risks	Bushfire	Low	Direct Indirect	Sensitive (emergencies, safety)	Standard	Likely	No	Specific	• Planning for Bushfire Protection – NSW Rural Fire Service, dated 2019.	**Section 6.2.7.7**
	Flooding	Low	Direct Indirect	Sensitive (on-site activities, emergencies, safety)	Standard	Likely	No	General	• Floodplain Risk Management Guidelines (OEH), dated 2019 • Floodplain Development Manual: The management of flood liable land – NSW Government, dated 2005.	**Section 6.2.8**
	Hazardous and offensive development	Low	Direct	Sensitive (emergencies, safety)	Detailed	Likely	No	General	• State Environmental Planning Policy No 33—Hazardous and Offensive Development – 1992 EPI 129 • Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 – Department of Planning, dated 2011	**Section 6.2.7.6**

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
	(Battery Energy Storage System, BESS)								• Assessment Guideline: Multi-level Risk Assessment – Department of Planning and Infrastructure (DPI), dated 2011 • Hazardous Industry Planning Advisory Paper No 6: Hazard Analysis – Department of Planning, dated 2011.	
Hazards and risks (cont'd)	Waste	Low	Direct Indirect	Sensitive (safety, environment)	Standard	Likely	No	General	• NSW Government – DECCW – Waste Classification Guidelines, dated 2009.	**Section 6.2.10**
	Aviation	Moderate	Direct Cumulative	Sensitive (impacts on to local/regional agricultural/ recreational aviation)	Detailed	Likely	No	Specific	• Department of Infrastructure, Transport, Regional Development and Communications – National Airports – Safeguarding Framework – Guideline D: Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation, dated 2019.	**Section 6.2.7.1**
	Tele-communications and EMI	Moderate	Direct Cumulative	Sensitive (interference with local/ regional communications)	Detailed	Likely	Yes	Specific	• Wind Energy Guideline for State Significant Wind Energy Development (DPE, 2016a).	**Section 6.2.7.3**
	EMF	Low	Direct Indirect Perceived	Sensitive (amenity of nearby residences, community concern)	Standard	Likely	No	General	• National Health and Medical Research Council advice, as updated from time to time.	**Section 6.2.7.2**
Hazards and risks (cont'd)	Blade Throw	Low	Direct	Sensitive (safety)	Standard	Likely	No	General	• Applicable international standards for design of wind turbine components.	**Section 6.2.7.4**
	Shadow Flicker	Low	Direct Cumulative Perceived	Sensitive (change in visual amenity, nearby dwellings, townships and public viewpoints)	Standard	Likely	No	General	• Refer Visual above.	**Section 6.2.7.5**
	Flooding	Moderate	Direct Indirect	Sensitive (local hydrology)	Detailed	Likely	No	General	• Refer to Water below.	**Section 6.2.8**
Heritage	Aboriginal, encompassing any natural heritage	High	Direct Indirect Cumulative Perceived	Sensitive (Aboriginal cultural heritage value, Traditional Custodians)	Detailed	Likely	Yes	Specific	• NSW Government – OEH – Department of Premier and Cabinet – Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW, dated 2011 • NSW Government – DECCW – Aboriginal Cultural Heritage Consultation Requirements for Proponents, dated 2010 • NSW Government – DECCW – Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, dated 2010.	**Section 6.2.4**
Heritage (cont'd)	Historic	Low	Direct Indirect	Sensitive (potential heritage values)	Standard	Likely	No	General	• Local and State heritage registers • Heritage Office – NSW Skeletal Remains: Guidelines for Management of Human Remains, dated 1998.	**Section 6.2.4**
Land	Land capability	Low	Direct Indirect Perceived	Sensitive (existing local agricultural activity and economy)	Standard	Likely	No	General	• DPI – Agricultural Land Use Mapping Resources in NSW, dated 2017 • NSW Government – OEH – The Land and Soil Capability Scheme, dated 2012.	**Section 6.2.8**
	Soil chemistry Acid sulfate soils		Sensitive (erosion, contamination and fertility of soils)						• NSW Government – OEH – The Land and Soil Capability Scheme, dated 2012 • Soil and Land Survey Handbooks • Landcom – Managing Urban Stormwater: Soils and Construction Volume 1, dated 2004	

Group	Matter	Scale of Impact	Nature of Impact	Sensitivity of Receiving Environment	Level of Assessment	Mitigation Measures Required	Cumulative Impact Assessment Required?	Engagement	Relevant government plans, policies and guidelines	Section in Scoping Report
									• NSW Government – Department of Environment and Climate Change – Managing Urban Stormwater: Soils and Construction Volume 2, dated 2008 • DPI – Agricultural Land Use Mapping Resources in NSW, dated 2017.	
Social	Way of life Community Accessibility Culture Health and wellbeing Surroundings Livelihoods Decision-making systems	Moderate	Direct Indirect Cumulative Perceived	Sensitive (social, environmental and economic values of local community)	Detailed	Likely	Yes	Specific	• Social Impact Assessment Guideline for State Significant Projects, dated 2021 • Undertaking Engagement Guideline Guidelines for State Significant Projects, dated 2021.	**Section 6.2.6**
Water	Surface Water Flooding Water Supply Groundwater	Moderate	Direct Indirect Cumulative	Sensitive (local hydrology, groundwater and water quality) + access to water (local community values)	Detailed	Likely	Yes	General	• Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018 • NSW Government – NSW Water and River Flow Objectives, dated 2006 • NSW Government – Department of Environment and Climate Change – Floodplain Risk Management Guidelines, dated 2016 • NSW Government – Floodplain Development Manual: The management of flood liable land, dated 2005 • Landcom – Managing Urban Stormwater: Soils and Construction Volume 1, dated 2004 • NSW Government – Department of Environment and Climate Change – Managing Urban Stormwater: Soils and Construction Volume 2, dated 2008 • Department of Land, Water and Climate – NSW State Groundwater Dependent Ecosystem Policy, dated 2002.	**Section 6.2.8**
Cumulative Impacts	Overall cumulative impacts associated with the Project	Moderate	Direct Indirect Perceived	Sensitive (local and regional social, environment and economic values)	Detailed	Likely	Detailed	Specific	• Cumulative Impact Assessment Guidelines for State Significant Projects, dated 2021.	**Section 6.2.9**



APPENDIX 2

Social Impact Scoping Report

umwelt
Environmental & Social Consultants

BayWa r.e.

BULLAWAH WIND FARM

Social Impact Scoping Report

FINAL

September 2022

BULLAWAH WIND FARM

Social Impact Scoping Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
BayWa r.e. Projects Australia Pty Limited

Project Director:	Nathan Baker
Project Manager:	Lauren Evans
Technical Director:	Dr Sheridan Coakes
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Report No.	22110/R09
Date:	September 2022

Environmental & Social Consultants

This SISR was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Dr Sheridan Coakes	23 June 2022	Nathan Baker	30 June 2022
V2	Lauren Evans	25 August 2022	Nathan Baker	25 August 2022
03	Lauren Evans	23 September 2022	Nathan Baker	23 September 2022

Abbreviations

Abbreviation	Definition
ABS	Australian Bureau of Statistics
AEMO	Australian Energy Market Operator
BOCSAR	Bureau of Crime Statistics and Research
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
FTE	Full-time equivalent
IER	Index of Economic Resources
IRSD	Index of Relative Socio-Disadvantage
km	Kilometres
LGA	Local Government Area
NSW	New South Wales
PHIDU	Public Health Information Development Unit
PHN	Primary Health Network
REZ	Renewable Energy Zone
ROI	Register of Interest
SEAR's	Secretary's Environmental Assessment Requirements
SEIFA	Socio-Economic Indexes for Australia
SIA	Social Impact Assessment
SISR	Social Impact Scoping Report
SSC	State Suburb

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1.0 Introduction

This Social Impact Scoping Report (SISR) documents the process and outcomes of the scoping phase of the social impact assessment (SIA) undertaken by Umwelt for the Bullawah Wind Farm (the Project). It forms part of the Project's request for Secretary's Environmental Assessment Requirements (SEARs).

This request for SEARs are to be lodged with the New South Wales (NSW) Department of Planning and Environment (DPE) by BayWa r.e. Projects Australia Pty Limited (BayWa r.e.) as part of the Project's State Significant Development Application (SSDA) under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This SISR has been prepared in alignment with the DPE *Social Impact Assessment Guideline* (DPE, 2021) or 'the Guideline' and represents the 'Phase 1 SIA' for the Project. The 'Phase 2 SIA' for the Project will occur later, form part of the detailed environmental impact assessment process and will be incorporated in the Environmental Impact Statement (EIS) for the Project.

1.1 Project Overview

The Project is located approximately 28 km south east of Hay and in the Riverina region of south-western NSW, within the Hay Shire, Murrumbidgee and Edward River LGA. The Project Area is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km southwest of the Project Area, population 7,862) and Griffith (88 km northeast of the Project Area, population 27,300). Smaller townships of Darlington Point, Jerilderie and Coleambally are nearer to the Project.

While the exact Project boundaries are still being refined, the Project will take in an area mostly east of the Jerilderie, North Boundary and Willurah roads junction, either side of the Balranald to Darlington Point transmission line, and south of the Oolambeyan National Park. The Cobb Highway is situated ~20 km west of the Project Boundary (western most extent) and Conargo Road is ~8.5 km east of the Project Boundary (eastern most extent), while Jerilderie Road traverses the Project Area (north to south direction), until the intersection of North Boundary Road and Willurah Road. North Boundary Road crosses the middle section of Project Area (east to west direction), whilst Willurah Road is adjacent to the western side of the southern extent of the Project Boundary, running parallel in a north to south direction. The Sturt Highway (which goes through Hay) is directly north of the Project Boundary at a distance of >20 km.

The Project Area is zoned as RU1 Primary Production within the Hay Local Environment Plan (LEP) 2011, the Murrumbidgee LEP 2013 and Conargo LEP 2013. The majority of land that surrounds the Project is also zoned RU1 Primary Production, however the Oolambeyan National Park (directly north and adjacent to the Project Boundary) is zoned as E1 National Parks and Nature Reserves.

The indicative Project Boundary encompasses an area of approximately 33,000 hectares. The topography of the Project Area (all land within and including the Project Boundary) is relatively flat and homogenous ranging from between 90 and 100 m above sea level (ASL). The Project Area is dissected by a number of larger waterways namely Abercrombie and Eurolie Creek in the north and Coleambally Outfall Drain in the south.

The Project is located ~420 km from the Port of Melbourne (closest port to Project) and ~850 km from the Port of Newcastle (farthest port from the Project). Transportation access to the Project would be provided via the existing public road network and BayWa r.e. is currently considering multiple port, transportation and access route options. Preferred options are to be selected following feasibility and logistics studies, and during the detailed design stages of the development.

1.1.1 South-West Renewable Energy Zone (REZ)

The NSW Government's 'Electricity Strategy' and 'Electricity Infrastructure Roadmap' set out a plan to deliver the State's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions. This builds on the 'NSW Transmission Infrastructure Strategy' and supports the implementation of the Australian Energy Market Operator's (AEMO) 'Integrated System Plan'.

The South-West REZ was chosen due to an abundance of high-quality solar resources, proximity to Project EnergyConnect, relative land-use compatibility, and a strong pipeline of proposed projects. EnergyCo NSW is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping the proposed Project is within the boundaries of the REZ. **Figure 1.1** shows the current proposed REZ.

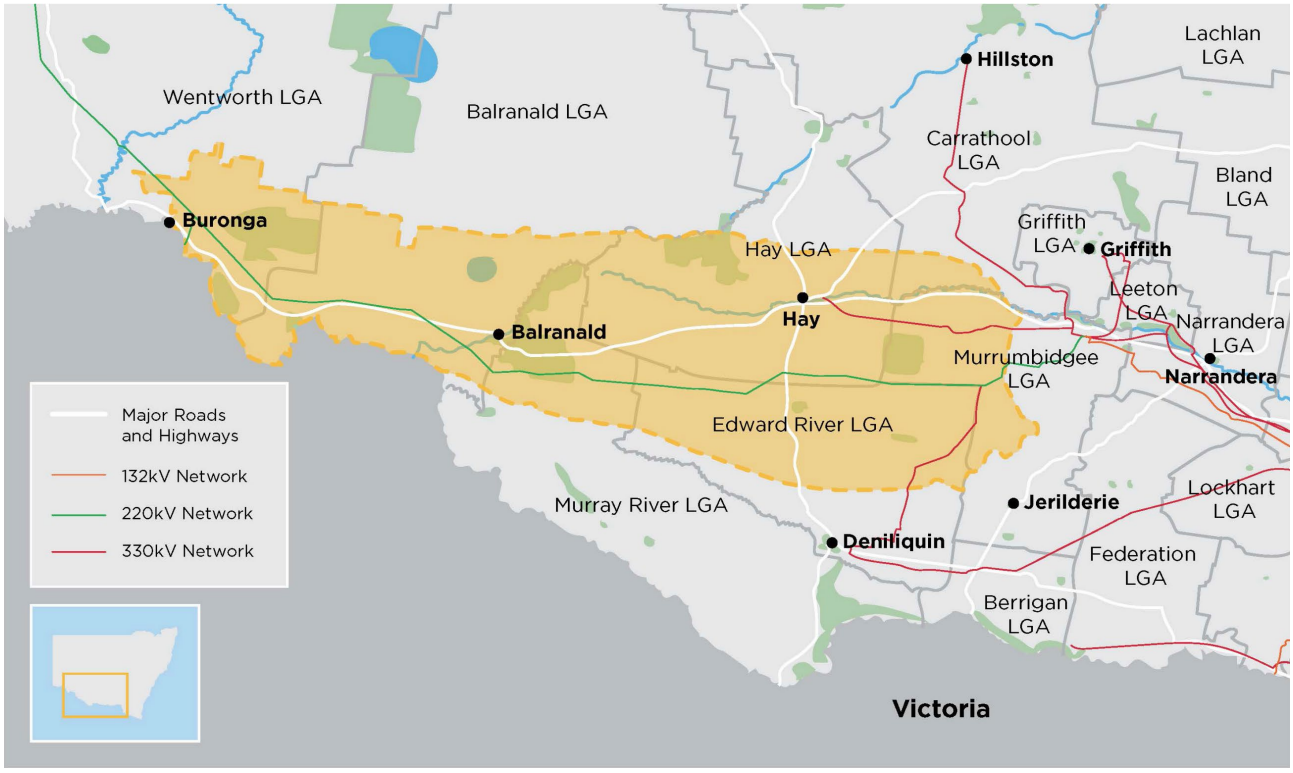


Figure 1.1 South-West Renewable Energy Zone

The Project Boundary is entirely within the South-West REZ. There are various other renewable projects currently operational in the REZ, including Darlington Point Solar Farm, Coleambally Solar Farm and Lang's Crossing Solar Farm. In addition, Hay Solar Farm has been approved, with various other projects in the planning phase including the Burrawong Wind Farm and Coleambally Battery Energy Storage System (BESS).

1.1.2 Indicative Project Design

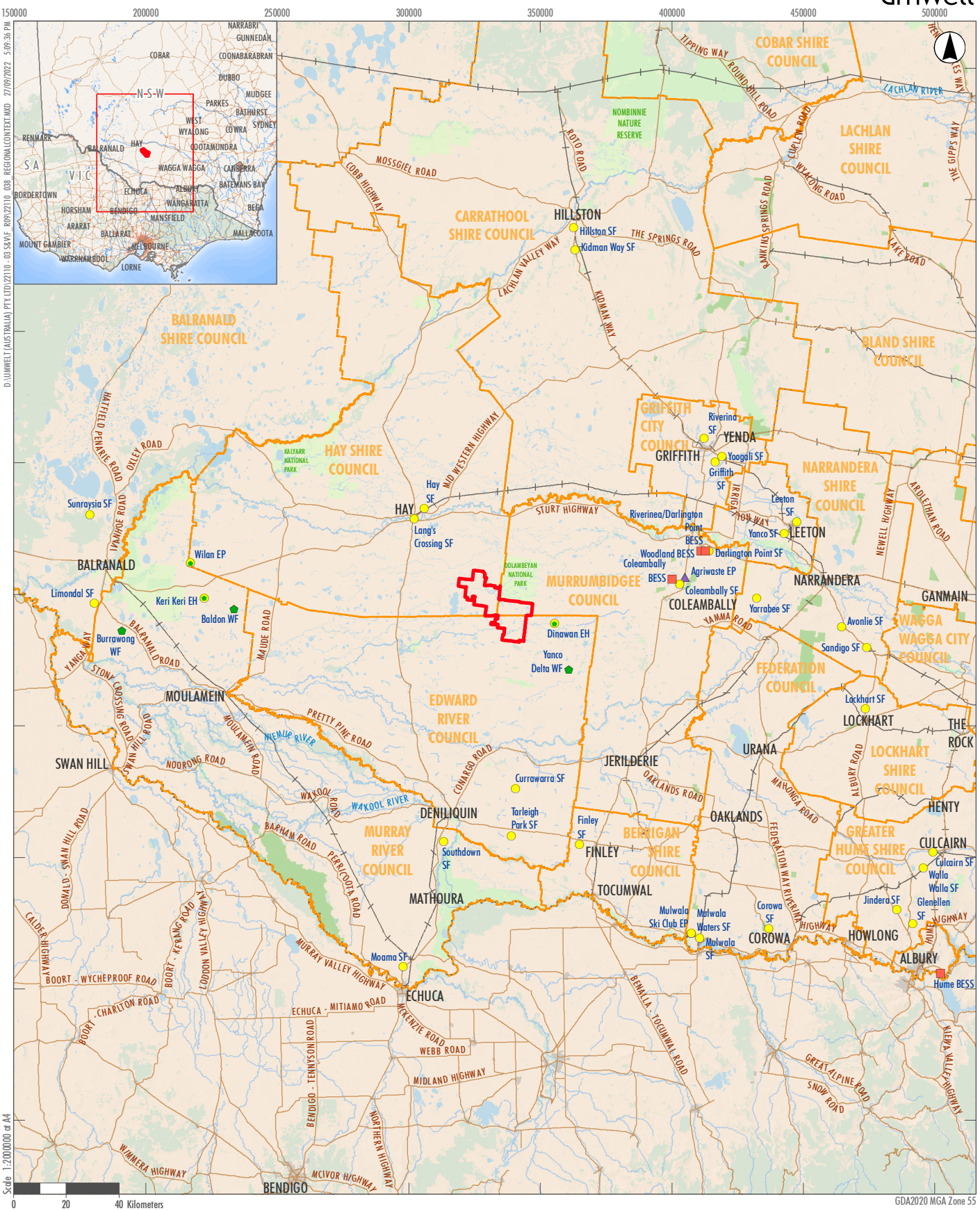
The Project will include the installation, operation, maintenance and decommissioning of 170 wind turbines, BESS facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The key components of the Project include:

- ~170 (3 blade) wind turbines, with a maximum blade-tip height of 300 m AGL with an installed capacity of up to 1,000 MW (1 GW).
- Internal electrical reticulation network i.e. electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings.
- A single grid-scale BESS (~500 MW, up to four-hour battery).
- Temporary and permanent meteorological monitoring masts.
- Temporary construction facilities including:
    - construction compound/s and site office buildings and storage areas
    - on-site concrete batching plants for use during the construction phase
    - laydown areas used for wind turbine installation and storage of wind turbine components.
- Targeted road network upgrades to facilitate delivery of wind turbine components to the Project site as required.
- Provision for a temporary accommodation camp on site (if required).

There is substantial commercial interest in the South-West REZ, such that there are several other renewable energy developments in the vicinity of the Project, most at the early stages of the planning and approvals process. Other new and nearby renewable energy projects include, but are not limited to, the Dinawan Energy Hub (~10 km east of the Project, being developed by Spark Renewables), Yanco-Delta Wind Farm (~16 km south-east of the Project, being developed by Virya Energy), and then Baldon Wind Farm, Keri Keri Renewable Energy Hub, Wilan Energy Park and Burrawong Wind Farm (each >50 km from the Project), as well as The Plains Renewable Energy Park (south of Hay, precise location yet to be announced). Other new renewable energy projects in the South-West REZ are anticipated.

The Project Area encompasses lands within both the Hay and Griffith Local Aboriginal Land Council (LALC), and the Deniliquin LALC is in close proximity to the southwest of the Project.

The Project's regional context, indicative layout, land-use zoning and other relevant features are identified in **Figure 1.2** to **Figure 1.4**.



Legend

- Project Boundary
- Local Government Areas
- Major Roads
- Railway
- Hydro Areas
- Watercourses
- State Forest
- NPWS Estate

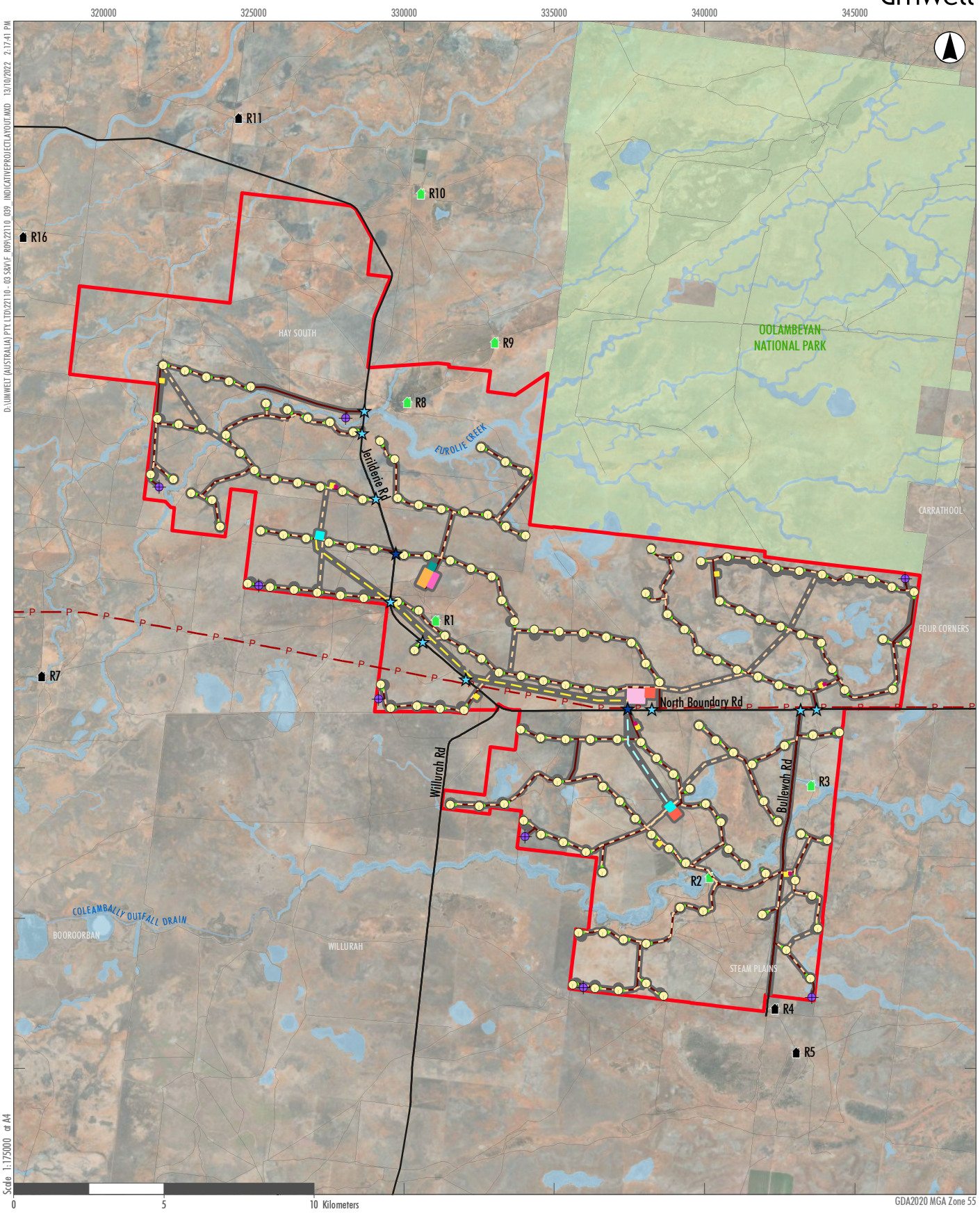
South-West REZ Renewable Projects

- Battery Energy Storage System (BESS)
- Bioenergy
- Renewable Energy Hub (EH)/Energy Park (EP)
- Solar Farm (SF)
- Wind Farm (WF)

FIGURE 1.2

Regional Context

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Indicative Development Area
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Main Site Entry
- Secondary Site Entry
- Existing 220kV Electricity Transmission Line
- Public Roads
- NPWS Estate

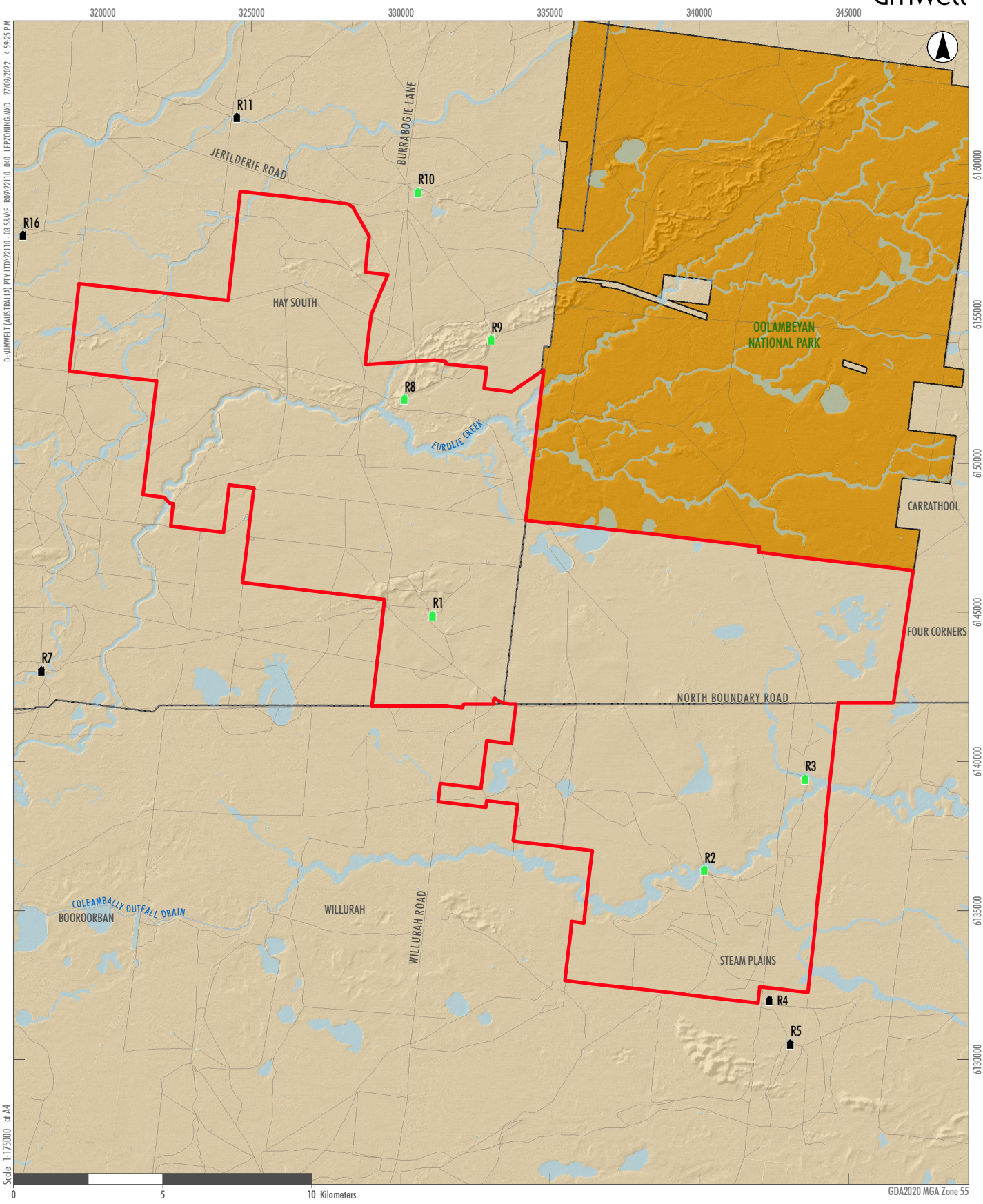
Project Infrastructure

- Internal 330kV Transmission Line (Central to South)
- Internal 330kV Transmission Line (North to Central)
- Cable Route
- Access Tracks
- Permanent Meteorological Masts
- Collector Substation
- Conceptual Temporary Accommodation Camp
- Hardstands
- Main Substation including BESS
- Operation and Maintenance Building
- Main Temporary Construction Compound
- Main Temporary Laydown
- Temporary Construction Compound
- Temporary Satelitte Laydown

FIGURE 1.3

Preliminary Layout

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Road
- Watercourse

Local Environment Plan - Land Zoning

Hay (2011), Murrumbidgee (2013), Conargo (2013)

- E1 National Parks and Nature Reserves
- RU1 Primary Production

FIGURE 1.4

Land Use Zoning

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

1.2 The Proponent

The Proponent for the Project is BayWa r.e. Projects Australia Pty Limited, a wholly owned subsidiary of BayWa r.e. which forms part of the BayWa Group, a global agriculture, energy and building materials company with more than 3,000 locations in more than 50 counties.

Based in 29 countries, with revenues of almost USD 4.2 billion, BayWa r.e. is a leading global renewable energy developer, service provider, distributor and energy solutions provider, and is actively shaping the future of energy. BayWa r.e. delivers end to end project solutions, ongoing operations management and is an Independent Power Producer with an expanding energy trading business. BayWa r.e. has successfully brought over 4.5 GW of renewable energy online, while managing over 10 GW of renewable energy assets.

BayWa r.e. Projects Australia Pty Limited has hubs in Brisbane, Melbourne, Sydney and Hobart, focussing on delivering wind and solar projects within Australia and New Zealand, and offering services such as asset and operations management across the Asia Pacific region, as well as turnkey construction, internal financing and investment opportunities and Power Purchase Agreements (PPAs). A relatively new ANZ player, BayWa r.e. Projects Australia has commissioned over 270 MW of solar and wind projects, and our project pipeline reports more than 4GW under development.

For brevity, BayWa r.e. Projects Australia Pty Limited will be referred to as 'BayWa r.e.' throughout this SISR.

2.0 Methodology

2.1 Assessment Requirements

This Social Impact Scoping Report has been prepared in accordance with the Guideline (DPE, 2021) as part of the environmental impact assessment process, as per **Figure 2.1**.

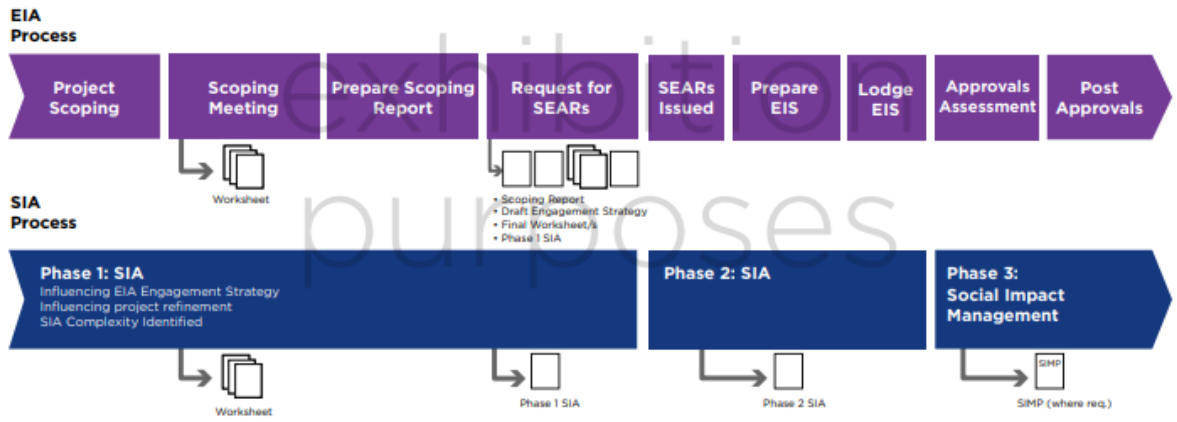


Figure 2.1 SIA and AIS process (DPE, 2021)

The assessment forms part of the Scoping Report and accompanies the request for SEARs to be lodged with the NSW DPE and includes the following key components:

- **Social baseline profiling:** defining the baseline social context in which the Project is situated.
- **Issues scoping:** preliminary identification and evaluation of social impacts and issues relevant to the Project, to determine the level of assessment required for the EIS, proportionate to the scale of the Project and the potential impacts of importance to the community.

Commencement of SIA early in the Project, informed by community and stakeholder engagement, affords opportunities to effectively integrate social outcomes within the detailed Project planning and design.

As is the case with any type of change, some individuals or groups within the community may benefit, while others may experience negative impacts. If negative impacts are predicted, it is the role of the SIA to determine how such impacts may be addressed effectively to reduce the degree of disruption to those affected. If positive impacts are predicted, the aim of the SIA is to maximise these opportunities and identify how they might be further enhanced and realised.

Figure 2.2 below provides an overview of the key SIA program phases, with this SISR relevant to 'Phase 1 – Scoping'.

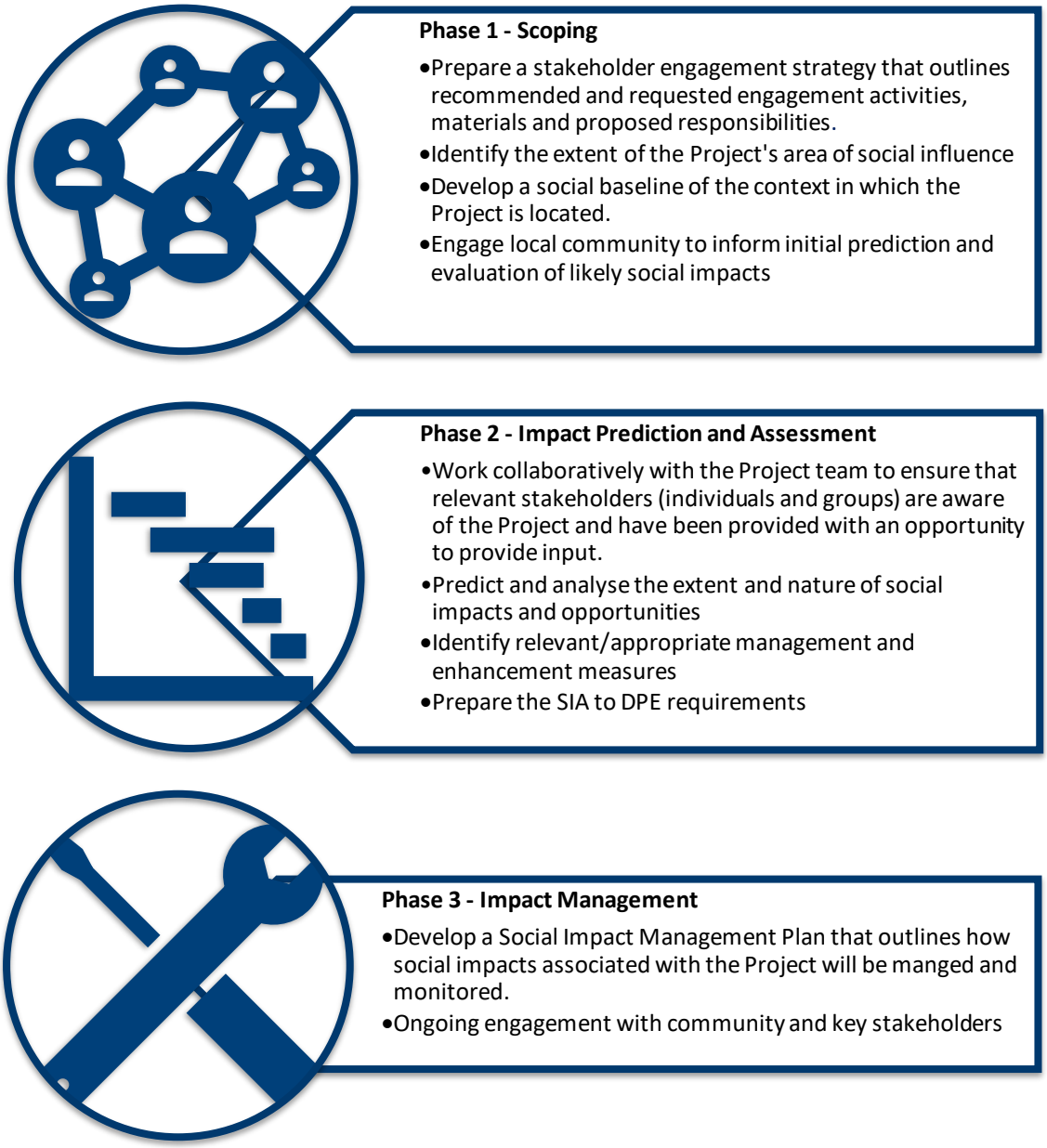


Figure 2.2 **SIA Program Phases**

According to the Guideline (DPE, 2021) and as outlined in **Figure 2.3** below, social impacts can involve changes to people's:

Figure 2.3 **Social Impact Categories**

2.2 Area of Social Influence

The social baseline profile considers the Project's social locality or 'area of social influence'. The area of social influence for this Project is defined as:

- The landholdings, property owners and residents situated on or intersecting with the Project Area as well as the footprint of any ancillary infrastructure.
- The Statistical Area Level 2 (SA2), as per the Australian Bureau of Statistics' (ABS) statistical areas, of Hay, Deniliquin, Jerilderie, Griffith Region, Coleambally, Darlington Point and Griffith.
- The host local government areas (LGA) of Edward River and Murrumbidgee, and Hay [1].

Figure 2.4 visually represents the area of social influence.

The area of social influence may extend beyond these boundaries at subsequent stages of Project planning and assessment, to include locations where construction contractor workforces may be sourced and where materials may be supplied for the Project.

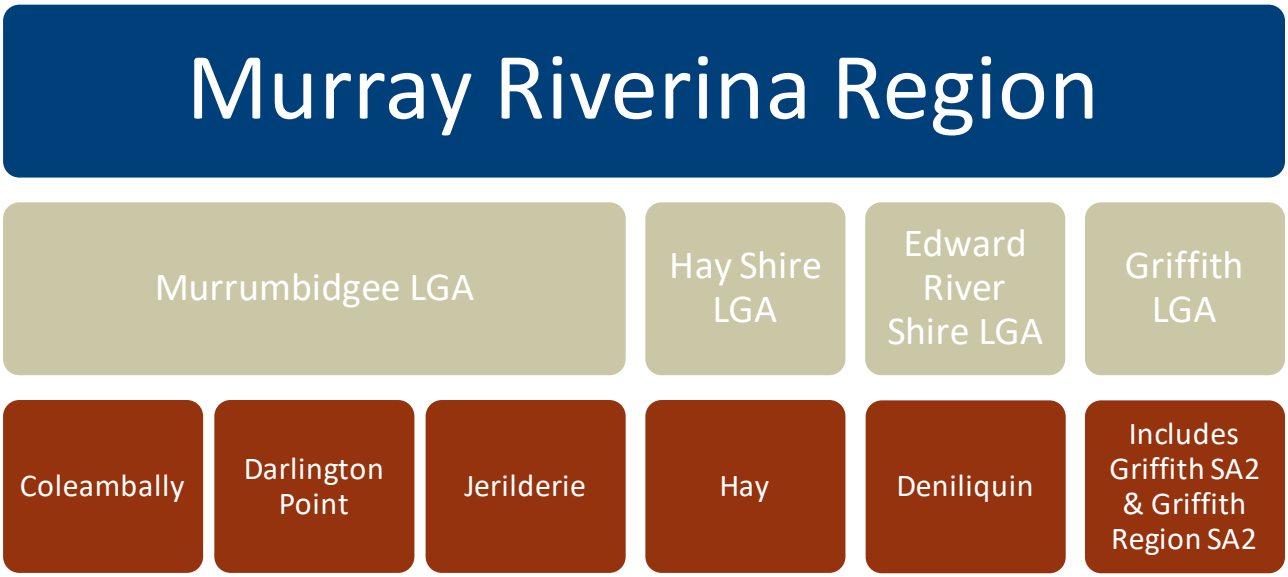


Figure 2.4 Area of Social Influence

2.3 Social Profiling

A baseline social profile gathers knowledge from both primary and secondary data sources to increase understanding of the existing social environment in which a project is proposed, and of potentially affected communities. The social baseline profile is a foundational component of SIA, as it provides the basis for which social impacts associated with the Project may be predicted, assessed, monitored, and managed over time.

[1] Hay SA2 was not included in the social baseline as it largely encompasses the same area identified as Hay LGA.

The Guideline (DPE, 2021) outlines the key components of a social baseline study, including:

- an understanding of the project's scale and nature
- who may be affected by the project, including any vulnerable or marginalised groups
- any built or natural features on or near the project that could be affected, or which hold tangible and intangible community values and associations
- an initial analysis of the defining characteristics of the communities within the projects area of social influence, including social, cultural and demographic trends and other change processes
- history of development within the social area of influence, and how people have responded to these changes previously.

Profiling provides a comprehensive summary of the key characteristics of the people of a community or Project Area and is concerned with developing a detailed understanding of the social and economic context in which a project is based to inform impact prediction.

2.3.1 Data Sources

To gain an understanding of the demographic characteristics and composition of communities within the area of social influence, and to ascertain how the Project may change or affect people, socio-economic and demographic data has been gathered and summarised from the ABS Census (2016) and the Social Health Atlas of Australia (PHIDU, 2020), as well as through a review of local media, regional and local government plans and strategies. The data sources and indicators used to inform the Project's social baseline are described in **Table 2.1** below.

Table 2.1 Data sources and indicators used to inform the Project's social baseline

Key Questions	Data Source	Indicators of Interest
• What is the demographic composition of the community? • What is the proportion of the population that is vulnerable to the proposed project/change? • What skills exist in the region? Are there relevant skill sets to enable the local and regional population to capitalise on employment opportunities during construction/operations? • Is the Project going to be of value to the local/regional community? Does the project align with community values, aspirations, needs? • Are there any groups that will require a particular engagement approach to facilitate their involvement and participation (i.e., languages or cultural/ educational barriers, vulnerabilities)? • Are there any specific social trends evident in the region?	**ABS Census (2016)** • LGAs: Hay, Murrumbidgee, Edward River. • SA2s: Coleambally, Darlington Point, Jerilderie, Deniliquin, Griffith Region, Griffith.	• Current population and trends. • Median age and age distribution. • Unemployment rate. • Key industries of employment. • Educational attainment. • Ownership and tenure of private dwellings. • Weekly household income. • Proportion of vulnerable groups (unemployed, low-income families, elderly, Aboriginal and Torres Strait Islanders). • Cost of living (rental and mortgage payments).
• What is the socio-economic status of the community? • What is the level of advantage / disadvantage in the community?	**ABS Census of Population and Housing (2016)** • LGAs: Hay, Murrumbidgee, Edward River • SA2s: Coleambally, Darlington Point, Jerilderie, Deniliquin, Griffith Region, Griffith	• Index of Relative Socio-economic Disadvantage, 2016. • Index of Economic Resources, 2016. • Index of Education and Occupation, 2016.
• What is the level of health in the community? • What are the main risk factors?	**Social Health Atlas of Australia (PHIDU, 2020)** • LGAs: Hay, Murrumbidgee, Edward River.	• Chronic diseases. • Risk factors. • Premature death.
• What has been the response of the community to similar Projects in the region? • How supportive or not are community residents of renewable energy projects? • Have community residents expressed concerns regarding current electricity prices?	**Local media review** **Submissions reports (comparable projects)** **Community and stakeholder engagement**	• Level of support for renewable projects. • Number of articles relating to renewable projects. • Community sentiment regarding wind farms.

Key Questions	Data Source	Indicators of Interest
• What are the Council's key priority areas? • Is the proposed project aligned with the Council's strategic plan? • Are community values, concerns and/or aspirations documented in the Community Strategic Plan? • How does the proposed project fit within the broader regional and state planning energy strategy?	**Government strategic plans or policies:** • Edward River Community Strategic Plan 2018–2030. • Hay Shire Community Strategic Plan 2017–2027. • Murrumbidgee Council Strategic Plan 2017–2027. • Riverina Murray Regional Plan 2036. • Riverina and Murray Joint Organisation Freight Transport Plan 2020.	• Level of investment in renewable energy infrastructure in NSW. • Support for and awareness of renewable/ solar energy in the community. • Number of solar energy and renewables projects in the region.
• What are the attitudes and perspectives of local and regional residents – are they likely to be supportive of the project? • What are the key concerns of the community in relation to the project? • Are there any strategies on how to manage the impacts of the project? • To what extent will the project support the community?	**Community and Stakeholder Engagement**	• Knowledge of the project. • Level of support for the project. • Community sentiment towards renewable infrastructure and energy. • Concerns related to the project.

2.4 Stakeholder Identification

Social impact assessment involves the participation and collaboration of people who have an interest in, or those that are affected by a project. As Burdge (2004) outlines, stakeholders may be affected groups or individuals that:

- live, work, or recreate near the Project
- have an interest in the proposed action or change
- use or value a resource associated with the Project
- are affected by the Project e.g., may be required to relocate because of the project.

A stakeholder identification process was undertaken during the scoping phase for the Project to support the planning and delivery of community and stakeholder consultation to inform the SIA. This process involved identifying stakeholders with an interest in the Project, or those directly and indirectly affected by the Project. This included identifying any potentially vulnerable or marginalised groups.

Further definition of the stakeholder identification process is outlined in the Community and Stakeholder Engagement Plan (CSEP) in **Appendix A**.

Key stakeholders that have been consulted or engaged during the scoping phase (beginning February 2022) are outlined in **Figure 2.5**. Subsequent phases of the SIA will seek broader involvement across the stakeholder groupings identified and will include wider community resident involvement.

Figure 2.5 Key Stakeholder Group

2.5 Community Consultation

Table 2.2 details the range of engagement mechanisms utilised to obtain input from various stakeholder groups for the Scoping Report, as well as mechanisms to be implemented in subsequent phases of the SIA program. The CSEP (**Appendix A**) outlines the engagement approach and strategy used to inform this SISR and the scoping phase of the SIA.

Table 2.2 Engagement Mechanisms

Mechanism	Engagement Objective	Description	First Round of Consultation	Targeted stakeholder group
Website/ hotline/ email	Inform	A dedicated project website page to provide project information and updates	A website was established in 2022	All stakeholders
Media Release	Inform	Media statement outline key messages for local media	A media statement was issued on 6 April 2022	All stakeholders
Personal Meeting / Interviews	Consult	Telephone, online of in-person meetings with individual key stakeholders	Meeting conducted between February and June 2022	Host landholders Proximal landholders Local government Aboriginal stakeholders Community and special interest groups
Project Information Sheets	Inform	Distribution of project information	No. 1 – Project overview was distributed in April 2022	Broader community
Community Information Session	Consult	A drop-in information session to present information and updates on the project with invites to the broader community through project information sheets, advertisements on local paper, and on Council's channels.	Two information sessions were held on 18 and 19 May 2022 in Coleambally and Hay	Broader community

Table 2.3 outlines the stakeholders that have participated in the scoping phase to date, as well as those who have informed the development of this SISR.

Table 2.3 Stakeholders Consulted during Scoping Phase

Stakeholder Group	Mechanism Used	Number Contacted	Number Engaged
Host Landholders	Personal Interviews	4	4
Proximal Landholders	Personal Interviews	14	8
Broader Community	Community Information Session Project Newsletter	2,872 households were informed 2,872	35* -
Local Government	Personal letters and meetings	3	3**
Aboriginal Stakeholders	Personal letters and meetings	7	4
Community and environmental groups	Personal letters and meetings	4	3**
Local Media	Media release	5 media releases were issued	-
		TOTAL NUMBER OF ENGAGEMENT	**57**

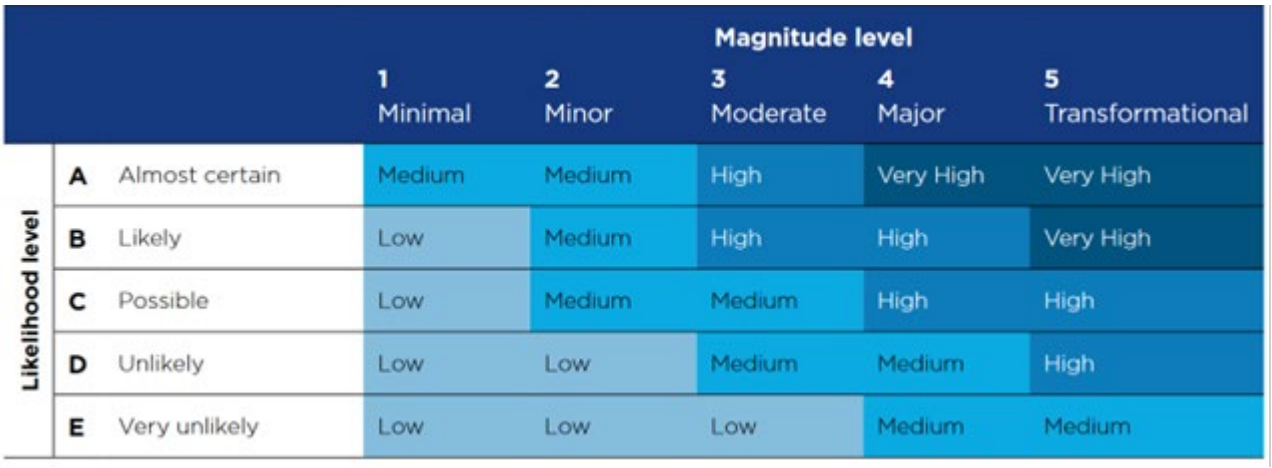
** Some overlap between attendees at the information session and other engagement forums.*

*** These numbers reflect number of meetings, rather than number of attendees.*

2.6 Preliminary Impact Assessment

As noted above, a preliminary evaluation of the social issues and impacts identified during the Scoping Phase (outlined in **Section 6.0**) has been undertaken to understand the level of assessment required for each impact in the EIS/SIA-preparation phase, and to inform Project refinements, design, and detailed planning.

The significance assessment has been undertaken using the risk matrix provided in The Guideline (DPE, 2021) which considers social impact magnitude and likelihood, as well as key characteristics of impact (extent, duration, intensity or scale, sensitivity or importance and level of concern or interest).
A significance rating has been assigned from the perspective of the affected stakeholder group, in addition to a significance rating derived from the risk matrix in the Guideline (DPE, 2021) and defines what impacts will be further investigated and validated as part of subsequent phases of the SIA and the EIS.



Likelihood level		Magnitude level 1 Minimal	2 Minor	3 Moderate	4 Major	5 Transformational
A	Almost certain	Medium	Medium	High	Very High	Very High
B	Likely	Low	Medium	High	High	Very High
C	Possible	Low	Medium	Medium	High	High
D	Unlikely	Low	Low	Medium	Medium	High
E	Very unlikely	Low	Low	Low	Medium	Medium

Figure 2.6 Social Impact Significance Matrix

Source: (DPE, 2021)

A key objective of the scoping phase SIA is to identify the level of assessment required for each impact in the assessment phase, as per The Guideline (DPE, 2021).

The level of assessment determines the extent of effort and data required to assess the impact and will fall into one of four categories as outlined in **Table 2.4**.

Table 2.4 Guide to Determining Levels of Assessment for Each Social Impact

Threshold	Level of assessment of the impact	Meaning
Three or more 'yes' or 'unknown' significant characteristics	Detailed assessment	Impact will not be assessed in other EIS technical studies and will be primarily assessed by specialists in the Phase 2 SIA.
Two 'yes' or 'unknown' significant characteristics	Standard assessment	Impact will be partially assessed in other EIS technical studies; however, further information and evaluation is required in the SIA to analyse the social dimensions of the impact.
One 'yes' or 'unknown' significant characteristic	Desktop integration assessment	Impact will be mostly assessed in other technical studies in the EIS, and desktop review will cross-reference and integrate those studies in the SIA Report
No 'yes' or 'unknown' significant characteristics	No further assessment	The social impact is unlikely to be experienced by anyone, although a monitoring framework will incorporate mechanisms to respond to any unanticipated impacts.

Source: (NSW Department of Planning, Industry, and Environment, 2020)

3.0 Social Baseline

This section describes the social baseline profile of the communities in and around the Project. It provides initial analysis of the defining characteristics of the communities considering demographic, social and economic indicators. Further, it considers the natural and physical attributes of the area of social influence and an understanding of how people currently live, work and recreate in the area.

The following components have been considered in the social baseline for this Project, namely:

- geographic and spatial – identification of communities of interest and relevant stakeholders
- governance – an understanding of the relevant governance structures including those of the Traditional Owners and local, State and Federal government jurisdictions
- development context – a review of the recent history of local communities, including cultural characteristics and community values, as well as previous experiences with renewable energy development projects and other development issues to ascertain the response of local communities to these changes
- community capital/assets – an assessment of levels of vulnerability or resilience across the communities of interest and their capacity to cope with change
- key community values, issues, and concerns – documentation of current community issues, as identified in key strategic planning documents, regional plans and/or studies as well as within local and regional media.

3.1 Development Context

3.1.1 Energy Policy in NSW

The NSW Government's current energy security policy and approach to a clean energy transition is being delivered through the strategic development of the renewable energy sector, as outlined through the NSW Government's Renewable Energy Action Plan (2013), Electricity Strategy (2019) and the Electricity Infrastructure Roadmap (2020). This policy context is relevant to inform the planning and development of the Bullawah Wind Farm.

3.1.2 The South-West Renewable Energy Zone (REZ)

As noted in **Section 1.0**, the NSW Government's Electricity Strategy (2019) and Electricity Infrastructure Roadmap (2020) sets out a plan to deliver the state's first five (5) REZs in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions. This builds on the NSW Transmission Infrastructure Strategy (2018) and supports the implementation of the Australian Energy Market Operator's (AEMO) 'Integrated System Plan'.

REZs co-locate renewable energy generation, energy storage, and transmission lines with the aim of providing affordable, reliable and low-emissions electricity to the grid. REZs aim to install the transmission infrastructure required to attract private investment, and to enable the transition to an electricity network powered by renewable energy sources.

The South-West REZ was chosen due to an abundance of high-quality solar resources, proximity to Project EnergyConnect, relative land-use compatibility, and a strong pipeline of proposed projects (NSW Government, 2021). EnergyCo NSW is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping (refer **Figure 1.1** of **Section 1.0**), the proposed Project is within the boundaries of the REZ.

In October 2021, EnergyCo NSW released a Register of Interest (ROI) process to seek information from developers interested in being part of the South-West REZ. Between October and November 2021 there were 49 registrations of interest for the REZ. Ongoing consultation with local stakeholders and the Southwest Regional Reference Group will be considered alongside details from the ROI to help inform the development of the REZ (EnergyCo, 2022).

3.2 Local Setting

As noted in **Section 1.0**, the Project is located approximately 28 km south east of Hay and in the Riverina region of south-western NSW, within the Hay Shire, Murrumbidgee and Edward River LGA. The Project Area is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km southwest of the Project Area, population 7,862) and Griffith (88 km northeast of the Project Area, population 27,300). A record of the Project map, as provided in the Community Information Sheet distributed by BayWa r.e. is then provided in **Figure 3.1** below.

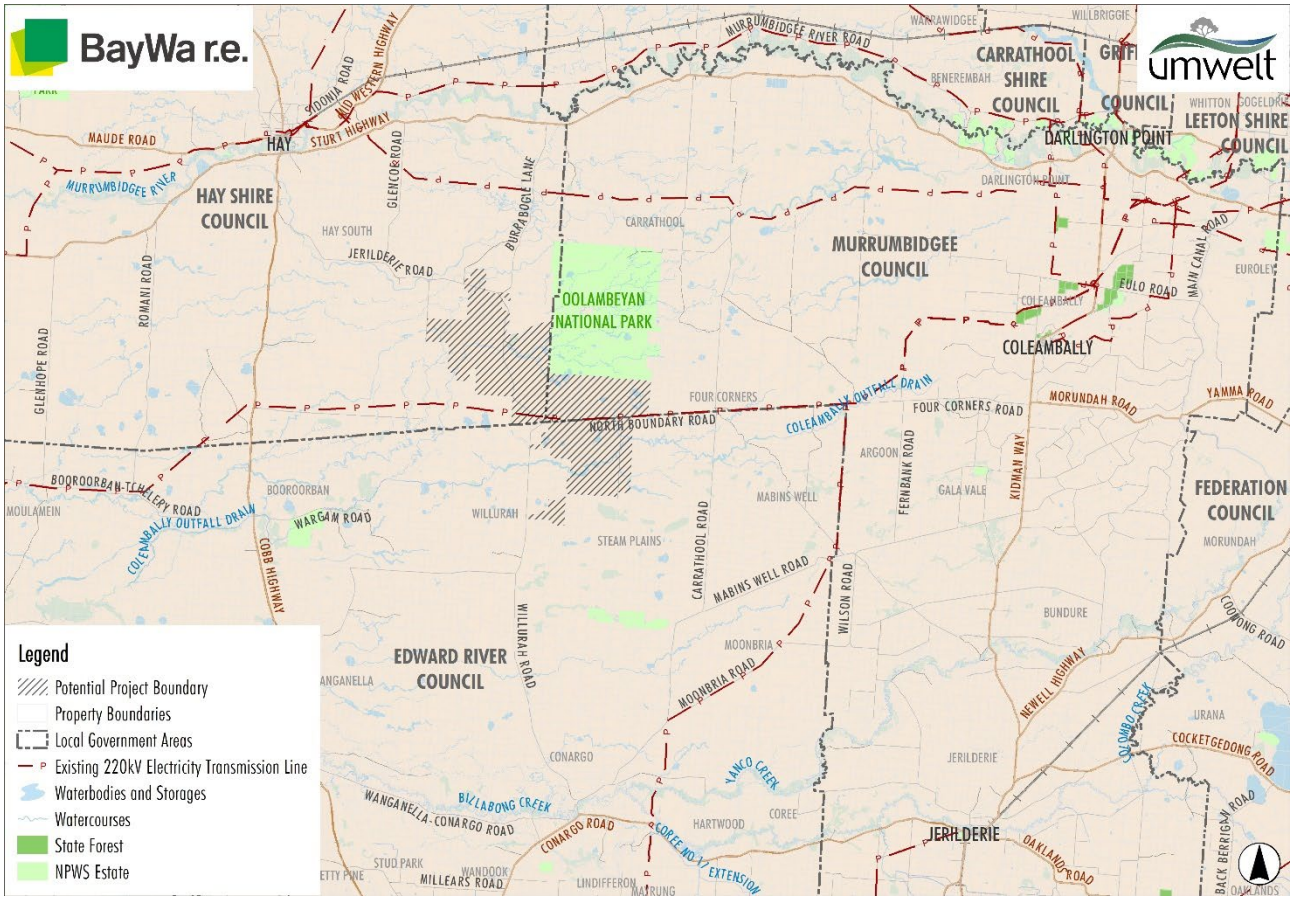


Figure 3.1 Project Location, as shown in the Community Information Sheet issued by BayWa r.e.[2]

[2] The Project Area boundary has been amended slightly since the issuing of the Community Newsletter

Surrounded by agricultural lands and small settlements, the closest townships are Conargo (50 km, population 188), Jerilderie (112 km, population 1,029), Coleambally (80 km, population 1,331) and Darlington Point (100 km, population 1,016) (see **Table 3.1** for more details). Beyond these townships, isolated rural residential properties surround the site to the north, south, east, and west.

The Project area is zoned RU1 'Primary Production', as is most of the land use surrounding the site. Oolambeyan National Park is located north and west (and directly adjacent) to the revised Project Boundary. The Project is situated ~600 km from Adelaide, ~320 km from Melbourne, ~520 km for Port Kembla and ~570 km from Sydney (each a linear distance) and transportation access to the wind farm would be provided via the existing public road network and a yet to be defined site access road.

Table 3.1 Settlements in the Vicinity of the Project Area

Location	Population
Hay Shire	
Hay	2,406
Edward River	
Deniliquin	6,833
Booroorban	33
Wanganella	30
Conargo	188
Murrumbidgee Shire	
Jerilderie	1,029
Coleambally	650
Darlington Point	1,162
Griffith City	
Griffith (SSC)	18,196
Shire of Campaspe	
Echuca	14,043

3.2.1 Governance

3.2.1.1 Traditional Owners & Aboriginal Governance

The Project Area is located within the traditional lands of the Wiradjuri nation. Wiradjuri means '*the people of the three rivers*', and the nation's traditional and modern-day connections to Country extend over a large area of NSW encompassing the Macquarie, Lachlan and Murrumbidgee Rivers, bounded by the Murray River in the south. The NSW Aboriginal Land Council (NSWALC) is the State's peak representative body in Aboriginal Affairs and is constituted by Part 7 of the Aboriginal Land Rights Act 1983 No 42.

The Project Area is situated within the NSW Aboriginal Land Council boundaries of the Wiradjuri Region, which encompasses much of southern central NSW and includes 21 more localised LALCs. Every four years, voting members of Local Aboriginal Land Councils (LALC) vote for a Councillor (Cr) to represent their region.

The current Councillor of the Central Regional is Leeane Hampton. Given the Project's location, several LALCs are likely to have an interest in the Project, including the Hay LALC, Deniliquin LALC and Griffith LALC. **Figure 3.2** below shows the LALC boundaries.

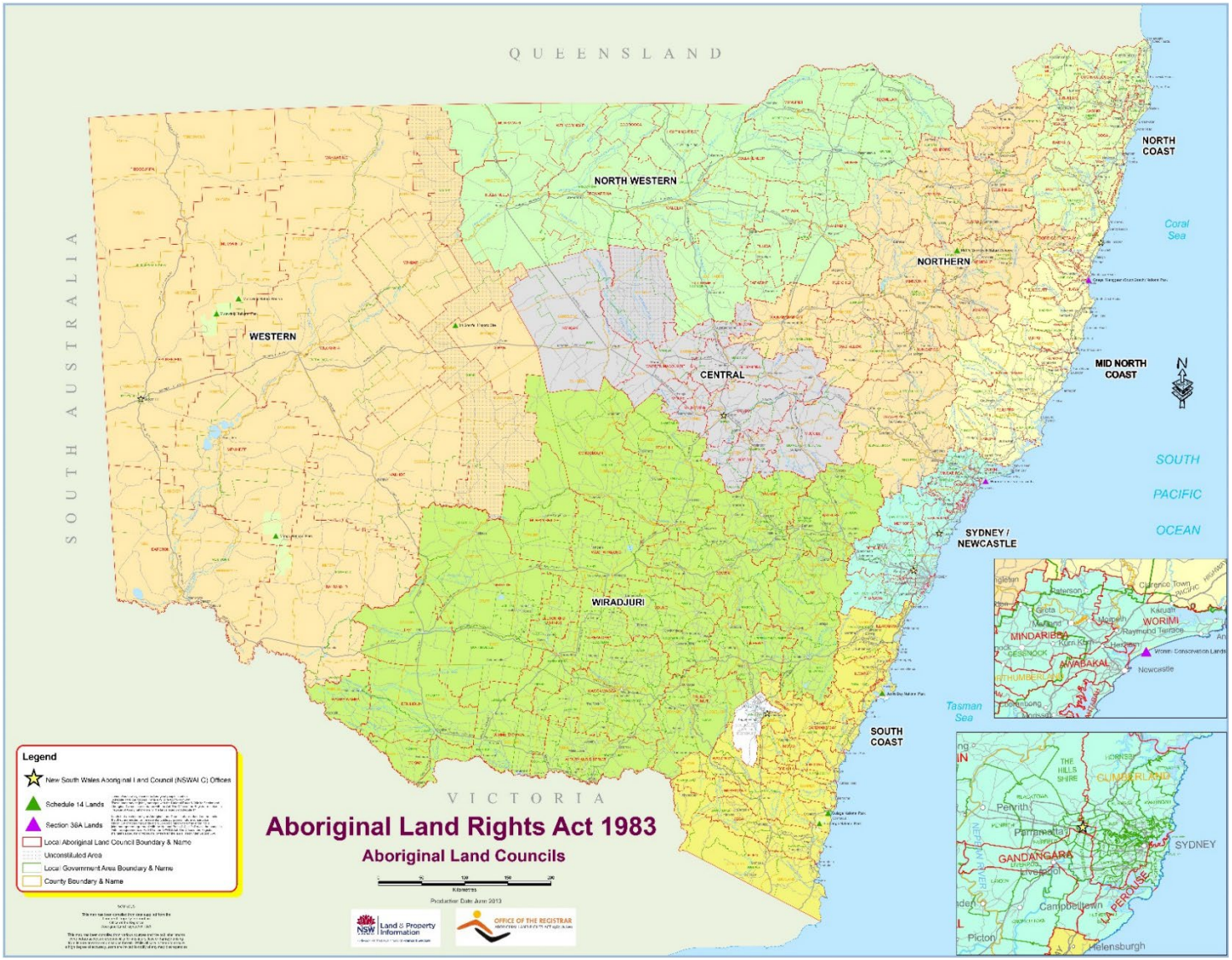


Figure 3.2 Local Aboriginal Land Council boundaries

Edward River LGA, Hay Shire and Murrumbidgee LGAs are represented by Liberal Party MP Sussan Ley who holds the Federal seat of Farrer. At a state level, the Project sits within the Murray electoral district. The seat of Murray is held by Shooters, Farmers and Fishers MP, Helen Dalton.

3.2.1.2 Local Government

The Project Area sits across three LGAs within the Murray and Riverina regions as outlined below.

Edward River Council

The Edward River Council was formed in May 2016, following the amalgamation of the former Conargo Shire Council and Deniliquin Council. Edward River Council provides services and support to a community of approximately 9,000 permanent residents across a region covering 8,881 square kilometres, including the town of Deniliquin and the six rural villages of Blighty, Booroorban, Conargo, Mayrung, Pretty Pine and Wanganella (Edward River Council , 2022).

The history of the area began with the Wamba Wamba and Perrepa Perrepa people, followed by early colonial settlers claiming significant areas of land in the Edward River region. Deniliquin became the heart of the Australian Merino industry, which produced half of the worlds Merino wool. The introduction of irrigation into the region fundamentally altered agriculture and allowed diversification of farming enterprises (Edward River Council, 2020).

Murrumbidgee Council

The Murrumbidgee Council was formed in May 2016 following the amalgamation of Jerilderie Shire Council and Murrumbidgee Shire Council. The council provides services to just under 4,000 permanent residents across an area of 6,880 square kilometres, including the towns of Coleambally (population: 660), Darlington Point (population: 1,162) and Jerilderie (population: 881). The population has grown by approximately 120 people or 3.3% in the last decade.

The Murrumbidgee LGA relies on primary production including sheep, cattle, wheat, corn rice and poultry. It also benefits from the Murrumbidgee River, a growing tourism destination for fishing, hiking, and water sports.

Hay Shire Council

The Hay Shire Council is the oldest Council of the three LGAs, formed in 1965. The LGA covers an area of 11,326 square kilometres and has an estimated population of 2,946 in 2016 (ABS, 2016). The largest town within the LGA is Hay, with a population of approximately 2,400 residents (ABS, 2016).

Similar to Edward River and Murrumbidgee, Hay Shire's economy is predominantly based on agriculture, producing merino wool and commercial crops such as wheat, rice and corn (Hay Shire Council, 2022).

3.2.2 Land Use and Settlement

The Project area is zoned RU1 'Primary Production', as is most of the land use surrounding the site. Oolambeyan National Park is located north and west (and directly adjacent) to the revised Project Boundary. This land is zoned E1 'National Parks and Nature Reserves'.

The indicative Project Boundary encompasses an area of approximately 33,000 hectares. The topography of the Project Area (all land within and including the Project Boundary) is relatively flat and homogenous ranging from between 90 and 100 m above sea level (ASL). The Project Area is dissected by a number of larger waterways namely Abercrombie and Eurolie Creek in the north and Coleambally Outfall Drain in the south.

As discussed in **Section 3.2.1.1**, agriculture across the three LGAs is largely focused on irrigated crops, sheep and cattle grazing and canola growing, with the local economy of the LGAs heavily reliant on these industries.

In addition to the four privately owned properties that fall within the Project area, there are 10 dwellings located within an 8km radius of the site. As previously noted, land within the Project Area has predominately been used for agricultural purposes, including grazing and cropping.

3.3 Regional Setting

The Project Area is located at the intersection of the Riverina Region and Murray Region in NSW.

The Riverina Murray Region is a productive agricultural area characterised by highly valued rural and biodiversity lands, the Murray and Murrumbidgee rivers, and an interdependent network of distinctive communities (NSW Government , 2017). The Riverina Murray region encompasses a total of 20 LGAs, located along the Victoria and Australian Capital Territory (ACT) borders as shown in **Figure 3.3** (NSW Government , 2017).

The RDA defined Riverina Region covers an area of 80,586 sq kms and services a population of 169,856. It comprises the regional cities of Wagga Wagga and Griffith and the local government areas of Bland, Carrathool, Coolamon, Cootamundra-Gundagai, Griffith, Hay, Junee, Leeton, Lockhart, Murrumbidgee, Narrandera, Snowy Valleys, Temora and Wagga Wagga (Regional Development Australia, 2022).

The Murray region of New South Wales is located in the southwest of the state, including the regional centres of Albury, Deniliquin, and Hay and the area north of the Murray River. The region covers a total area of around 97,800 square kilometres or 12 per cent of New South Wales and is home to approximately 118,900 people (ABS 2018).

Agricultural land in the Murray region occupies 84,900 square kilometres, or 87 per cent of the region. Areas classified as conservation and natural environments (nature conservation, protected areas, and minimal use) occupy 8,500 square kilometres, or 9 per cent of the region. The most common land use by area is grazing native vegetation, which occupies 48,300 square kilometres or 49 per cent of the Murray region (ABARE, 2016).

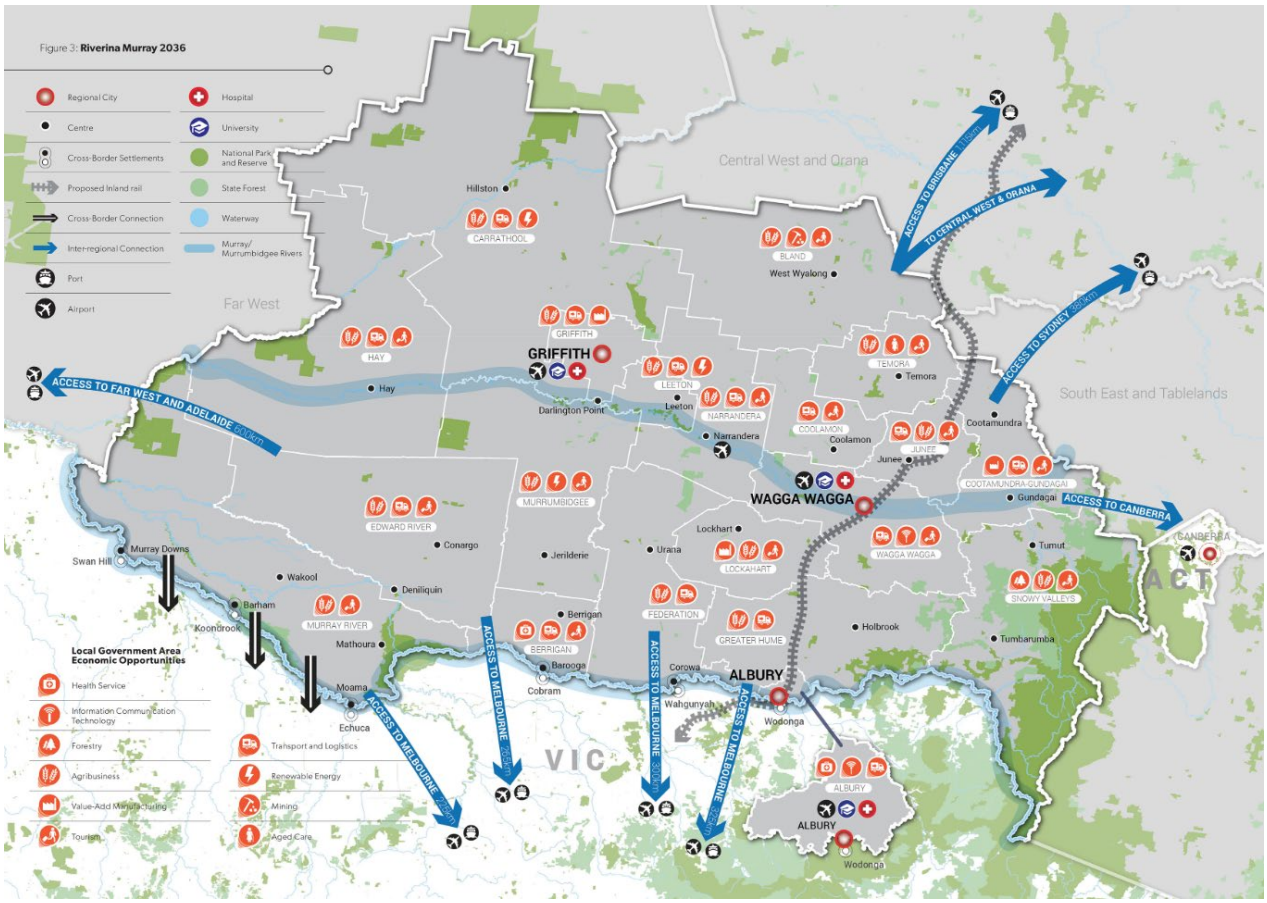


Figure 3.3 Regional Context of the Riverina Murray Region

Source: (Department of Planning and Environment, 2017)

3.3.1 Comparable Developments

This section draws on several data sources to build an understanding of the renewable energy development context of the region, to capture any ongoing social change processes in the area of social influence, and to identify how local communities have responded to change over time.

Given the location of the Project Area, in the South-West REZ, there are several other renewable energy projects that are operating, under construction, or are currently being planned. These projects are summarised in **Table 3.2** to inform an understanding of cumulative development in the region, and potential cumulative effects that multiple nearby projects may have on local communities.

A select number of comparable projects in the region have been reviewed to identify how relevant stakeholders and communities have responded to these proposed developments, to inform an understanding of the potential concerns and community perceptions in relation to the proposed Bullawah Wind Farm. These projects are outlined as follows:

Table 3.2 Comparable Developments

Project,	Location	Status	Notes on project acceptance	Likely cumulative Impact
Hay Solar Farm	Hay (approx. 40 km north-west of the Project)	Approved in 2017. Construction likely to begin in 2022, with operation expected to start in 2023.	Faced opposition from community due to disruption of current land uses as well as flood risk and disruption to Aboriginal cultural heritage.	• Traffic and transport changes. • Social amenity impacts to residents proximal to both projects (noise, visual). • Impacts on local accommodation and housing sector.
Coleambally Solar Farm – Neoen	Coleambally	Approved (Operational)	-	• Histories of poor community engagement resulting in decreased acceptance of other projects.
Dinawan Energy Hub – Spark Renewables	between Coleambally and Jerilderie	Pre-Scoping Report	-	• Traffic and transport changes. • Social amenity impacts to residents proximal to both projects (noise, visual). • Impacts on local accommodation and housing sector.
Yanco Delta Wind Farm – Virya Energy	Jerilderie (approx. 50 km south-east of the Project)	Preparing EIS	-	• Traffic and transport changes. • Social amenity impacts to residents proximal to both projects (noise, visual). • Impacts on local accommodation and housing sector.
Riverina Solar Farm – Suntech Power Development Australia	Griffith	Approved (Operational)	Received positive support from the NSW Resources and Energy Department, the NSW Department of Premier and Cabinet, and the local Griffith community as it was poised to diversify the region's energy mix and create employment (Suntech, n.d.).	• Limited impact as already operational.

Project,	Location	Status	Notes on project acceptance	Likely cumulative Impact
Darlington Point Solar Farm – Edify Energy	Darlington Point	Operational since 2020. Modification approved in 2021 to increase BESS capacity from 50/100 MWh with an expected workforce of 30-35 during construction	Community consultation generally focused on positive of economic uplift and employment opportunities. Concerns raised included visual impacts, biosecurity, and managing flood risks. No issues from consulted landholders regarding the modification.	• Low impact upon the local accommodation and housing sector during construction resulting from multiple incoming workforces.
Tarleigh Park Solar Farm - RES	23km southeast of Deniliquin.	Approved (operational)	Received 31 submissions during exhibition phase. Opposition to the project included land use conflict, in particular the impact the Project will have on agriculture productivity and long-term farming sustainability, lack of meaningful engagement and visual amenity.	• Limited impact as already operational.
Currawarra Solar Farm – RES	Deniliquin	Approved (construction to begin in 2022, to begin operation in 2023)	Lack of long-term economic sustainability, land use conflicts.	• Limited impact as it is predicted the solar farm will be operational prior to the construction of the Project.
Agriwaste Energy from Waste Facility – Agri Waste Energy	Darlington Point	Preparing EIS	-	• Increased construction vehicle traffic on local roads causing congestion and delay. • Potential pressure on local accommodation and services to house and support construction staff, and managing socioeconomic outcomes after construction.
Coleambally Battery Energy Storage System	Darlington Point	Preparing EIS	-	• Increased construction vehicle traffic on local roads causing congestion and delay. • Pressure on local accommodation and services to house and support construction staff, and managing socioeconomic outcomes after construction.

Project,	Location	Status	Notes on project acceptance	Likely cumulative Impact
Woodland Battery Energy Storage System	Darlington Point	Preparing EIS	-	• Increased construction vehicle traffic on local roads causing congestion and delay. • Pressure on local accommodation and services to house and support construction staff, and managing socioeconomic outcomes after construction.
Yanco Solar Farm – ib vogt GmbH	1km west of Leeton and approx. 45 kms southeast of Griffith	Development approval granted in 2019, with project expected to be commissioned in 2022	120 direct jobs (70 of which will local). Concerns regarding water access and use.	• Limited impact as already operational.
Griffith Solar Farm	Griffith	Approved in 2016, operational since 2018, with three approved modifications.	Increased risk of flooding and impacts to road and rail access.	• Limited impact as already operational.
Evandale Wind	Deniliquin	Approved in 2003	Received high rates of opposition from broader community members.	• Limited impact as already operational.
Burrawong Wind Farm – Windlab Developments Pty Ltd	Kyalite (approx. 190km west of the Project)	Preparing EIS	Community response has been positive. The Proposal is expected to create up to 250 FTE jobs during construction, in addition to opportunities for local contractors and suppliers. Reasons for opposition included water access and use, land use conflicts, road safety and impact on recreational and agricultural aviation.	• Limited impacts due to distance between Projects.

3.3.2 Other Major Projects in the Region

Since the announcement of the South-West REZ, there has been a focus on renewable projects in the area to support the development of this zone. EnergyConnect has begun the construction of a 900km electricity line between Wagga Wagga, NSW and Robertstown, SA, with an additional connection to Red Cliffs, Victoria. The project is expected to generate 800 regional jobs in NSW during construction and 700 during operation.

EnergyConnect will provide purpose-built camps based along the alignment, each housing between 200 and 400 people (Transgrid, 2021). Construction of the transmission line began in early 2022 with construction of the eastern alignment running from Buronga in Western NSW to Wagga Wagga due to commence in 2023 (Transgrid, 2022).

3.4 Sustainable Livelihoods Approach – Community Capitals

To understand the communities of interest to the Project and to evaluate their resilience and adaptive capacity to change, this social baseline has utilised the Sustainable Livelihoods Approach (U.K. Department for International Development [DFID] 1999) for analysis purposes.

According to this framework, people seek to maintain their livelihood within a context of vulnerability. Specifically, threats to their livelihood include shocks (such as sudden onsets of natural disasters, health problems, conflicts, and economic crises), trends (for instance, those relating to the economy, health, resources, and governance) and seasonality (such as cyclical fluctuations in prices or employment). People draw upon these assets to build and maintain their livelihood. A livelihood is considered sustainable '…when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'.

The DFID approach draws on broad categories of community capitals as a fundamental basis to identifying and further enhancing community capacity and resilience. This methodology has been further developed by Coakes and Sadler (2011) to reflect the five capitals approach – human, social, natural, physical, and economic/financial. The vulnerability of each capital area can be assessed through the selection of a suite of socio-economic indicators specific to each capital area to assess a community's vulnerability to change or conversely their adaptive capacity; and has been widely applied within the energy project context. Elements of each capital area are further outlined in **Figure 3.4** below.

Using the Capitals framework outlined above, the following sections summarises key community strengths and vulnerabilities of the study areas with additional detailed information provided in **Appendix B**.

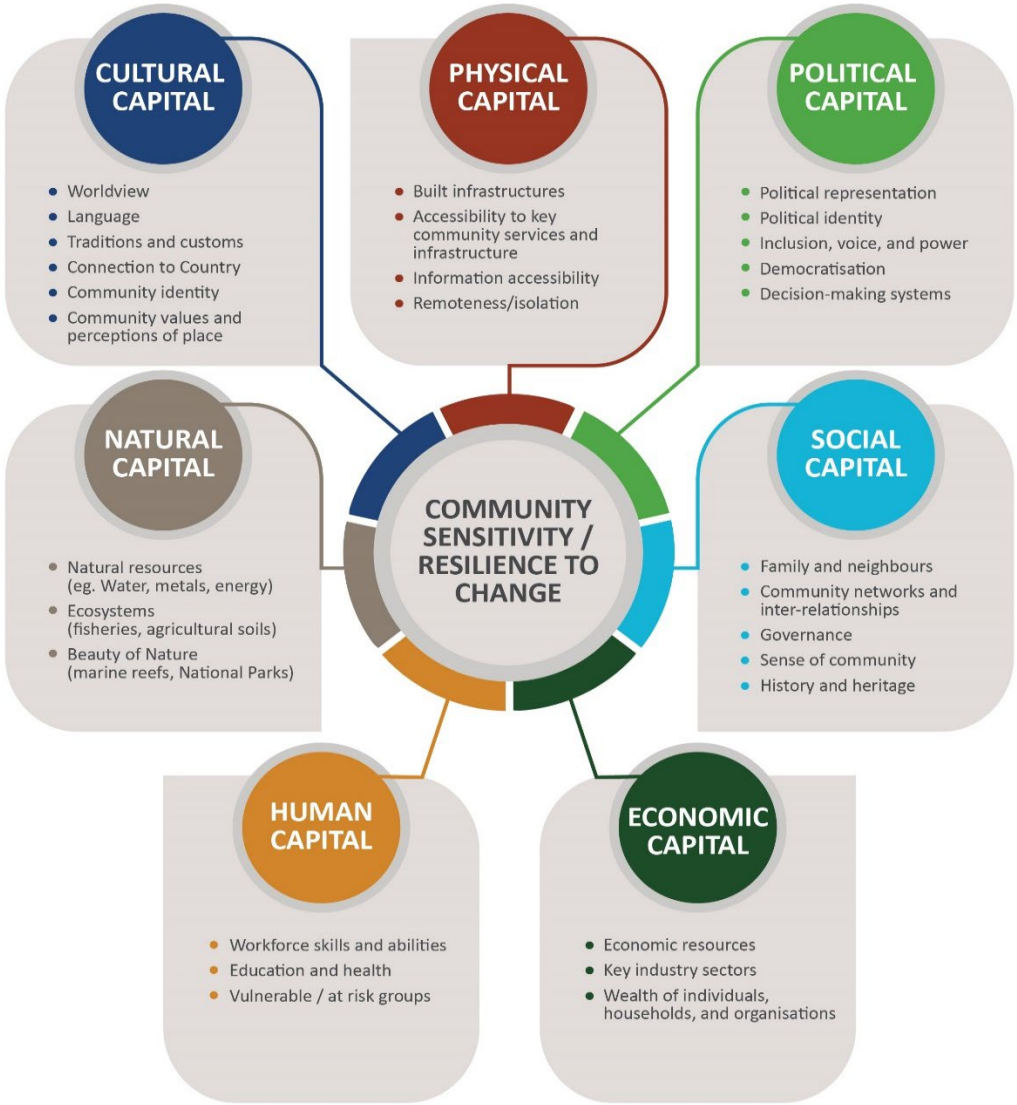


Figure 3.4 Community Capitals Framework

Adapted from Coakes and Sadler (2011)

3.4.1 Natural Capital

Natural capital refers to the natural assets and resources that contribute to community sustainability. Natural capital can include resources such as minerals, land, forests, and waterways, which provide benefit to the community, as well as environmental assets that provide cultural, social, or recreational value.

The natural capital of the Project and surrounds can be characterised as outlined in **Table 3.3**.

Table 3.3 Natural Capital Assets in the Social Area of Influence

Asset	Comment
Murray-Darling Basin and Murrumbidgee River	The Project is located within the Murray-Darling Basin. The natural variability of the river systems (including periods of flooding and drought) drives diverse and productive ecosystems. Many plants and animals are adapted to flourish through different parts of the wetting and drying cycle (Murray Lower Darling Rivers Indigenous Nations, n.d). The Murrumbidgee River runs to the north of the Project site and supports a major irrigation network. The Project Area itself sits within the Coleambally Irrigation Area,[3] providing irrigation to approximately 500 farms, with services available from mid-August to mid-May (Colleabally Irrigation, 2021). The Edward/Kolety and Wakool rivers form an anabranch and floodplain of the Murray River, north of the Murray in southern NSW.
Vulnerability to climate change	Long-term climate change projections, particularly those at the dry end of the range, are extremely challenging for Hay Shire. By 2050, the worst-case projection for annual rainfall is about 258 mm, which would render much of the Shire unsuitable for intensive dryland agricultural uses (Sinclair Knight Merz, 2016).
Natural advantages in agriculture, forestry and fishing	Agriculture, forestry and fishing is currently the industry sector with the largest output for the Riverina and Murray Region, accounting for 23.7% of all output (worth $4,451.6m). In 2016, cereal crops (worth $746.3m) were the greatest agricultural commodity of the region, followed by livestock slaughtering (worth $571.9m). A downturn in agriculture within the region would therefore impact the regions overall economy.
Natural beauty and tourism opportunities	Hay brands itself as 'Big Sky Country' and as the only place in NSW where visitors can experience an uninterrupted 360-degree view of the sunrise or sunset (The Riverine Grazier, 2022). The vast, flat landscape of Hay Plain is claimed to be one of the world's three flattest places and the landscape provides a spectacular backdrop for photographers, astronomers and nature lovers (The Riverine Grazier, 2022). The Sunset Viewing Area, located to the north of Hay is a popular spot for tourists to the area. This emphasis on natural beauty and flat landscapes is a form of natural capital throughout much of the region. The smaller towns in the region have begun marketing themselves as areas that focus on rural tourism. Darlington Point has a growing focus on rural tourism, focusing on fishing, swimming, boating and featuring the Altina Wildlife Park. Coleambally and Jerilderie both market themselves as 'RV friendly towns.
Oolambeyan National Park	The Oolambeyan National Park, located to the north of the proposed Project site. The Park is 21,851 hectares in size and offers excellent opportunities for birdwatching and bushwalking (Office of Environment and Heritage, 2014). A main attraction within the national park is the Homestead picnic area, located on the northern border.
Home to the Plains Wanderer Birds	The area is home to the Plains Wanderer, a small quail-like bird. Plains-wanderers prefer sparse native grasslands, which typically occur on hard red soils. An open grassland structure with around 60% bare ground allows birds to easily move about, find seeds and insects to eat, and to detect and slip away from predators like foxes. Plains-wanderers will disappear from the habitat that becomes too sparse or too dense. There has been a severe decline in numbers of Plains Wanderers in NSW since 1920, and they are now considered a critically endangered species in the region. A main reason for this decline is due to the conversion of native grasslands into land consisting of dense pastures and crops that is apparent throughout the region (Office of Environment and Heritage). The majority (>99%) of records of plains-wanderers in New South Wales over the past 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south and Urana in the east. This land is therefore extremely significant to the on-going protection of Plains Wanderers as the birds are now effectively extinct in previously populated areas such as eastern NSW, south-

[3] Despite this, there is relatively little irrigation cropping carried out within the Project Boundary, which consists primarily of grazing land.

Asset	Comment
	western Victoria and south-eastern South Australia (NSW Office of Environment and Heritage , 2019)

3.4.2 Human Capital

The level of human capital within a community is assessed by considering population size, age distribution, education and skills, general population health and the prevalence of vulnerable groups within the community. In comparison to NSW, the social area of influence has the following key characteristics, as outlined in **Table 3.4**.

Table 3.4 Human Capital

Item	Comment
More Aboriginal and Torres Strait Islander people	The three LGAs have a higher proportion of Aboriginal and Torres Strait Islander residents than the NSW average (Edward River LGA 4%, Hay LGA 6%, Murrumbidgee LGA 8%, compared to 3% in NSW).
An older population	Currently, 22% of the population in both Edward River and Hay are aged 65 and over, compared to 16% across NSW and 17% in Murrumbidgee LGA. The three LGAs have a higher median age, ranging from 41 to 46, than the state average of 38 years. Jerilderie SA2, located in the Murrumbidgee Shire has the highest median age (48 years) of the study communities.
Slower (or no) population growth	The population across Hay is predicted to decline in the coming 20 years to 2,400. Both the working age population and number of children is predicted to decline, however the number of people aged 65 and over is estimated to increase. These rates are reflected in the population projections for Edward River LGA, where a population decrease is also predicted. The population of Murrumbidgee LGA is predicted to remain stable, however it is predicted there will be an increase of people aged 65 and over.
Relevant industries	Industry employment is similar across both LGAs, with Construction –employing 11% Professional, Scientific and Technical Services – 3.2%
Lower post-school qualification levels	Education levels across the three LGAs are significantly lower when compared to NSW, with less people completely year 12 or equivalent, and a greater percentage completing year 9 or below. Certificate level qualifications are the most common post school qualification across the three LGAs, in line with the state, accounting for 19-22% of the population. However, the rate of bachelor's degree attainment is significantly lower than the state average (Edward River LGA 8%, Hay LGA 6%, Murrumbidgee LGA 7%, compared to 16% in NSW).
Similar mental health outcomes	Edward River LGA experiences similar rates of mental health and behavioural problems (22.4 ASR per 100) as the state (22.3 ASR per 100) and sits relatively close to the state in terms of high or very high psychological distress (12.7 ASR per 100 compared to 12.4 ASR per 100). Murrumbidgee LGA has a slightly lower level, sitting at 10.8 ASR per 100.
Lower self-reported health outcomes	Self-assessed levels of fair or poor health are also higher across the three LGAs than the state (15.6 in Murrumbidgee, 16.4 in Edward River, and 17 in Hay compared to 14.1 in NSW). The Murrumbidgee Local Health District, which incorporates the three LGAs, reported a significantly higher rate of avoidable deaths than NSW, with this rate much higher for males than females.
Lower educational and occupational related skills	The SEIFA Index of Education and Occupation (IEO) for each of the SA2's and LGAs is shown in **Figure 3.5** and reflects the general level of education and occupation-related skills of people within an area, indicative of relative disadvantage compared to other areas in NSW.

Item	Comment
Substantial problems finding and retaining staff	Labour shortages is a key challenge in the area of social influence. A Skills Study conducted by the Riverina RDA in 2021 found that 78% of respondents reported difficulties filling vacancies, with an average of 48% of all vacancies unable to be filled in the past 12 months. The key issues identified as to why these vacancies could not be filled was due to a lack of qualified/experienced candidates, or candidates unwilling to move to regional areas (Renkin & Bamberry, 2021). The top 5 industries reporting staff shortage issues were accommodation and food services, agriculture, forestry and fishing, health care and social assistance, manufacturing, professional, scientific and technical services. These impacts have flow on effects, increasing workloads for existing staff, decreasing capacity to take on new work, decreasing productivity and increasing stress levels (Renkin & Bamberry, 2021).

Figure 3.5 indicates the communities of interest to the Project in relation to their levels of relative education and occupation. As the figure illustrates, the highest IEO index across the communities is within the 5th decile, indicating that approximately half of the other SA2's and LGAs in NSW have a higher level of education and occupation-related skills in comparison. Specifically, Griffith has the lowest level of education and occupation-related skills compared to the other communities within the area of social influence and is within the lowest 20% of NSW.

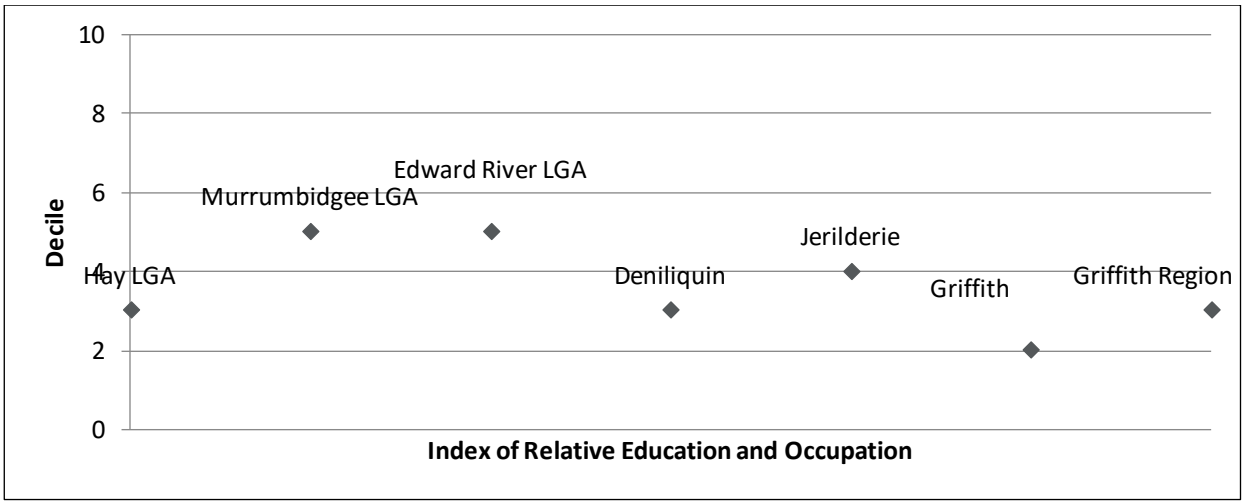


Figure 3.5 SEIFA Index of Relative Education and Occupation

Source: SEIFA 2020

3.4.3 Social Capital

Various indicators can be used to examine and assess social capital. Such indicators can include the level of volunteering, population mobility, crime rates, and the demographic composition of the community, such as the percentage of people born overseas, language proficiency etc. The following provides a summary of the key characteristics of the study areas from a social capital perspective, with the dataset available in **Appendix B**.

Compared to the broader population of NSW, the area of social influence is characterised in **Table 3.5**.

Table 3.5 Social Capital

Item	Comment
A more homogenous population	The percentage of people born overseas is low across the majority of study localities, ranging from 7% to 10%. The most diverse locality is Griffith SA2 with 24% of the population born overseas, sitting much closer to the NSW average of 30%. The three LGAs have high percentages of households where only English is spoken at home, all higher than the state average of 68.5%.
A more settled, less transient population	The percentage of people living at the same address 5 years ago is consistent across the three LGAs (58%), sitting slightly higher than NSW average of 54%. Griffith Region SA2 has the least transient population, with 63% living at the same address 5 years ago and Griffith SA2 is the most transient, sitting at 54%. The higher transience of Griffith SA2 is to be expected given the higher proportion of renters compared to other SA2's.
A higher proportion of people living alone	The three LGAs have a higher percentage of lone person households than the state. Similarly, all LGAs have SA2's with a higher rate of families without children than across the state (37%), which is particularly noticeable in Jerilderie SA2 (51%).
Higher levels of volunteerism	Volunteer rates across Edward River LGA (27%), Hay LGA (27%) and Murrumbidgee LGA (29%) sits higher than the state average (18%). Griffith SA2 is the only area with a lower volunteer rate than the state, sitting only one percent lower. Edward River Council recognises that whilst the LGA has limited resources, its strong community networks and groups are a key asset contributing to the area.
Higher levels of socio-economic disadvantage	**Figure 3.6** provides the overall socio-economic status and level of disadvantage within each community, as determined by the Index of Relative Socio-economic Disadvantage (IRSD) - a SEIFA score prepared by the ABS which ranks areas in Australia according to relative socio-economic disadvantage. A low score indicates a greater degree of disadvantage, with the lowest 10% of areas receiving a decile of one, and the highest, ten. When considering the relative socio-economic disadvantage of communities within the area of social influence, the locality of Deniliquin has the most disadvantage. More broadly, Murrumbidgee LGA has a lower level of socio-economic disadvantage than Hay LGA.

Figure 3.6 indicates the communities of interest to the Project in relation to their levels of relative socio-economic disadvantage, with the figure illustrating that all SA2s and LGAs in the area of social influence are below the Australian average for socio-economic advantage.

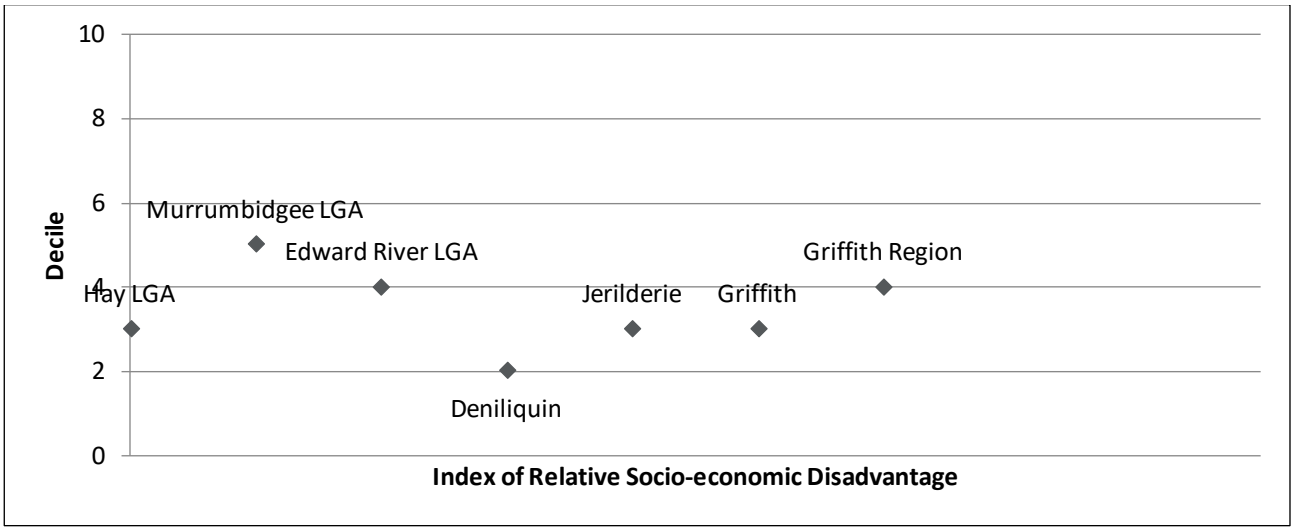


Figure 3.6 Index of Relative Socio-economic Disadvantage

3.4.4 Economic Capital

Examining a community's economic capital involves consideration of several indicators, including industry and employment distribution, workforce participation and unemployment, income levels and cost of living pressures, such as weekly rent or mortgage repayments. The following provides a summary of the key characteristics of the communities within the area of social influence from an economic capital perspective, with the complete dataset in **Appendix B**).

Compared to NSW, the area of social influence is characterised in **Table 3.6**.

Table 3.6 Economic Capital

Item	Comment
Different employment outcomes, with variation across the LGAs	Unemployment rates as of December 2021 varied across the LGAs with Edward River continuing to experience the highest rates of unemployment sitting at 6.3% compared to the state average of 4.1%. Murrumbidgee has the lowest rates of unemployment (2.3%), continuing to decline since September 2020. Unemployment in Hay and Edward River also saw a slight decline in unemployment in the last quarter of 2021 (see Figure 3.9).
Higher rates of home-ownership	Hay Shire has the highest rate of home ownership without a mortgage across the LGAs (41.3%), and Jerilderie has highest rate across all localities (43.7%). Despite all localities having higher rates of home ownership without a mortgage than the state average of 32.2%, all localities sit below the state average of home ownership with a mortgage. This is reflective of an older population and a rural population where properties are often passed from parents to children over generations.
Lower housing costs	Median mortgage repayments are far lower than the state average of $1,986/month in all localities, with residents in Murrumbidgee LGA having the lowest repayments ($900) and residents in Griffith SA2 having the highest repayment of all localities at $1,500/month. These rates are reflected in rent payments with all localities sitting below the state average of $380/week. Griffith SA2 has the highest median rent ($230) and Griffith Region SA2 the lowest ($150). The total weekly household income across all localities is lower than the state average of $1,486. Jerilderie SA2 has the lowest weekly income and Griffith Region SA2 the highest ($992 and $1,315 respectively).

Item	Comment
Substantial regional strengths in agriculture and manufacturing	The agricultural industry is the top industry of employment across the three LGAs, accounting for 36.4% in Murrumbidgee, 23.8% in Hay and 16.6% in Edward River. Despite agriculture also being the top industry of employment in Griffith Region SA2 (30.5%), it was much lower in Deniliquin and Griffith SA2's, accounting for only 7.1% and 7.7% respectively. Griffith SA2 has a high percentage (19.3%) of workers employed in the manufacturing industry, with all localities outside of Hay having a greater percentage of people employed in manufacturing than elsewhere in the state. The Edward River Region supports a wide range of agricultural industries through a combination of dry land and irrigated farming practices, with one of the most extensive high water irrigation areas in NSW (Edward River Council, 2020). As explored in **Section 3.4.1,** the Riverina region is highly dependent on agriculture as its main industry output. Recent experiences of drought and associated low irrigation water allocations, as well as poor commodity prices in some sectors, has therefore placed considerable strain on both the community and economy (Sinclair Knight Mertz, 2016).
A growing focus on tourism	The tourism sector in the region continues to grow, becoming an increasingly significant component to Edward River's current and future economic profile. Both Hay Shire Council and Murrumbidgee Council have also identified opportunities to promoting and enhancing tourism to contribute to economic prosperity of the region (Hay Shire Council, 2017) (Murrumbidgee Council, 2017). Tourism assets have been shaped by its location on the Edward River and water and nature-based activities (Edward River Council, 2020). Edward River LGA saw a spike in tourism in the 5 years until 2020, with top visitors to the Riverina Murray area more broadly consisting of overnight visitors visiting friends and family, business and families with young children (Edward River Council , 2020).

3.4.5 Physical Capital

Physical or built capital includes provision of infrastructure and services to the community. Within this capital area it is important to consider the type, quality, and degree of access to public, built and community infrastructure (including amenities, services, and utilities) as well as housing.

The area of social influence is characterised in **Table 3.7**.

Table 3.7 Physical Capital

Item	Comment
Strong road and rail infrastructure	The region is well connected via various major highways, as outlined in **Table 3.4**. Murray and Southern Riverina regional towns are strategically placed along Australia's main north-south transport corridor, linking the region to populated markets and business economic centres. However, the rail network remains suboptimal due to inflexible scheduling, structural problems and track damage (Riverina And Murray Joint Organisation , 2020). Beyond this, the Riverina-Murray Strategic Plan identifies the need to update regional connections, including freight and road lines, with heavy vehicles access through towns and cities an issue across the region. Hay is not currently serviced by rail infrastructure. The NSW Government are supporting the development of a $11 million upgrade of the Riverina Highway (Environment, 2017). Since 2016, there has been a reduction in road incidents within Edward River LGA, however Edward River Council continues to recognise the ongoing opportunity to increase road safety.
High reliance on cars for journeys to work	Journey to work patterns align with the heavily agricultural land use and dispersed development patterns across the area of social influence. Overall, the data shows a heavy reliance on motor vehicles across the regional study area to access employment. Hay and Murrumbidgee LGAs have a slightly higher rate of residents who travel to work by car than the state average of 58%, with this significantly higher in Edward River (68%). Deniliquin and Griffith have the highest rates of car travel of all localities, with 72% and 74% of residents travelling to work by car.
Lower access to internet	The proportion of household with internet access is lower than the state average across all localities, with Hay LGA having the lowest percentage of 73%, compared to 85% in NSW.
Extremely low rental vacancy rates	Residential vacancy rates spiked in Hay between late 2018 and mid-2020, however have seen a sharp decline since July 2020. As of March 2020, residential vacancy rates sat at 0.3%. Darlington Point and Deniliquin have seen similar trends since 2018. Deniliquin has had a vacancy rate no higher than 0.2% since July 2020 and Darlington Point has had no residential vacancies since October 2021. Despite an increase in residential vacancies in Griffith prior to the onset of COVID-19 lockdowns across the country in 2020, vacancy rates have remained relatively low since March 2020, with brief spikes in December 2020 and 2021.
Low rates of properties for sale	The number of properties on the market in Hay has seen an overall decrease since 2017, with a total of 45 property listings in April 2022. Similarly, this has also been experienced in Deniliquin and surrounding areas including Darlington Point and Coleambally (SQM Research, 2022).
High tourism rates	The Murray region saw a spike in tourist accommodation occupancy rates between the June quarter of 2020 and 2021 from 22.07% to 58%. Similarly, the occupancy rate of the Riverina rose to 74.7% in the June quarter of 2021, making it the region with the greatest occupancy rate across the country. Important to note is the impact of COVID-19, with the September 2019 quarter having similar rates to 2021 at 54.8% in the Murray and 71.2% in the Riverina (Destination NSW, 2021).
Several hospitals and health care facilities, but a desire to the increase access to services	There are a variety of health care facilities across the various LGAs, including Deniliquin Hospital, Griffith Base Hospital, Hay District Hospital and Tocumwal Hospital, alongside a range of other clinics and health centres. Despite this, it has been noted that a key challenge for Hay is maintaining access to services that support the Shire's population, including high quality health, education, cultural and recreational services (Sinclair Knight Mertz, 2016). Similarly, Edward River Council have listed improving essential services, alongside infrastructure, transport and communication services as key to improving the wellbeing of its residents. The three LGAs have lower rates of people who experienced a barrier to accessing healthcare than the state. This was particularly evident in Murrumbidgee LGA.

Source: (Transgrid, 2022) and (Transport for NSW, 2022)

3.4.6 Cultural Capital

The Murray Darling Basin has always been a heartland for Aboriginal culture in South eastern Australia. The rich resources supplied by its river systems support dense populations, with sophisticated economic, cultural and spiritual practices. Water is the key driver for these productive cultural and ecological landscapes.

The greater Riverina-Murray region is rich in Aboriginal heritage, with the rivers spiritually and culturally significant for Aboriginal communities across the region including the Yorta Yorta, Wiradjuri, Wamba Wamba, Barapa Barapa, Wadi Wadi, Muthi Muthi, Latji Latji, Barkandji and Nyampa peoples (NSW Government , 2017). The Project Area sits to the Northeast of a Native Title Claim submitted in December 2021 to the Federal Court by Wamba Wamba.

Several Aboriginal organisations operate in the area including the Tirkandi Innaburra Cultural Development Centre NSW in Coleambally and Waddi Housing and Advancement Corporation in Darlington Point. The Yarkua Indigenous Knowledge Centre was also formed in 2003 as a place to hold archival material, provide education and research services, undertake cultural heritage and environmental work, provide community services and, more recently, acquire land (Yarkuwa 2011).

3.5 Local Challenges and Opportunities

In summary, key challenges and opportunities being experienced in the region are outlined in **Table 3.8**. Key challenges include the need to provide for an ageing population with limited health services and addressing the existing strain on short-stay accommodation provision.

The natural resources combined with the region being home of the endangered species of Plain Wanderer, and similarly the vulnerability to climate change and water security, are also regional constraints that have been identified.

To further support regional development, issues such as ageing infrastructure, traffic congestion and the emerging strain on local service provision need to be addressed, as well as upgrades needed to road infrastructure and the telecommunication network.

Table 3.8 outlines the key challenges and opportunities for the region.

Table 3.8 Local Challenges and Opportunities

Challenges	Capital	Opportunities
• Traffic congestion • Road infrastructure and road surfaces require upgrade • Lack of public transport options • Broadband and mobile coverage need upgrading • Rapid development associated with the REZ designation generating potential strain on infrastructure • Shortage of short and long-term accommodation to meet construction worker need • Vulnerability to climate change.	Physical	Upgrades and development of recreational infrastructure including Hay Park. Recent upgrades to local roads. Strong road infrastructure and freight hubs in Murrumbidgee.
• Water security challenges • Vulnerability to climate change • Endangered Plain Wanderer species.	Natural	High-value habitat for Plains Wanderer birds. Area has quality agricultural land. Community values the beautiful natural environment. Area has been identified as having favourable natural resources for renewable energy development (sun and wind). Rich biodiversity due to Murray-Darling Basin and rivers. Nature-based tourism, particularly in relation to fishing and water sports.
• Ageing population • Slow population growth or population decline • Lack of services or facilities for young people • Concern about suicide and mental health	Social	Growing tourism sector. Strong sport and water-skiing facilities and cultures. Tight-knit community. High levels of volunteerism. Representation of Aboriginal and Torres Strait Islander people in the community. Low prevalence of crime. Low mobility of residents resulting in sustained sense of community.
• Potential for labour force competition due to multiple planned projects in the REZ • Increasing retirement age population leading to decrease in skilled employee base • Low median weekly household income resulting in less spending in the local economy	Economic	Diversifying agricultural ventures in the area. Low cost of living. Deniliquin is home to a thriving manufacturing and light industrial sector centred primarily around engineering products for the rural and agricultural sector. Key tourism events such as Deni Fest.

Challenges	Capital	Opportunities
• Strong reliance on agriculture.		
• Limited health services. • Difficulties in attracting and retaining General Practitioners (GPs) • Limited tertiary education options • Ageing population.	Human	Population increasing. Land values increasing. Tight-knit community with strong support networks.

3.5.1 Identification of Vulnerable Groups

Through the development of the social baseline profile and analysing the outcomes of the different engagement activities, the following population groups within the area of social influence have been identified as potentially having vulnerability to the social or economic changes that the Project, and the cumulative effects of other developments across the region, may bring:

- Youth and elderly residents affected by the lack of services.
- Local Indigenous residents.
- Residents or property owners whose property access and livelihoods may be affected.
- Regular users of short-stay accommodation and tenants within the private rental market.
- Residents who have difficulty in access telecommunication services.
- Local job seekers.

4.0 Perceived and Likely Social Impacts

This section analyses and discusses the scoped issues and impacts (positive and negative) in relation to the Project. The analysis has been framed in accordance with the social impact categories outlined in the Guideline (DPE, 2021) and standard SIA practice and identifies community consultation responses from different engagement activities undertaken to date.

4.1 Summary of Findings

Of those consulted in the scoping phase of the SIA (n=30):

- 58% were males and 42% females.
- Most respondents were middle aged and older. 42% were between 35–54 years old, 19.5% were between 55–64 years old and a further 19.5% were over 65 years old. Only 6% of the respondents were aged between 18–34 years old and 13% of the respondents preferred to not disclosure their age.
- 52% of respondents identified themselves as a community member, 35% identified themselves as a neighbouring landholder and 13% as being part of a community group (Indigenous groups, local government, local business, chamber of commerce).

When respondents were asked to rate their level of acceptance towards renewable energy projects in the region on a scale of one (1) to ten (10), with one (1) being not at all accepting and ten (10) being very accepting, 72% provided acceptance ratings of nine (9) or ten (10), with only 13% providing ratings of five (5) or less; illustrating positive support for the Project (median acceptance score of 8.1 out of 10).

Further description of the scoped social impacts, as gathered through consultation with key stakeholders and community members, are noted within each SIA category or theme, and described in the following sections.

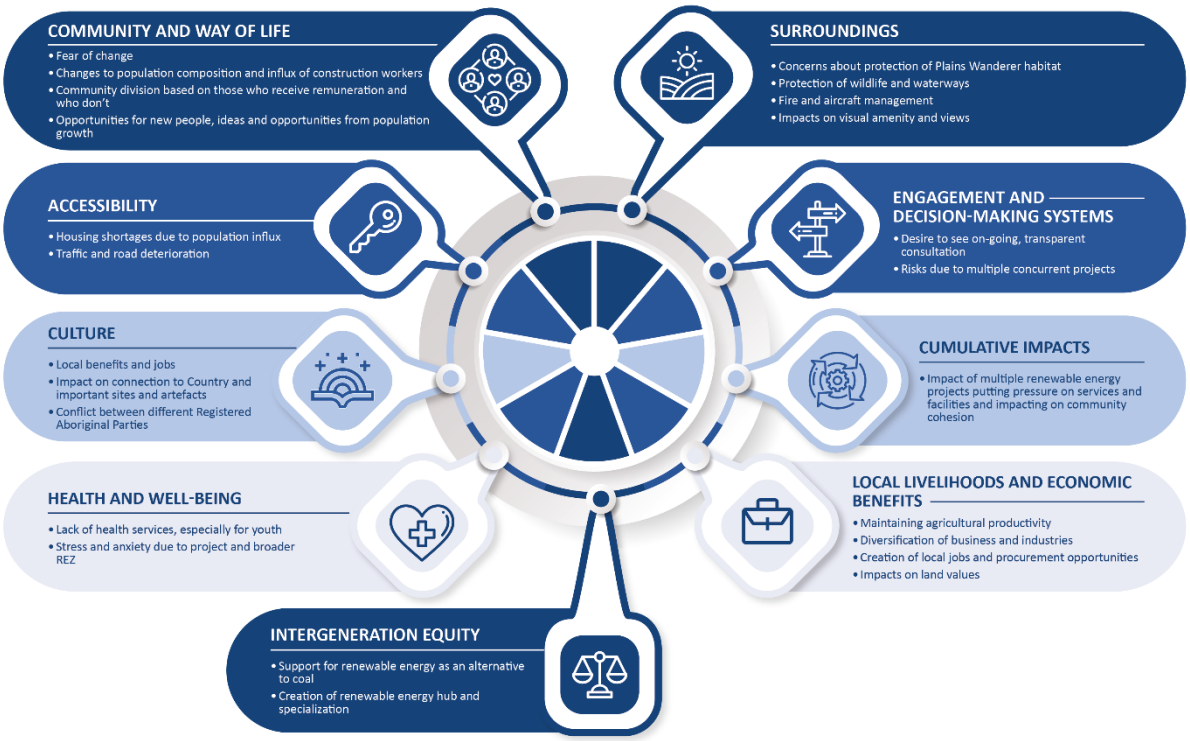


Figure 4.1 Social Impact Categories

4.2 Community and Way of Life

The area of social influence is often described by locals as a 'tight-knit community.' When asked what they most liked about living in the area, survey respondents raised the rural lifestyle, the sense of community, the ability to raise kids, the beautiful community support and the focus on sport and water skiing in the area; with key strengths of the community noted in responses obtained.

> *"Friendly, supportive of one another, we raise a lot of money for a lot of causes… The local businesses and communities rally together."* – Neighbouring landholder

Some respondents expressed that the introduction of renewable energy projects may impact on their way of life, with these concerns largely associated with changes in land use, and the potential impact on agricultural business. A future rise in the population was also raised as potentially having both positive and negative impacts. While for some, an increase in population was perceived as bringing much needed new energy, people and opportunities to the region; for others, population increase during Project construction was seen to place increased pressure on local services and infrastructure.

When reflecting on openness to changes to way of life in the area, one neighbouring landholder commented:

> *"[Our community is] pretty private and proud. I grew up and live in Hay, I don't completely love it, but it is where we are. I think the Hay public are proud of their town and I don't think they like too much change. The farming community are open to adapting our ways to help us in the future."*

Remoteness or isolation was also a common theme from respondents, who valued the open spaces and distances but also saw themselves as having access to services and other people when needed.

> *"Hay is a really well balanced and vibrant community. Its isolated enough, but not too isolated. It's a community minded town. You can go down the street and know most people. It's very agriculturally based. It relies on prosperity of the river, It's a resilient community. It doesn't have the impact of alternative industries at the moment."* – Neighbouring landholder

> *"It's a really good place to live. We're remote, it's the edge of the outback, properties are large but Hay is a great town, great water skiing, sporting, 4 1/2 hours to Melbourne, an hour to Griffith. Its far enough away you're not living on top of people, but close enough that you still have access to a lot of things."*

Based on comparable projects with large temporary workforces in regional and rural settings, communities can also experience changes to the composition and character of local towns due to transient workforces. Over time, this can potentially cause a level of income disparity between differing groups of the population.

4.2.1 Community Cohesion

A few respondents raised concerns about the possibility of the Project causing community division or conflict. A neighbouring landholder noted:

> *"Potential for community division – some of the farmers getting the turbines are a bit secretive about it all. No one wants to miss out on getting turbines on their land. Everyone wants to have the opportunity."*

This is a common concern in wind farm developments, where host landholders receive financial remuneration and neighbouring landholders either question the amount of compensation or the decision-making process for how remuneration (or lack thereof) is decided. Where large divisions in the community emerge in response to real or perceived unfairness in payments and impacts, community cohesion can decline.

A further concern related to the influx of workforce, changing the dynamics of the town – especially as multiple concurrent projects may occur in response to the region being designated as a REZ. This population influx will likely be temporary as construction workforces enter the region and leave when construction concludes. Depending on how these workforces are housed or serviced, there is potential for changes to community cohesion or connection as short-term populations compete with long-term residents for access to services and facilities (refer to section 4.3 for further discussion of this issue).

4.3 Accessibility

Accessibility was also raised as an area of concern by stakeholders' respondents, especially as it relates to transmission line capacity, access to accommodation and impacts on road and transport networks.

Respondents raised concerns about existing solar farms not being efficient due to the lack of transmission line capacity. As one stakeholder explained:

> *"Unless energy can be stored, there isn't local benefit because there is so much solar energy in the day that the price drops and the grid can't handle it."* – Local community group member

Accommodation and housing needs (both affordability and availability) during the Project's construction period were also raised as a concern. Respondents noted that existing accommodation levels wouldn`t be sufficient and could drive local communities out of town due to the lack of housing. This matter was also raised by a local council representative, who argued that the Project should consider a comprehensive workforce accommodation strategy that includes accommodation camps instead of utilising local hotels and motels. Consultation participants outlined that there was a need for more rental housing in the region and also a need for temporary workers accommodation to avoid pressure on existing housing.

Anticipated impacts on traffic and local roads were also raised by stakeholders. Neighbouring landholders raised concerns relating to an increase in noise and traffic in the locality which could cause day-to-day amenity disruption for nearby residents, as well as an increase in commuter travel times.

Respondents similarly noted recent local road upgrades and widening projects in the Hay Shire, arguing that, despite this work, road conditions had worsened. One stakeholder argued that the Project may require improvements to local road networks to avoid negatively impacting local communities. The community recognise that those improvements will in turn also improve the accessibility and quality of local infrastructure provision for the wider community.

> *"Damage to local roads and bridges by heavy construction transport trucks. – Talk to local councils to ensure they know far enough in advance to apply for funds and complete local roads upgrades to required standards. The development should leave the local roads in better condition for the future."* – Community member

While not raised as an impact of the Project, community members also identified a lack of access to phone and internet reception as a key concern for the region. Several stakeholders referred to the region as a telecommunication 'black spot.'

> *"Telecommunications infrastructure – at the moment it's a huge problem. At the farm we have a satellite dish, and we only get service around the house. You don't get any Telstra or Optus service. It's needed for emergencies – I had an accident a few weeks ago and if I didn't have someone with me it would have been bad because I wouldn't have been able to contact anyone."*

4.4 Culture

Elements of cultural effects have been raised as a concern for the Project, such as those relating to artefacts, cultural sites and connection to Country. There is a large Indigenous population in the area of social influence;7.5% of the total population in Murrumbidgee is composed of Indigenous people and 6% are in Hay. Aboriginal stakeholders noted their desire to see benefits flow to the local Aboriginal community and to see pathways to jobs and training for local Aboriginal people. Particular programs included local well-being programs and school initiatives.

Stakeholders raised issues with less effective engagement processes on another proximal windfarm, explaining that there are tensions between different Local Aboriginal Land Councils in the area. Impacts upon culture and on local Aboriginal communities will be further explored during the next phase of the SIA and in the preparation of the EIS.

4.5 Health and Well-Being

A minority of residents identified a potential increase in level of anxiety and stress due to uncertainty of the project commencement timeframe. This is a common theme in large infrastructure projects, where uncertainty, fear of the unknown and a sense of loss of control over surroundings and processes can drive anxiety and stress (psychosocial impacts) surrounding projects. A level of anxiety was also raised by the community due to cumulative impacts because of the many different projects within the Southwest Renewable Energy Zone (REZ).

Surveys identified community concerns relating to a lack of social services and health infrastructure in the area. In particular, a lack of youth-focused services and facilities in the area was seen to be leading to higher levels of crime or anti-social behaviour and was resulting in young people leaving the area. Suicide, and youth suicide was raised across a few surveys and meetings.

> *"Need to look after youth. There are no youth services. We are trying to get funding for a youth worker. We have had youth suicides and there is nothing for youth in terms of support. Run some youth programs. Children go out of town to go bowling, but other than that there are no activities - leads to underage drinking"* – Neighbouring landholder

> *"We have issues with not having a youth worker - we don't have youth services. They come and go from other regional areas - there is no consistency and that is what young people need. There are definitely mental health concerns that roll on from this."* - Neighbouring landholder

While many respondents explained that current levels of health services were sufficient, some argued that there was a shortage of health practitioners in the region and people had to travel long distances to access services and facilities.

> *"Health services are lacking but we do have good hospital. We have 2 doctors now but there was a real shortage not too long ago."* – Neighbouring landholder

Concerns about a lack of health services are likely to be exacerbated by an incoming workforce, as the growing population competes for access to services and infrastructure.

4.6 Intergenerational Equity and Perspectives on Renewable Energy

Respondents frequently noted the potential Project benefits to broader environment values arising from the generation of low emission energy. For some, this was directly related to addressing climate change. Community members in general support the establishment of renewable projects of this nature in the region and have expressed enthusiasm for the Southwest REZ and the renewable energy providers it will attract to the region. For instance, a respondent noted the potential of the Project to bring renewable energy education and career opportunities to local people; with a further respondent outlining that the Project should strive to *"create a feature of the Wind Farms e.g. The Renewable Energy Centre of Australia."*

Some respondents identified the broader benefit the Project has as part of the renewable energy transition for Australia, and in turn its contribution to the sustainability and wellbeing of future generations. As part of this, stakeholders saw a positive role for the Project to facilitate research and knowledge sharing into community decarbonisation efforts and biodiversity protection.

For many, renewable energy was positioned as an inevitable and positive alternative to coal-fired energy, as noted in the following quotes.

> *"The more of them [renewable projects] the better. It's better than burning coal and flooding Lismore. The more renewables the better."* – Neighbouring landholder
>
> *Renewables need to quickly replace coal* – Community group member
>
> *I believe this is an opportunity for Australia to become less reliant on scarce resources* – Community group member

4.7 Surroundings

Some community members were concerned in relation to the impact of the Project on the natural environment and particularly the natural habitat of the Plains Wanderer. As discussed in **Section 3.4.1** (Natural Capital), the Plains Wanderers are critically endangered, and the majority of its remaining population lives in the Riverina region where the Project is located. Concerns were raised regarding the management of the land as crucial habitat for the species, and the potential impact of turbine noise. As community members raised:

> *"The area is straight through a Plains Wanderer habitat, one of the most endangered birds in Australia. Have you considered that?"* – Local community group
>
> *"Why is it next door to a national park set aside for endangered birds?"* – Community member
>
> *"It would be prime Plains Wanderer country and I don't want to see them put at risk. You won't find them near trees as hawks can get at them. Make sure hawks can't land on the turbines or you'll wipe out the Plains Wanderers."* – Community member

Many landholders in the area have a strong connection to this species, with local landholders working with the NSW Government in the *Bringing Plains-wanderers back from the brink* project to improve grazing management practices on areas of plains-wanderer grassland habitat.

When discussing outcomes of the project, stakeholders raised that support to create smaller paddocks to create a safer environment for Plains Wanderers would also support the bird population. Similarly, others raised the opportunity for biodiversity offsets to support improvements to the management of the Oolambeyan National Park or other key habitat areas.

Environmental impacts were also raised in the context of other wildlife and ecosystems in the area. For example, a community member raised a concern regarding the potential effect of the project on the natural flow of local waterbodies, or impacts on other bird species e.g., eagles. A neighbouring landholder similarly noted:

"Major concern is the wildlife - we have spent a lot of money doing shelter belts on trees, as have neighbours. The road we live on is one of the main family-owned farms and we are big on conservation and sustainability. We do not want to detract from wildlife. We're concerned about the noise and how far it radiates and what this will mean for the wildlife. We have spent a lot of money attracting the wildlife, as have neighbours. We don't want to detract from that."

4.7.1 Fire Management and Aircraft Movement

Some community members raised concern of fire management in the area, particularly in between October and March which is considered bushfire season. For them, the presence of the turbines could present a challenge, especially on very high fire danger days. It was noted by one community member the need for work safety procedures during these days.

"One thing that has come up is that we use aircraft a lot for spraying. We think if we have a huge fire out here, we would use planes, but how would that fit in with a turbine environment? Fire risk associated with the turbines too – there's a lot of grass out there so it would really impact if there was any sort of fire."

4.7.2 Visual Amenity and Views

Feedback from information sessions and interviews highlighted comparatively little concern about visual impact. While some stakeholders explained that the turbines would be '*not overly attractive*.' (Riverina, 2022), people referenced the visual impact in the context of a relatively homogenous landscape. For some, this change was considered acceptable, given the nature of the project:

"Aesthetically it will be a change - it's very flat plains and you can see things for a long way. It'll be a way from us so won't impact us too much. If you can see it would be a small visual imprint. We won't be looking and seeing turbines for the whole horizon." – Neighbouring landholder

For two respondents, wind farms were considered a strong negative visual impact on the landscape.

"The landscape itself is the feature and filling it with wind turbines will forever change the landscape."

Despite this, many people explained that the Project was well-located and that distances from neighbours meant impacts would be minimised. As one neighbouring landholder noted:

"There's plenty of room out here for turbines. I can drive from Deniliquin and not see anyone so I don't think it will impact too many people."

Respondents also argued that the Project was well-located to capitalise on wind resources.

"I think its common sense, we live in an area with a fair bit of wind and a lot of sunshine. That's the way it's going to be. Europe are way in front of us and we need to catch up, we get a lot more sunshine." – Neighbouring landholder

Many of those surveyed explained that they were not greatly concerned about the visual impact of the turbines, with some landholders seeing them as an improvement and as "*a sign of progress*" (neighbouring

landholder). When asked if there was any way in which BayWa could reduce the visual impact of the Project, neighbouring landholders noted:

> *"Nothing I can think of. I have seen them around the place, and they don't worry me - they look alright. This is the ideal place to have them because there's no neighbours whinging about noise. They look good."*
>
> *"They look alright the way they are, just keep them turning."* – neighbouring landholder

4.8 Local Livelihoods and Economic Benefits

4.8.1 Agricultural Productivity

Stakeholders also raised the importance of the agriculture industry in the region. This is central to community sense of place and regional economic productivity. The importance of agriculture was reflected in multiple surveys when respondents described their community:

> *"Small rural community characterized by a reliance on agriculture."* – Neighbouring landholder
>
> *"We are such a close nit community who can pull together in times of need. Economic is the value of farming with the land and water available."* – Member of Chamber of Commerce
>
> *"It's treeless - it quiet and its virgin country that's never been ploughed. Its proper sheep and grazing country."*

Although respondents noted that agricultural businesses were becoming more diverse in the past few years, with almond farms and farms being utilised for water trading, some raised concerns regarding the continuity of agriculture in the region in response to the increasing prevalence of droughts.

The area of social influence features a strong reliance on agriculture as the main drive of economy in the region. One neighbouring landholder explained that the introduction of renewable energy was a strong benefit to the community as it resulted in economic diversification. As they explained:

> *"Industry diversification - may help move the community from agriculture, especially during periods of drought".*

In contrast, one respondent staunchly opposed the wind farm because they felt it would take up too much productive and valuable farmland. Further, others raised questions about the ongoing focus on renewables in the region, questioning "*How will renewables impact the use of the land in 20 years' time?*". For these stakeholders, transitions away from agriculture could leave the area vulnerable when Projects were decommissioned.

4.8.2 Local Employment

Respondents often raised job creation as a key benefit of the Project. Similarly, a lack of staff was a common theme across multiple services, especially as COVID had reduced access to backpackers. For a community struggling to retain young people, the Project was perceived as a way to bring new people to the area and create economic opportunities. As two neighbouring landholders noted:

"Everyone is getting older. We need more younger people. It's hard to find employees."

"Jobs make people stay for longer. Would like to see local employment and anything that is generated to stay in Australia, or the community."

Respondents also highlighted the opportunity for local employment and contracting services, particularly during construction, to increase the commercial activity for local businesses and job security for local job seekers. The main opportunities raised were in providing food and accommodation for workforce, steel fixers, concrete workers, civil works contractors, interaction with local towns with supply of equipment and goods and services.

Council, local businesses and residents focussed on the economic benefits the Project could provide to the local community and have raised the role that the Project carries in providing employment and contracting opportunities for service providers and businesses.

Some community members that attended the information session have already expressed their interest in registering to work for BayWa. Respondents also raised the potential of social procurement and employment opportunities for women, Indigenous people and people with disabilities. A neighbouring landholder has expressed an optimistic approach about the changes in the business industry and economic growth in Hay in the past few years, which reflects an alignment with the potential benefits the Project can deliver:

"It has changed over the years. It's very sports orientated and children orientated. It has turned around and is now more reliant on business, whereas it was once purely agriculture. We are seeing an influx of people from the city coming and taking over. In the past 12 months... They are buying cheap housing. We have a lot of people who are returning to Hay to live (30 years old bringing people moving back with family which is a huge positive). Hay is growing. There has been a growth in business - even during covid. Hay Shire Council has been positive with park enhance. Hay is on the rise."

The generation of training opportunities to meet job demand was also raised across surveys and meetings. Some stakeholders described the potential social benefit that the Project could offer through diversification of skills and vocational training, and the establishment of a new industry sector with opportunity for workers to specialise, re-skill or upskill.

"I don't imagine the Hay community would be skilled in turbines, but maybe building local skills to ensure local employment would be good." – Neighbouring landholder

"Be active in the community through scholarships and sporting grants (similar to Aus Scott). I think if you're going to have a footprint you need to have that type of ongoing activity – it doesn't need to be upfront, but you do need consistency." – Neighbouring landholder

The community raised the potential of partnering with TAFE for courses and apprenticeship, which they believe could support retaining local population and maintaining jobs in Hay.

The indirect impacts on people's livelihoods such as an anticipated increase in commercial activity for local service providers and suppliers in nearby townships, during the construction period, has the potential to bring about positive flow-on social benefits and improved community wellbeing.

4.8.3 Land Values

An issue reported by stakeholders consulted was the perceived impact of the Project on land values. For one person, this was a question about compensation to reflect land value, noise or visual impacts, or the inability for people to continue to use their land as working properties. A neighbouring landholder raised the concern: *"Will there be economic benefit to the landholders - will those who are impacted be compensated?"*

In contrast, another neighbouring landholder speculated that the Project could result in an increase in land value.

> *"How it will relate to the value of the land. The turbine income would be reflected in the land value. It may become a barrier to expand rural holding, but also may be a positive because there is another form of income to help them leverage buying more."* – Neighbouring landholder

4.9 Engagement and Decision-Making Systems

Community members have raised the importance and appreciation for the early-stage consultation on the Project, and the positive steps BayWa has made towards reaching out to the community members. Some stakeholders raised concerns that they hadn't been consulted sufficiently with their concerns eased once BayWa explained the broader SSD process and the on-going opportunities for engagement as the EIS process continued.

Some stakeholders consulted raised concerns about previous examples of poor consultation and communication in the region. A nearby solar farm was referenced as an example of poor community engagement, raising anxiety and concern. This is a common occurrence in communities experiencing rapid and concurrent development, where previous bad experiences build community distrust and consultation fatigue. As the REZ continues to develop this will be an on-going risk across all projects. As one community member explained:

> *"Country areas are not being consulted enough. They should be more upfront on what impacts and any negatives which could be involved throughout the lifetime of the project and beyond. In 30 years' time, what is going to happen to wind turbines which are out of there use by date."* – Community member

There is a desire in the community to be consulted regularly and consistently as Project plans progress, and some stakeholders noted their preference to be contacted via one-on-one discussions. Stakeholders explained that they wanted to ensure that local voices and affected people have been heard, their issues understood, and interests considered in the planning and assessment of the Project.

Concerns were raised regarding procedural fairness, related primarily to a desire amongst nearby landholders to receive 'fair' compensation for the impacts they too experience by living near the Project. This matter was raised in the context of nearby or neighbouring property owners wanting to realise benefits from the Project.

4.10 Cumulative Impacts

The Bullawah Wind Farm is located in the Southwest REZ and is proximal to several existing and proposed renewable energy projects.

Surveys reflected that community respondents were aware of these other projects, with a neighbouring landholder noting that "*there are a few proposals at the moment, so it seems like a lot to keep track of.*"

A further neighbouring landholder raised the issue of cumulative population change:

> *"Another concern would be the influx of the community and changing the dynamics of the town – especially with all the projects that are in the pipeline. Also, the impact it will have on the wider community. The town might change dramatically in construction but because of the nature of renewables its only really a few people there for maintenance."*

Community members expressed interest in gathering or learning more about the plans for the Southwest REZ more broadly, to inform their position on the Project; with local communities better informed on how the region is able to provide enough energy to replace the ageing power infrastructure elsewhere in the State; and to better understand the role that the community plays in hosting this energy generating infrastructure long-term.

5.0 Community Identified Strategies and Opportunities

Community identified strategies to mitigate or respond to issues and impacts, as well as opportunities to enhance the positive impacts of the Project, as well as contribute positively to the local community have been compiled in **Table 5.1**. This knowledge provides a basis to further consider and explore community benefit sharing options during subsequent phases of the Project. **Section 6.0** identifies preliminary project refinements or management measures aligned with identified and perceived social impacts documented.

Project-led community development strategies often lead to greater social outcomes when an identification process of local needs and opportunities is undertaken in collaboration with local communities. Local benefit sharing schemes and targeted supports can over time generate improvements in a community's sense of place, social cohesion, and the capacity of local organisations.

Table 5.1 Potential Strategies and Opportunities

Impact/Issue	Strategy/Opportunity
Land use conflict and loss of natural habitat	**Biodiversity** • Development of a management plan to protect the local wildlife, particularly the endangered Plains Wanderers. • Development of a biodiversity offset plan to protect the natural environment, particularly in the Oolambeyan National Park. • Support to create smaller paddocks to protect Plains Wanderers. **Land use** • Means to co-exist with agriculture and clear compensation methods for neighbouring landholders.
Distributive equity and local benefit sharing	Stakeholders raised that the Project would have a positive contribution to the region, particularly in job generation. **Local employment, procurement, and training** • Opportunity of employment for the local community and benefits of the projects fed back into the region. • Increased opportunities for short term and long-term employment. • Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region. • Social procurement and employment opportunities for women, Indigenous people and people with disabilities. • Support for local well-being programs. **Housing, Infrastructure and service provision improvements** • Ensure the provision of new housing and/or temporary accommodation due to the influx or workforce population. • Work with councils to ensure required road upgrades, so as the local road network is improved and left in better conditions. • Early planning for the heavy loads and/or over dimension loads at the local bridges to ensure they have appropriate capacity.

Impact/Issue	Strategy/Opportunity
	• Develop a plan for a bigger transmission line so it can support more wind farms in the future. • Early planning with NSW Ambulance and local health to ensure continuous service provision. • Develop safety procedures for welding and grinding in the open on high fire danger rated days. • Improvement of telecommunication lines. • Funding for community nurses, youth services and youth activities. • Develop an industry sponsored career path.
Partnerships and participation in decision-making processes	• Multiple information sessions as the community would benefit by better understanding how windfarm works and its impacts. • BayWa to be actively involved with the community. Could provide support through scholarships, sporting grants and business awards.

6.0 Preliminary Social Impact Evaluation

As discussed in the above section, the scoping phase has identified a range of key issues of relevance to near neighbours, local communities, and stakeholders in relation to the Project. A preliminary evaluation of the likely social impacts has been developed in **Table 6.1**, which will be further explored and validated during the next phase of the SIA and in the EIS.

Table 6.1 Preliminary Impact Evaluation

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Surroundings	Project establishment and operations	Negative impacts on flora and fauna - including the Plains Wanderer	C & O	Environmental groups Aboriginal Stakeholders Broader Community National Parks and Wildlife Services (NSW)	Negative	**High (Likely, Major)**	Development of a management plan to protect the local wildlife, particularly the endangered Plains Wanderers. Development of a biodiversity offset plan to protect the natural environment. Actively engage and involve the community in all environmental plans and action. Engage proactively with relevant community groups to support and protect local environmental values.	Medium (Possible, Moderate)	Standard Assessment
Way of Life Surroundings Livelihoods	Project establishment	Competing land use - particularly agricultural operations and any fragmentation of farming practices or restricted access to sections of farms	C & O	Neighbouring and host landholders	Negative	**High (Likely, Major)**	Identify and site infrastructure on properties: • where landholders have given formal consent to host project infrastructure • where property characteristics and agricultural activities are compatible with Project infrastructure	Medium (Possible, Moderate)	Standard Assessment

[4] C – Construction O – Operation D – Decommissioning

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
							• Plan and site transmission lines and access routes with sensitivity for existing land uses and landholder needs. Consider refinement to design and layout planning that allow for continued farming use of the land, in consultation with host landholders on a case-by-case basis. Construction and operational management controls to be developed in consultation with landholders to ensure maintained access across the Project Area with minimal disturbance associated with construction activities. Open, transparent, and accessible communication of Project information. Investigate broader options for project to facilitate co-existence with agriculture.		

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Community Decision-Making Way of Life	Project establishment and operations	Changes to the degree of social acceptance of the Project and REZ more broadly due to the cumulative impact of multiple projects	C & O	Broader Community Aboriginal Stakeholders Landholders Community Groups	Negative	**Medium (Possible, Moderate)**	Active community engagement throughout the lifecycle of the project, providing clear information of next steps of project development. Multiple information sessions as the community would benefit by better understanding how windfarm works and its impacts a bit more. Consideration of cumulative impacts in designing Project mitigation strategies.	Medium (Possible, Minor)	Detailed Assessment
Livelihoods	Project establishment and operations	Income received by host landholders may provide additional sources of income, bringing about improved outcomes for household income and resilience	C & O	Host landholders	Positive	**Very High (Almost Certain, Major)**	Open, transparent, and accessible communication of Project information. Development of participatory local benefits scheme or good neighbour programs including financial compensation.	Very High (Almost Certain, Major)	
Surroundings Way of life	Project construction and establishment of infrastructure	Visual amenity changes impacting the rural landscape	C & O	Neighbouring landholders and residents Broader community Environmental and community groups	Negative	**Medium (Likely, Minor)**	Consideration of property impacts and mechanisms to address personal issues on a case-by-case basis.	Medium (Likely, Minor)	Standard Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Community Livelihoods	Project construction and operation	Changes to rural amenity impacting people's sense of place	C & O	Broader community Neighbouring landholders and residents	Negative	**Low (Possible, Minor)**	Consideration of property impacts and mechanisms to address personal issues on a case-by-case basis. Development of a Community Benefits Strategy to support community initiatives.	Low (Possible, Minimal)	Standard Assessment
Surroundings Wellbeing	Production of noise and dust from construction	Increase in construction-generated noise and dust could cause disturbance and annoyance for nearby residents.	C	Neighbouring landholders and residents Broader community Service Providers	Negative	**Medium (Likely, Minor)**	Construction and operational management controls to be developed in consultation with landholders to ensure minimal disturbance associated with construction activities. Consider the use of water trucks nearby properties to alleviate the dust from construction activities. Open, transparent, and accessible communication of Project information.	Low (Possible, Minimal)	Standard Assessment
Surroundings Health and Wellbeing	Project operations	Operational wind turbine noise affecting personal wellbeing.	O	Neighbouring landholders Host Landholders	Negative	**Medium (Possible, Minor)**	Construction and operational management controls to be developed in consultation with landholders to ensure minimal disturbance associated with operational activities.	Low (Unlikely, Minor)	Standard Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Surroundings	Project construction	Construction-related traffic could cause an increase in personal disturbance caused by noise, a deterioration in road conditions, greater travel times, and heightened road safety risks - particularly important to consider cumulatively with other major projects and overlapping construction activities	C	Neighbouring landholders and residents Broader Community	Negative	**High (Likely, Moderate)**	Development and implementation of a Construction Environmental Management Plan (CEMP) in consultation with local communities and key stakeholders. Detailed planning transport routes with public safety considerations and information disclosure, consulting with and notifying residents, considering any sensitive user groups. Consider supporting upgrades to local roads or transport infrastructure.	Medium (Possible, Moderate)	Standard Assessment
Community Livelihoods	Construction workforce influx	Increase in economic activity within local communities and townships caused by influx of workers	C	Local Businesses and Service providers Broader Community	Positive	**Very High (Likely, Major)**	Coordinate efforts and liaise with key stakeholders to coordinate provision of accommodation and other services or suppliers. Develop a local participation plan.	Very High (Likely, Major)	Detailed Assessment
Community Way of life Accessibility	Construction workforce influx	Project construction will cause a temporary rise in the population, increasing pressure on local services and infrastructure,	C	Neighbouring landholders and residents Broader Community Local Businesses	Negative	**High (Likely, Major)**	Develop local participation plan and workforce accommodation strategy. Coordinate efforts and liaise with key stakeholders to coordinate provision of	Medium (Possible, Moderate)	Detailed Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
		particularly housing and accommodation (affordability and availability)		and Service Providers			accommodation and other services or suppliers. Liaise with local health providers to develop a strategy for addressing increasing demand on their services. Investigate provision of temporary workforce housing to support the Project.		
Community	Construction workforce influx	Increase in human capital for local communities (expertise)	C & O	Broader Community Business and Service Providers	Positive	**High (Likely, Major)**	Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region.	Very High (Likely, Transformational)	Detailed Assessment
Community Livelihoods	Project establishment and operations	Community investment initiatives and funds to improve social outcomes for local communities	O	Neighbouring landholders and residents Aboriginal Stakeholders Community and environmental Groups Broader Community Local Businesses and Service Providers Local Government	Positive	**High (Possible, Major)**	Develop local employment and procurement plan. Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region. Active involvement with the community to provide opportunities to improve social outcomes.	High (Likely, Major)	Detailed Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Livelihoods	Project establishment	Potential property devaluation impacting the ability for private property owners to buy or sell, particularly when considered cumulatively with adjacent proposed projects	C & O	Neighbouring landholders and residents	Negative	**Medium (Possible, minor)**	Open, transparent, and accessible communication of Project information. Development of participatory local benefits scheme or neighbour programs.	Low (Possible, minimal)	Detailed Assessment
Livelihoods	Construction workforce influx	Training and education opportunities through sourcing local employment	C & O	Broader Community Local businesses and service providers	Positive	**High (Possible, Major)**	Develop local employment and procurement plan. Proactive support for the establishment of programs that encourage and incentivise re-skilling and upskilling of local workers to remain in the region. Social procurement and employment opportunities for women, Indigenous people and people with disabilities.	Very High (Likely, Transformational)	Detailed Assessment
Health and wellbeing	Project establishment	Project development may increase stress and anxiety for proximal residents who feel uncertain about their futures and changes to their way of life	C & O	Neighbouring landholders and residents	Negative	**Medium (Possible, Moderate)**	Active community engagement throughout the lifecycle of the project, providing clear information of next steps of project development.	Low (Possible, Minimal)	Detailed Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Culture	Project establishment	Impacts to Aboriginal Cultural Heritage, including artefacts, cultural sites and connection to Country.	C	Aboriginal Stakeholders	Negative	**Medium (Possible, Minor)**	Inclusion of Indigenous groups and Registered Aboriginal Parties in decision-making processes. Active community engagement with Indigenous groups providing clear information of next steps of project development. Delivery of an Aboriginal Cultural Heritage Assessment	Medium (Possible, Moderate)	Standard Assessment
Community	Project establishment	Incoming construction workforce may decrease levels of community cohesion	C & O	Broader community Special Interest groups Neighbouring landholders and residents	Negative	**Medium (Possible, Moderate)**	Develop local employment and procurement plan. Open, transparent, and accessible communication of Project information. Assessment of housing and service provision options for the incoming workforce	Medium (Possible, Minor)	Detailed Assessment
Surroundings Safety, Health & Wellbeing	Construction of turbines	Aero-safety concerns due to height and quantity of turbines	C & O	Broader Community Businesses and Service Providers Neighbouring landholders Host landholders	Negative	**Medium (Possible, Moderate)**	Further consultation to characterise and assess specific circumstances, risk and extent.	Low (Possible, Minimal)	Standard Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Surroundings Livelihoods	Project establishment	Concerns over water access and use.	C & O	Broader Community Special interest and environmental groups	Negative	**Medium (Possible, Moderate)**	Further consultation to characterise and assess specific circumstances and extent. Development of a biodiversity offset plan to protect the natural environment. Actively engage and involve the community in all environmental plans and action.	Low (Unlikely, minor)	Standard Assessment
Surroundings	Decommissioning	Rehabilitation and waste production during decommissioning phase leading to environmental degradation and waste production	C, O & D	Special Interest Groups Neighbouring and host landholders Broader Community Aboriginal Stakeholders	Negative	**Medium (Possible, Moderate)**	Development of a waste management and recycling plan for the Project Development of environmental management plans for decommissioning	Low (Unlikely, minor)	Standard Assessment
Decision making	Project operation	Positive role in the energy transition, climate change reduction and positioning of the REZ as a wind power hub	C & O	Community Groups Broader Community	Positive	**Very High (Likely, Transform-ational)**	Actively engage and involve the community regarding the benefits of renewable energy and the natural environment. Open, transparent, and accessible communication of Project information.	Very High (Almost Certain, Transformational)	Standard Assessment

Social impact category	Project aspect	Social impact description	Duration [4]	Extent/affected parties	Positive/ Negative	Perceived Stakeholder Significance	Project refinements/ management measures	Residual impact significance	Phase 2 Assessment level
Decision making	Project construction and operation	Lack of trust in decision making and engagement systems	C & O	All stakeholders	Negative	**High (Possible, Major)**	Open, transparent, and accessible communication of Project information.	Medium (Possible, Moderate)	Detailed Assessment

7.0 Conclusion

This SISR has documented the SIA process undertaken during the Scoping Phase of the Bullawah Wind Farm Project and forms part of the Scoping Report to inform the issue of SEARs by the NSW DPE.

It has included the compilation of a social baseline profile for the Project, early-stage community and stakeholder consultation to inform the scoping of Project-related social impacts and opportunities, and preliminary impact prediction and evaluation. The preliminary impact evaluation has been undertaken to inform and support the refinement of Project design and plans to reduce negative Project impacts and achieve greater positive Project benefits.

A detailed assessment of social impacts is required as part of the EIS and should be informed by an ongoing process of community consultation. As part of the EIS, future stages of the SIA for this Project will include a comprehensive prediction and assessment of social impacts and development of relevant strategies to mitigate negative impacts and enhance positive impacts associated with the Project. Further SIA and technical environmental impact studies will address perceptions of impacts raised by key stakeholders during this phase.

Subsequent phases of the SIA program will involve the following key activities:

- A detailed update of the baseline social profile to ensure that any further baseline data relevant to the impacts identified is obtained.
- Further validation of the area of social influence and identification of affected communities and vulnerable groups.
- Provision of feedback to those consulted during the scoping phase on the outcomes and issues raised and communication of the Project SEARs (once issued), including an outline of the next steps in the assessment process and opportunities for community input.
- Further engagement with a range of community and stakeholder groups, including but not limited to near neighbours, host property owners, local government, community members, interest groups, local businesses and service providers. This consultation will focus on the detailed investigation into social impacts associated with the Project. Further, it will involve the provision of feedback on the outcomes of EIS technical studies and will provide opportunities for community input to the development of appropriate mitigation and enhancement measures to address impacts and residual effects.
- A comprehensive assessment and evaluation of social impacts against existing baseline conditions.

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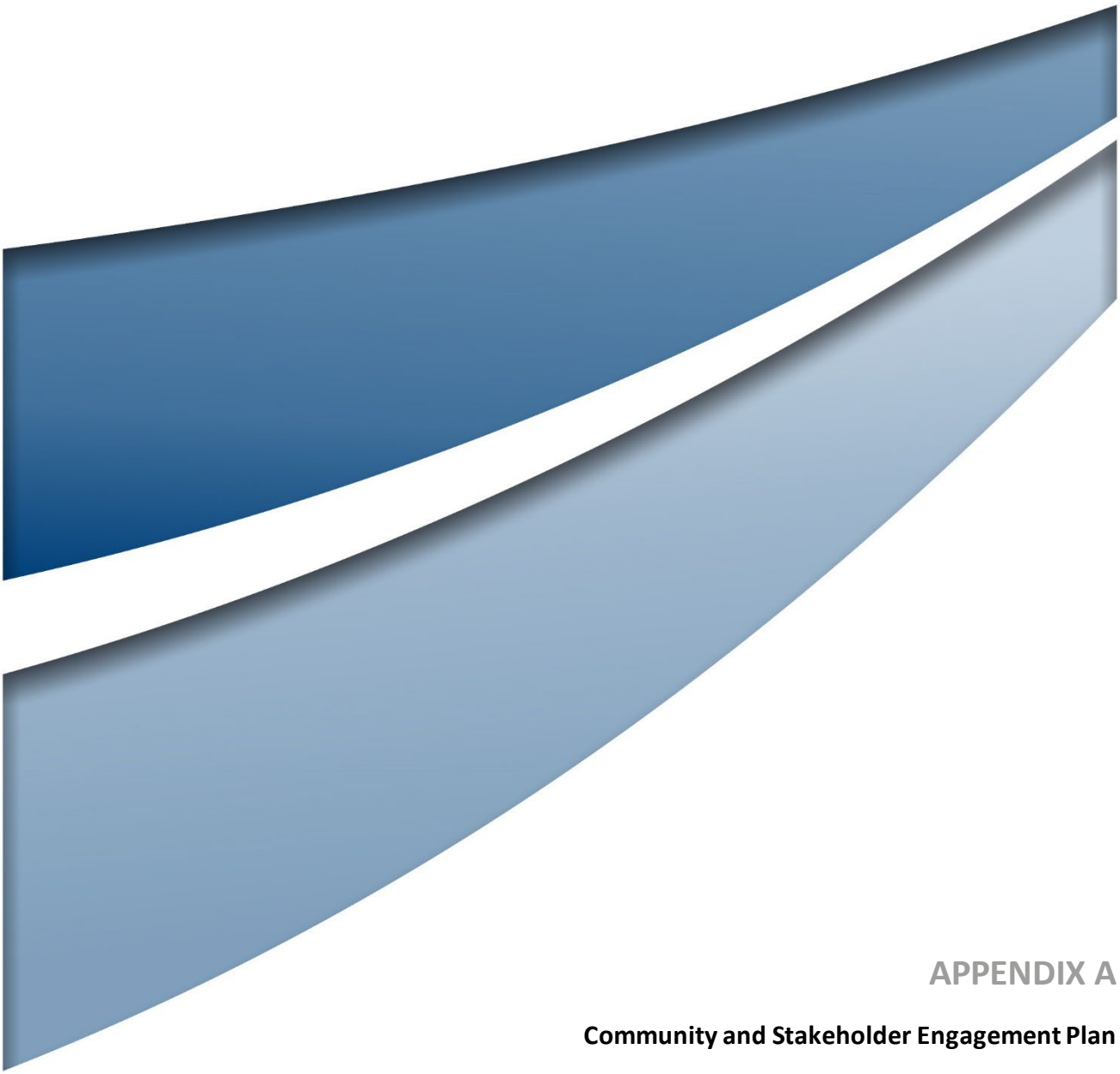

APPENDIX A

Community and Stakeholder Engagement Plan

umwelt
Environmental & Social Consultants

BayWa r.e.

BULLAWAH WIND FARM

Communications and Stakeholder Engagement Plan

VERSION 3

September 2022

BULLAWAH WIND FARM

Communications and Stakeholder Engagement Plan

VERSION 3

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
BayWa r.e. Projects Australia Pty Ltd

Project Director: Nathan Baker
Project Manager: Lauren Evans
Technical Director: Dr Sheridan Coakes
Technical Manager: Dr Kate Raynor
Report No. 21110
Date: September 2022

Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
01	Kate Raynor	9 March 2022	Nathan Baker	9 March 2022
02	Lauren Evans	25 August 2022	Nathan Baker	25 August 2022
03	Lauren Evans	23 September 2022	Nathan Baker	23 September 2022

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Appendices

1.0 Introduction

The proposed Bullawah Wind Farm (the Project) by BayWa r.e. Projects Australia Pty Ltd (BayWa r.e, the proponent) comprises the construction, operation and decommissioning of a wind farm located 28 km southeast of Hay in the Riverina Region of south-western New South Wales (NSW). The Project area is on grazing land that lies within the Hay Local Government Area (LGA), Murrumbidgee LGA and Edward River LGA. The Project is inside the NSW Government's South-West Renewable Energy Zone (REZ).

The Project will have an installed capacity of 1000 MW of clean green renewable energy, capable of powering half a million homes. A large-scale battery energy storage system (BESS) proposed on site will allow for the capture and storage of dispatchable energy. The power generated from the 170 turbines, each with a maximum blade-tip height of 300 m above ground level, or released from battery storage, will feed into the electricity grid via the proposed Project EnergyConnect transmission line.

1.1 Purpose and Objectives

This Community and Stakeholder Engagement Plan (CSEP) outlines the approach, strategy, and implementation program to inform the Project's Environmental Impact Statement (EIS) for the State Significant Development Application (SSDA), to be lodged with the NSW Department of Planning and Environment (DPE). In particular, the CSEP supports the preparation of the Social Impact Assessment (SIA), which constitutes one of the key technical studies as part of the EIS.

The purpose of this document is to outline the approach and strategy for community and stakeholder engagement across the project assessment phase, to inform the preparation of relevant Scoping Reports (in the Request for SEARs) and completion of the Project's specialist studies. The CSEP will form part of the documentation for the BayWa r.e. SSDA for the proposed Bullawah Wind Farm.

As noted in the NSW DPE SIA Guideline (2021), respectful, inclusive, and meaningful engagement is a fundamental part of project planning and development. Engagement with affected communities and stakeholders provides first-hand insight into what people value and how they expect a project to affect them.

Community engagement is a key component of the EIS processes, with the DPE SIA Guideline (2021) outlining the following objectives to guide engagement activities:

- To ensure those potentially affected by a project understand the project and how it will affect them.
- To collect relevant data, evidence, and insights for scoping the SIA to maximise diversity and ensure representativeness of views.
- To understand the interests that people have and how impacts may be experienced (from their perspective).
- To consider the views of people in a meaningful way and use these insights to inform project planning and design.
- To provide opportunities for people to collaborate on project design matters and input to preferred solutions to address impacts.

- To confirm data, assumptions, findings, and recommendations.
- To ensure people know how their input has been considered, and what strategies will be put in place to address their concerns.
- To help understand how other specialist studies prepared for the EIS assist in addressing social impacts.
- To respect people's privacy, allowing them to communicate their views anonymously if requested.

Specifically, this CSEP aims to:

1. inform and consult with the community in relation to the proposed project.
2. develop an understanding of the social locality/social area of influence of the project, specifically the host community/communities in which the project is proposed.
3. scope and identify any impacts upon people associated with the project.
4. enable community and stakeholder input into the project design, planning and development.
5. collaboratively develop relevant strategies to respond to impacts in the form of mitigation or enhancement measures and community benefit sharing options.
6. identify future engagement preferences of stakeholders and potential partnerships between the proponent and the community.

1.2 Approach

The NSW Government's revised SIA Guideline (2021) now makes SIA applicable to all SSDs in NSW, with proponents required to commission standalone Social Impact Scoping Reports as part of the Request for SEARs. These studies are informed by, and rely on, the outcomes of early, and ongoing community and stakeholder engagement through the assessment phase. The approach to stakeholder engagement for the Bullawah Wind Farm will also be informed by the NSW Government's Wind Energy Guideline for State significant wind energy development (NSW Department of Planning and Environment, 2016) and the Clean Energy Council's Community Engagement Guidelines (Clean Energy Council, 2018).

1.3 Process

This document will be developed in collaboration with BayWa r.e through review and workshopping. It will be updated throughout the project as required. **Table 1.1** provides an indicative timeline for Social Impact Assessment activities.

Table 1.1 Indicative Social Impact Assessment Timeline

Activity	Estimated Timing
Landholder engagement	2021 to early 2022
CSEP development	February 2022
CSEP Workshop	March 14 2022
CSEP review and finalisation	Early March 2022
Instrument development and preparation	Early March 2022
Launch of project website/'go live' date	February 2022
Advertisement of engagement activities	April to May 2022
Scoping phase stakeholder and community engagement delivery	March to August 2022
Submission of Scoping Report (including SIA Scoping Report) to DPE	September 2022
Issuance of SEARs	TBC
Submission of EIS (including SIA)	TBC
Public exhibition period	TBC
Indicative determination	TBC

2.0 Project Overview

The proposed Project is located 28 km southeast of Hay in NSW in the Riverina Region of south-western NSW within the Murrumbidgee, Hay and Edward River LGA's. The Project site is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km southwest of the project area, population 7,862) and Griffith (88 km northeast of the project area, population 27,300). Smaller townships of Darlington Point, Jerilderie and Coleambally are nearer to the Project site.

The Project site will take in an area mostly east of the Jerilderie, North Boundary and Willurah roads junction, either side of the Balranald to Darlington Point transmission line, and south of the Oolambeyan National Park.

Incorporating around 170 turbines, with a maximum blade-tip height 300m above the ground, the Project, if approved, will have an installed capacity of up to 1000MW. A BESS on site will also afford the capture and storage of energy generated, with additional infrastructure developed to connect to the proposed Project EnergyConnect transmission line.

The project is in early stages of development. Plans for the proposed development comprise:

- ~170 (3 blade) wind turbines, with a maximum blade-tip height of 300 metres (m) above ground.
- Power infrastructure providing connection to Project EnergyConnect i.e. on-site substations/switchyards to connect the proposed wind turbines to the South-West REZ transmission line, that runs through the Project Area.
- Internal electrical reticulation network i.e. electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings.
- A single grid-scale BESS (~500 MW, up to four-hour battery).
- Temporary and permanent meteorological monitoring masts.
- Temporary construction facilities including:
    - construction compound/s and site office buildings and storage areas
    - on-site concrete batching plants for use during the construction phase
    - laydown areas used for wind turbine installation and storage of wind turbine components.
- Targeted road network upgrades to facilitate delivery of wind turbine components to the Project Area as required.
- Provision for a temporary accommodation camp on site (if required).

Project benefits will include:

- Diversifying the local economy.
- Community benefit fund.
- 400 jobs during construction, 40 jobs during operation.
- Training opportunities for the community.
- Business opportunities for local suppliers.
- Economic multiplier effect for local economy.
- Significant investment in local infrastructure.
- Renewable energy to power 500,000 homes.

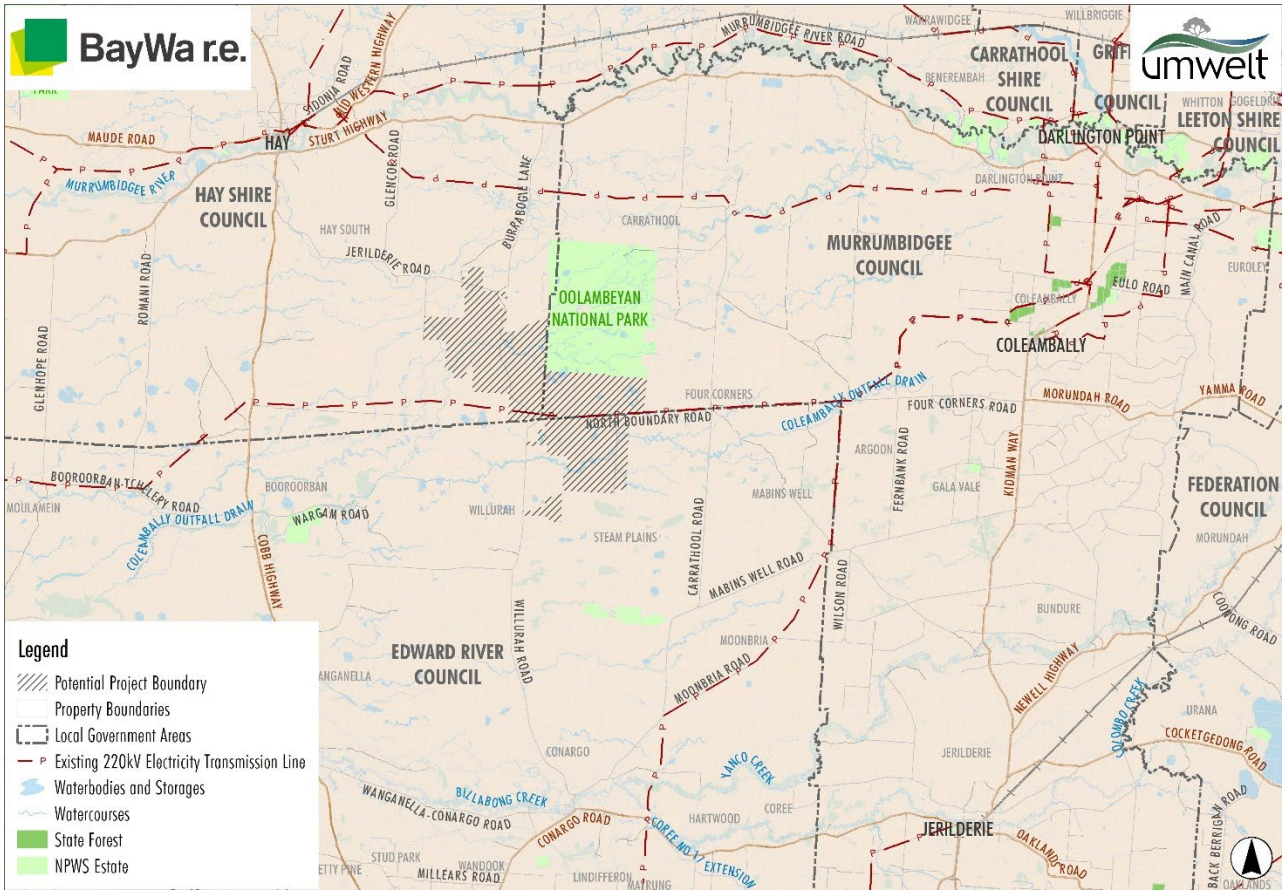


Figure 2.1 Area of social influence, as shown in the Community Information Sheet issued by BayWa r.e.[1]

[1] The Project Area boundary has been amended slightly since the issuing of the Community Newsletter (refer to Figures 1.1 to 1.4 of the Social Impact Scoping Report).

2.1 Policy Context

The NSW Government's current energy security policy and approach to a clean energy transition is being delivered through the strategic development of the renewable energy sector, as outlined through the NSW Government's *Renewable Energy Action Plan* (2013), *Electricity Strategy* (2019) and the *Electricity Infrastructure Roadmap* (2020). This policy context is relevant to inform the public positioning and key messaging for the planning and development of the Bullawah Wind Farm.

2.1.1 South-West Renewable Energy Zone (REZ)

The NSW Government's 'Electricity Strategy' and 'Electricity Infrastructure Roadmap' set out a plan to deliver the state's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions. This builds on the 'NSW Transmission Infrastructure Strategy' and supports the implementation of the Australian Energy Market Operator's (AEMO) 'Integrated System Plan'.

The South-West REZ was chosen due to an abundance of high-quality solar resources, proximity to Project EnergyConnect, relative land-use compatibility, and a strong pipeline of proposed projects. EnergyCo NSW is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping the proposed Project is within the boundaries of the REZ. **Figure 2.2** shows the current proposed REZ.

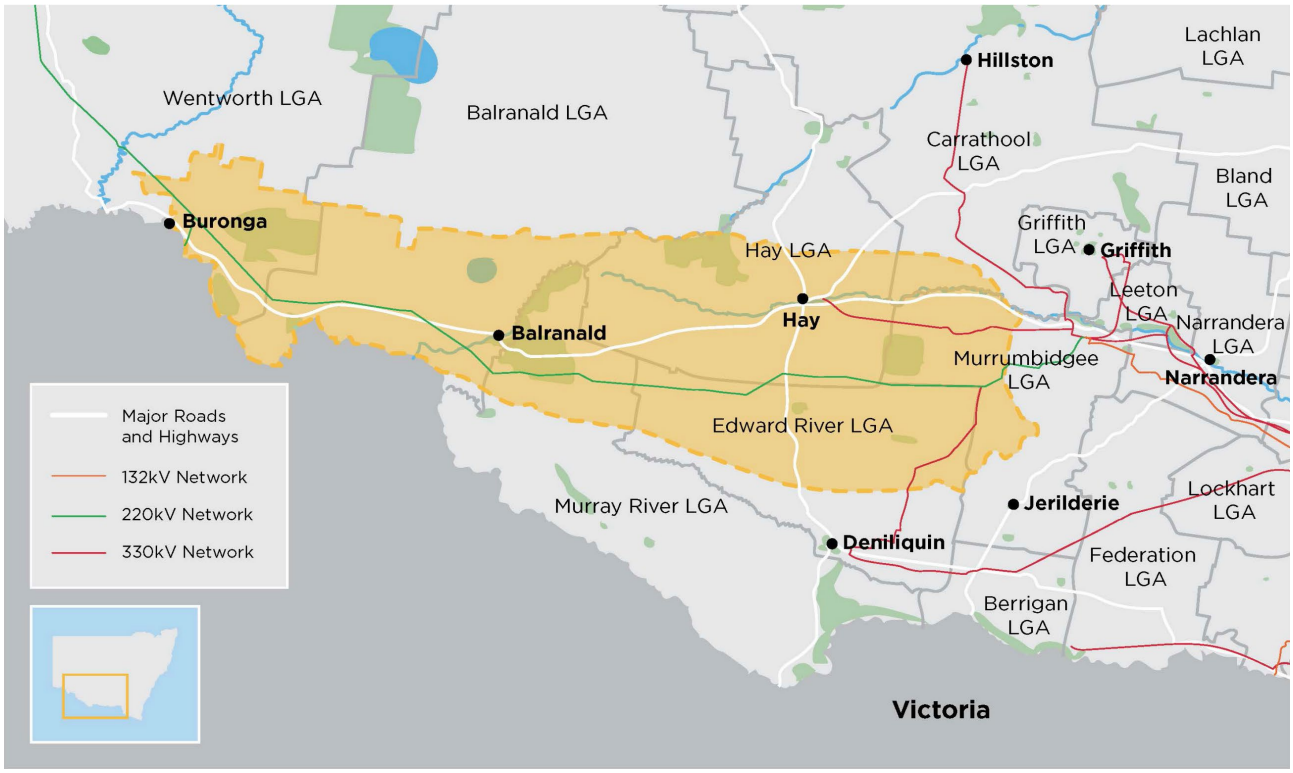


Figure 2.2 South-West Renewable Energy Zone

There are various other renewable projects currently operational in the REZ, including Darlington Point Solar Farm, Coleambally Solar Farm and Lang's Crossing Solar Farm. In addition, Hay Solar Farm has been approved, with various other projects in the planning phase including the Burrawong Wind Farm and Coleambally Battery Energy Storage System.

2.2 Social Context

This section provides a brief overview of key environmental, economic, social and infrastructure strengths, weaknesses and opportunities in the Project's social locality, identified through a preliminary review of policy and strategy documents and ABS statistics.

The Murray and Riverina regions have a strong focus on agricultural production, with agriculture being the top industry of employment in Edward River (16.6%), Murrumbidgee (36.4%) and Hay Shire (23.8%). Alongside promoting industry diversification and the growth of tourism, Murrumbidgee Council have committed to fostering a resilient and vibrant agriculture sector, as has the Edward River Council. A key challenge and goal for the area relates to the diversification of the economy, given the agriculture sector's dominance in the region.

The area has a strong focus on exploring and promoting alternate, sustainable energy sources with Murrumbidgee having committed to encouraging investment in solar and other sustainable energies. The Edward River Council is focusing on creating a valued and enhanced natural environment, with alternative energy usage used as an indicator to measure success. Similarly, the Hay Shire 10 Year Community Strategic Plan lists environmental sustainability as one of five key objectives that will shape the long-term vision for the community and further identifies 'investigating renewable energy resource options' as the key strategy for achieving this objective (Hay Shire Council , 2017, p. 17). The region has seen a recent increase in renewable energy projects, including Hay Solar Farm, Darlington Point Solar Farm, Coleambally Energy Storage and Yanco Solar Farm.

The demographics of the region show an older and ageing population, with median ages in Hay, Murrumbidgee and Edward River of 46, 41 and 45 respectively. The Hay 10 year Community Strategic Plan highlights maintaining student numbers in local schools, activities for young people and jobs for school leavers as key issues.

The area has strong rail and road connections to key locations. Similarly, the region is traversed by project EnergyConnect, an interconnector being built by Transgrid and ElectraNet between Wagga Wagga in NSW and Robertstown in SA. However, upgrades to transport infrastructure is a key consideration across the region, with councils placing an emphasis on improving local road infrastructure. Edward River Council has noted that improvements in services and infrastructure is a key priority to improve the wellbeing of its residents.

Given the region's reliance on the river and irrigation networks for agricultural production, water security has been noted as a key challenge moving forward, with commitments to protecting and managing waterways and catchments.

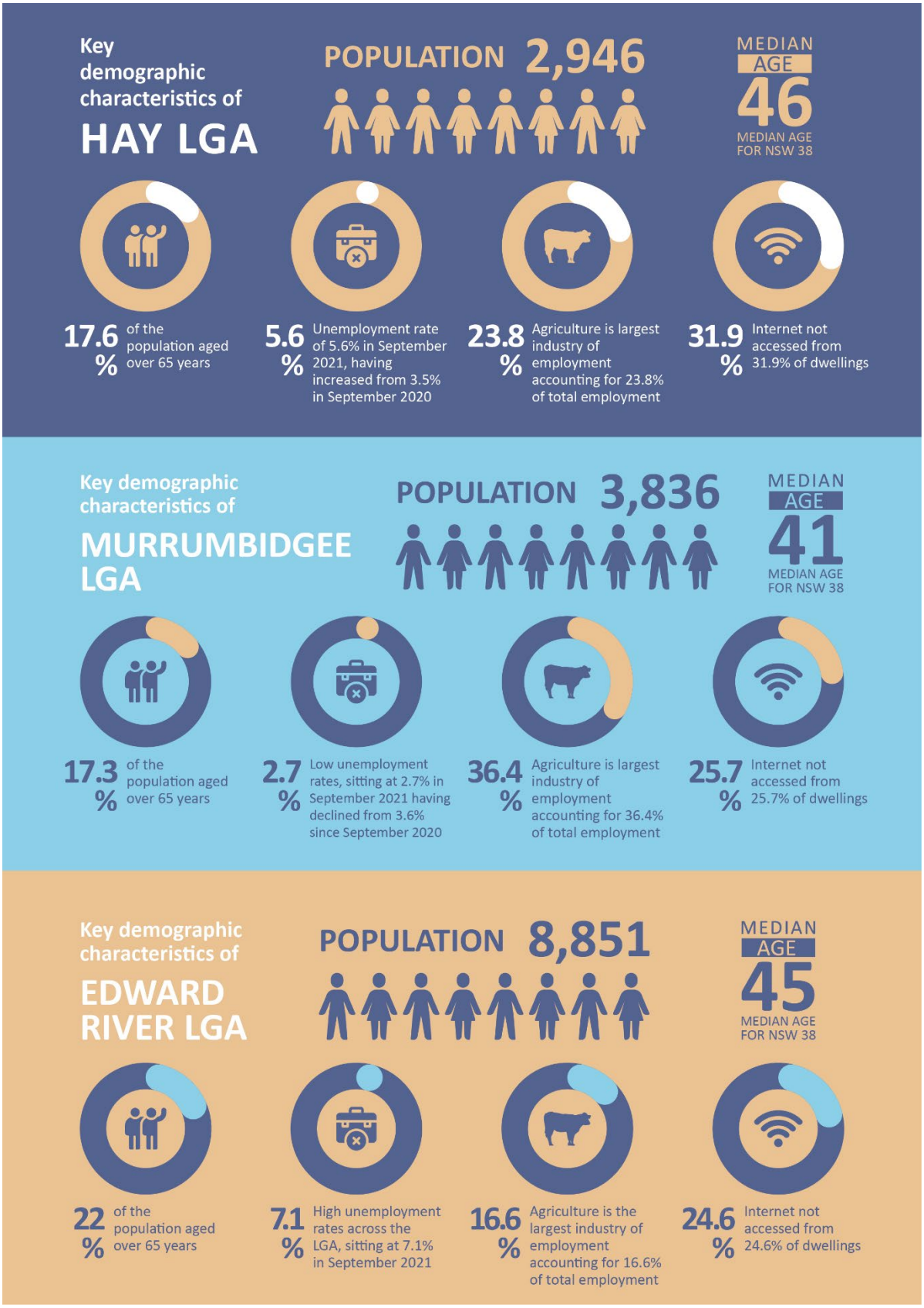


Figure 2.3 Overview statistics for Edward River, Murrumbidgee and Hay LGAs

2.3 Key Considerations

In recent times, proposed renewable energy projects across NSW have had diverse responses from local communities in relation to their perceived environmental and social impacts.

Following a preliminary review of submission reports and other publicly available documentation on nearby renewable energy projects within the region, including those listed in **Section 2.2,** we understand the following key local issues to be of importance in the planning and potential development of the Project:

- Concern relating to the number of concurrent projects coming online in response to the designation of the South-West REZ.
- Visual impact and view lines.
- Impact on endangered Plains Wanderers birds.
- Land use conflict – renewables development in productive agricultural areas, with land primarily used for grazing.
- Strain on township infrastructure and services from incoming construction workforce and particularly inadequate consideration given to workforce accommodation strategies given multiple concurrent projects in development.
- Lack of economic benefit experienced locally.
- Public health and safety concerns of neighbouring residents associated with Electric and Magnetic Fields (EMFs), radiation, hazardous materials, sleep disturbance from noise impacts and heat generation and flow on effects on livestock e.g., cattle and sheep.
- Land management impacts, such as spread of noxious weeds.
- Potential impacts to water flow during flood events.
- Interaction with the Oolambeyan National Park and impacts on access, visual amenity, ecosystems, and wildlife.

3.0 Engagement Strategy

The NSW DPE SIA Guideline (2021) outlines a number of stakeholder groups to consider in SIA engagement. The stakeholder groups that are relevant to this project are outlined in **Figure 3.1** below.

Figure 3.1 **Stakeholder groups**

3.1 Stakeholder Identification

A stakeholder identification process has been undertaken to further define relevant stakeholders for the project within each of these stakeholder groupings. A breakdown of these stakeholders is presented in **Table 3.1.** Best practice engagement design and delivery is guided by the International Association of Public Participation (IAP2) Public Participation Spectrum[2] as per **Figure 3.2**, with objectives for engagement identified and aligned with relevant engagement mechanisms.

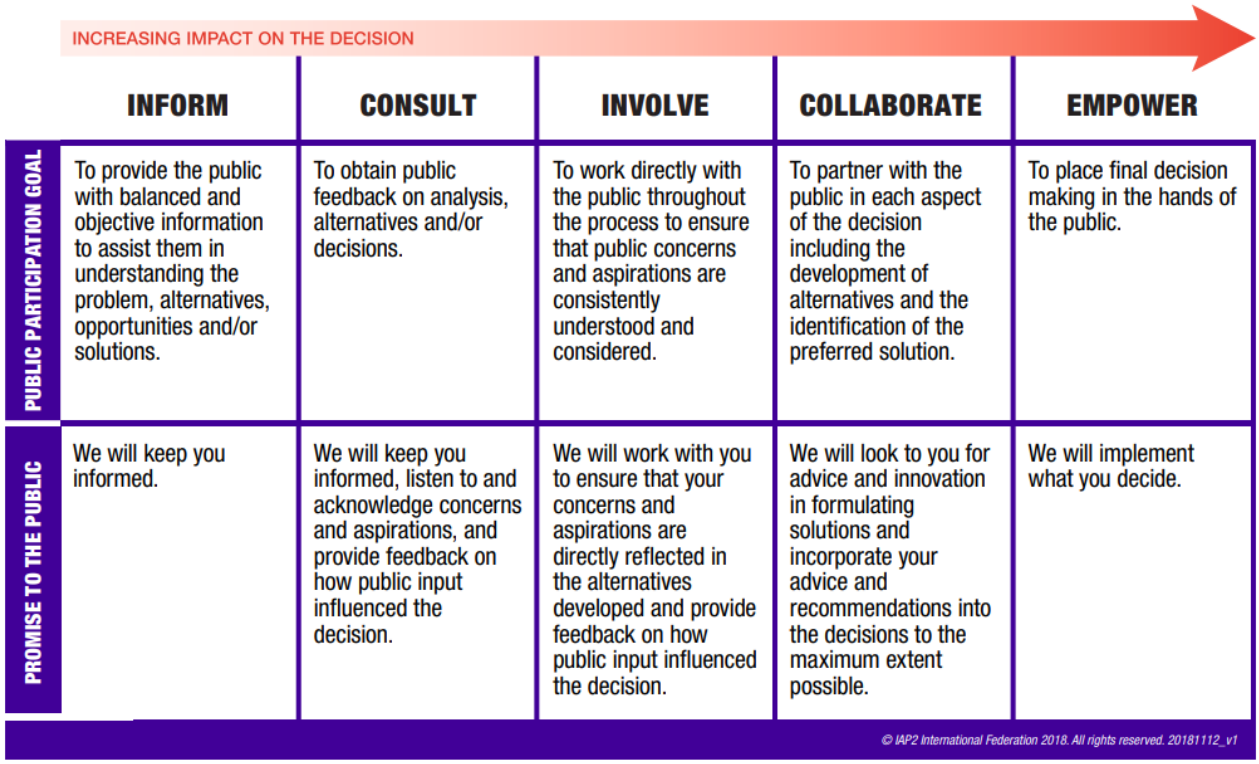


Figure 3.2 IAP2 Public Participation Spectrum

Source: International Association for public participation, 2018

Table 3.1 Stakeholder identification

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/Concern
Host landholders in Study Area	4 landholders	Collaborate	Social amenity impacts such as noise Visual changes to the landscape Accessibility impacts due to construction traffic Changes to way of life and livelihood Land use conflict
Adjacent landholders or proximal property owners	Approximately 10 residences within 8 km radius of the site Local road users	Collaborate	Social amenity impacts such as noise Visual changes to the landscape Accessibility impacts due to construction traffic Land use conflict Cumulative impacts from multiple projects
Local Government	Edward River, Hay, and Murrumbidgee Council – Mayor, Deputy Mayor, and Executive team	Collaborate	Cumulative impacts from multiple projects Accessibility impacts on local and regional services and businesses Commercial stimulus for local economy Local infrastructure and services provision (e.g., road impacts) Land use planning and/or conflict Concerns of community and local stakeholders

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/Concern
Local Businesses & Service Providers – Accommodation, Education, Emergency Services, Employment & Training, Health	TAFE NSW Hay War Memorial High School Deniliquin High School Deniliquin Business Chamber Coleambally Chamber of Commerce NSW Rural Fire Service Saltbush Motor Inn, Hay Settlement Motor Inn, Deniliquin Riviana Motel, Deniliquin Centrepoint Motel, Deniliquin Riviana Motel, Deniliquin Deniliquin Motor Inn Darlington Point Motel Deniliquin Hospital and Health Services Hay District Hospital Utilities providers; Transgrid, Essential Energy, Bus Services	Involve	Cumulative impacts from multiple projects Regional and local economic benefits Infrastructure and services provision Opportunities for collaboration Demand and capacity Increased demand/use of local and regional services by construction workforce Livelihood impacts Public safety for other road users (e.g., children and school bus drop off locations) Commercial stimulus for local economy
State Government	DPE Secretary DPE Director-Energy Infrastructure and Renewable Energy Zones NSW Environment Protection Authority (EPA) Aboriginal Affairs NSW Transport for NSW Regional Development Australia Riverina Local Land Services Murray Local Land Services National Park and Wildlife Services (NPWS)	Consult	Cumulative impacts from multiple projects Alignment to NSW Government initiatives Compliance with relevant legislation

Stakeholder Group	Stakeholders	Level of Engagement	Potential Interest/Concern
Aboriginal stakeholders	Deniliquin Local Aboriginal Land Council (LALC) Hay Local Aboriginal Land Council Griffith Local Aboriginal Land Council Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation Local Aboriginal service providers	Consult	Impacts on cultural connection to Country or place or on cultural values Inequity of impacts on Aboriginal community
Community and special interest groups	Hay Plains Landcare Group Murrumbidgee Landcare Inc Coleambally Landcare Group Murrumbidgee Environmental Water Advisory Group Murray Darling Wetlands Working Group Ltd Nature Conservation Council NSW Farmers Deniliquin Branch New Farm and Districts Historical Society Murrumbidgee Valley Food and Fibre Association (MVFFA) Riverina Ag Network Deniliquin Community Group Inc Coleambally Lions Club Lions Club of Hay Lion Club - Deniliquin	Consult	Cumulative impacts from multiple projects Accessibility impacts from construction workforce Land use conflict Sense of community / sense of place Commercial stimulus for local economy Local infrastructure and services provision Environmental impacts
Regional community	Residents in the broader Edward River LGA, Murrumbidgee LGA and Hay Shire LGA	Consult	Cumulative impacts from multiple projects Accessibility impacts from construction workforce Land use conflict Regional economic benefits Infrastructure and services provision
Local media	ABC Riverina Riverine Herald Hay Riverine Grazier	Inform	Cumulative impacts from multiple projects Regional economic benefits

3.2 Engagement Methods

Consultation with stakeholders and community groups will include:

- **Engagement:** to facilitate stakeholder involvement in the identification of issues/impacts, areas of interest/concern and strategies to address the issues raised.
- **Information provision:** to improve knowledge and awareness of the company, its activities, the project, and key issues/impacts as they arise.

Various methods will be used to engage with the different stakeholder groups based on the type of information being conveyed, level of feedback required, understanding of stakeholder needs and preferences regarding engagement. This will include existing or previous mechanisms utilised by BayWa r.e. and additional mechanisms as relevant.

Table 3.2 outlines the engagement mechanisms that will be used to engage each stakeholder group, that aligns with the level of engagement as noted in **Table 3.1**.

Table 3.2 Engagement mechanisms

	Project website	Social media	Community Hotline	Personal Interviews/ Meetings	Project Email	Community Information Sessions	Project Information Sheets
Host landholders							
Adjacent landholders or property owners							
Residents of neighbouring or nearby communities							
Local businesses and service providers							
Local Government							
State Government							
Aboriginal stakeholders							
Community and special interest groups							
Regional community							
Local media							
Lead Responsibility:	BayWa r.e.			Umwelt			

3.3 Engagement Materials and Topics

Umwelt will draft and prepare engagement materials to support the engagement activities outlined in **Section 4.0**. Materials and tools to support the proposed engagement activities may include the following:

- interview guides
- meeting agendas/run sheets
- project information sheets/posters
- other materials will be developed as relevant to address information requirements identified through the engagement process.

The NSW Wind Energy Guideline (2016) states that Proponents should undertake a comprehensive, detailed, and genuine community consultation process throughout the assessment process, including at the siting and pre-lodgement stage. Outcomes should include:

- Informing the community about the project, ancillary infrastructure, and the strategic context.
- Identifying the constraints and opportunities of the project area, including the values the wider community place on those attributes.
- Engaging with the community in the identification of landscape values, as required by the Wind Energy: Visual Assessment Bulletin.
    - This includes a requirement to conduct community consultation to establish key landscape features valued by the community, key viewpoints in the area (both public and private) along with information about the relative scenic quality of the area (NSW Department of Planning and Environment, 2016).
- Assisting landholders and communities to understand wind energy development, the development assessment process, how a proposal may affect them, and appropriate stages at which community consultation should be undertaken.
- Identifying and considering options for eliminating, reducing, or otherwise managing impacts.
- Discussing issues for landholder agreement if the project is approved, including siting, access, compensation, responsibility for decommissioning and rehabilitation.
- Assisting proponents to address community concerns regarding the design, development, construction, operation and decommissioning of wind energy facilities, in a transparent way.
- Discussing opportunities for shared community benefits or negotiated agreements.

3.4 Engagement Across SIA Phases

3.4.1 Phase 1 (Scoping)

It is expected by DPE in the SIA Guideline (2021) that the scoping phase will include community engagement activities to understand likely stakeholder issues and concerns early in the project, and to ultimately inform the social impact evaluation phase of the SIA.

Engagement in Phase 1 provides an opportunity to gauge and understand stakeholder issues/concerns/interests in relation to the project; to identify preliminary strategies/solutions to address topics raised; and to inform project design and planning.

In this regard, the SIA process calls for likely social impacts to be appropriately scoped and identified through consultation with potentially affected people and mitigation and enhancement options preliminarily explored.

To satisfy the SIA requirements, proposed engagement activities to be undertaken in this phase need to be targeted at identifying perceived issues of concern and/or positive impacts in relation to the proposed project to be further considered in the subsequent EIS phase.

Questions to include in interview discussion guides appropriate to this phase will include topics relating to:

- Awareness and attitudes towards wind farm development (and other renewables or industry development in the local or regional area).
- Awareness and public perceptions of BayWa r.e.
- Potential issues, concerns or interests related to the proposed project.
- Community values, identity, local needs, and aspirations.
- Areas of value and use within and near the project area.
- Sense of community in the area.
- Potential sensitive receivers and/or vulnerable community groups.
- Preferred engagement mechanisms, frequency, and content.

3.4.2 Phase 2 (EIS preparation)

Proposed engagement activities undertaken during Phase 2 will be focused on exploring and validating the issues/interests/concerns that have been identified during the Scoping Phase. The EIS program and preliminary insights or findings gathered through the various technical studies will also be further communicated during this phase, to assist in gathering feedback from key stakeholders and the wider community, on predicted project impacts.

Therefore, engagement in this phase, to inform the EIS and SIA will focus on:

- Assessment and evaluation of perceived issues, impacts and opportunities associated with the project.
- Existing capacity of local service provision and projected future demand.
- Potential strategies to address and respond to issues, impacts and opportunities.
- Enhancement measures to improve collaboration between BayWa r.e. and community or stakeholders, including potential community investment and benefit-sharing opportunities.

3.5 Recording, Monitoring and Record-keeping

Outcomes and records of each engagement activity will be documented by the team member(s) in attendance.

An Engagement Register in Excel format will also be maintained throughout the delivery of the Implementation Plan to ensure consistent tracking and recording of all community or stakeholder engagement activities and outcomes. Information to be recorded includes:

- activity details (including stakeholder engaged, attendees, time and place, mechanism used)
- discussion points
- summary of key outcomes or any actions
- stakeholder contact details
- preferences for future engagement.

Following completion of engagement for each phase, outcomes and data obtained will be collated and analysed to identify key impact themes and impact prioritisation. Identified issues or impacts may also be mapped to identify any patterns.

Communications and stakeholder engagement will be monitored throughout the project and this plan may be adapted to adjust engagement mechanisms, stakeholders, timing, or content in response to feedback or changing circumstances.

Outcomes of engagement undertaken will then be summarised in the Social Impact Scoping Report and Social Impact Assessment Report respectively.

4.0 Stakeholder and Community Engagement Implementation Plan

An overview of the activities proposed to effectively engage each stakeholder group across the two assessment phases is provided below.

4.1 Phase 1 (Scoping)

Table 4.1 presents the Scoping Phase Implementation Plan.

Specifically, in this phase, the CSEP aims to:

1. Inform and consult with the community in relation to the proposed project
2. Develop an understanding of the social locality/social area of influence of the project, specifically the host community/communities in which the project is proposed
3. Scope and identify any impacts upon people associated with the project
4. Afford community and stakeholder input preliminary project design, planning and development
5. Identify preliminary strategies that may be further explored to respond to impacts in the form of mitigation or enhancement measures or community benefit strategies.
6. Identify engagement preferences of stakeholders and potential partnerships between the proponent and the community.

Table 4.1 Phase 1 (Scoping) Implementation Plan

Mechanism	Detail	Alignment with Objectives (Section 1.1)	Stakeholder Group	Umwelt Responsibilities	BayWa r.e. Responsibilities	Timing	Required Input
Project Information Sheet 1	Project information sheet no.1 will provide an overview of the proposed project and approvals pathway, and how the community can be involved in the EIS process.	1	Proximal residents Broader community	• Draft content • Provide input into distribution area • Distribute info sheet	• Review and approve content • Design info sheet	Distribute early April	Project description Site map
Personal interviews/ meetings	Meetings with individual landholders to understand social impacts. Impacts identified will be fully assessed in the EIS preparation phase, as well as any potential project refinements considered.	1, 2, 3, 4, 5	Host landholders Neighbour landholders Proximal residents	• Draft interview guide • Create interview data management system • Attend meetings as relevant	• Review and approve interview guide • Undertake meetings • Record outcomes of meetings	February to June	Interview guide
Personal interviews/ meetings	Meetings with community groups to understand social impacts. Impacts identified will be fully assessed in the EIS preparation phase, as well as any potential project refinements considered.	1, 2, 3, 4, 5	Community/ environment/ special interest groups	• Draft interview guide • Create interview data management system Attend meetings as relevant	• Review and approve interview guide • Undertake meetings • Record outcomes of meetings	March to June	Interview guide

Mechanism	Detail	Alignment with Objectives (Section 1.1)	Stakeholder Group	Umwelt Responsibilities	BayWa r.e. Responsibilities	Timing	Required Input
Personal interviews/ meetings	Meetings with LGAs to understand social impacts. Impacts identified will be fully assessed in the EIS preparation phase, as well as any potential project refinements considered.	1, 2, 3, 4	Edwards River Murrumbidgee Hay Shire	• Create interview data management system Attend meetings as relevant	• Review and approve interview guide • Undertake meetings • Record outcomes of meetings	February, March and April	Interview guide
Community Information Session 1	2 x information session will be held with attendance by Umwelt and BayWa r.e. to allow the broader community and any interested parties to review information regarding the project, ask the project team questions, provide feedback, and raise any concerns or interests.	1, 2, 3	Broader community	• Organise the session, including location, bookings, catering etc. • Draft an invitation to/ advertisement about the session • Provide input regarding invitees • Distribute the invitation/advertisements • Attend the session and record outcomes	• Review and approve details of the session • Review and approve the invitation/ advertisements • Attend the session	May in Coleambally and Hay	Project posters and information

4.2 Phase 2 (EIS preparation)

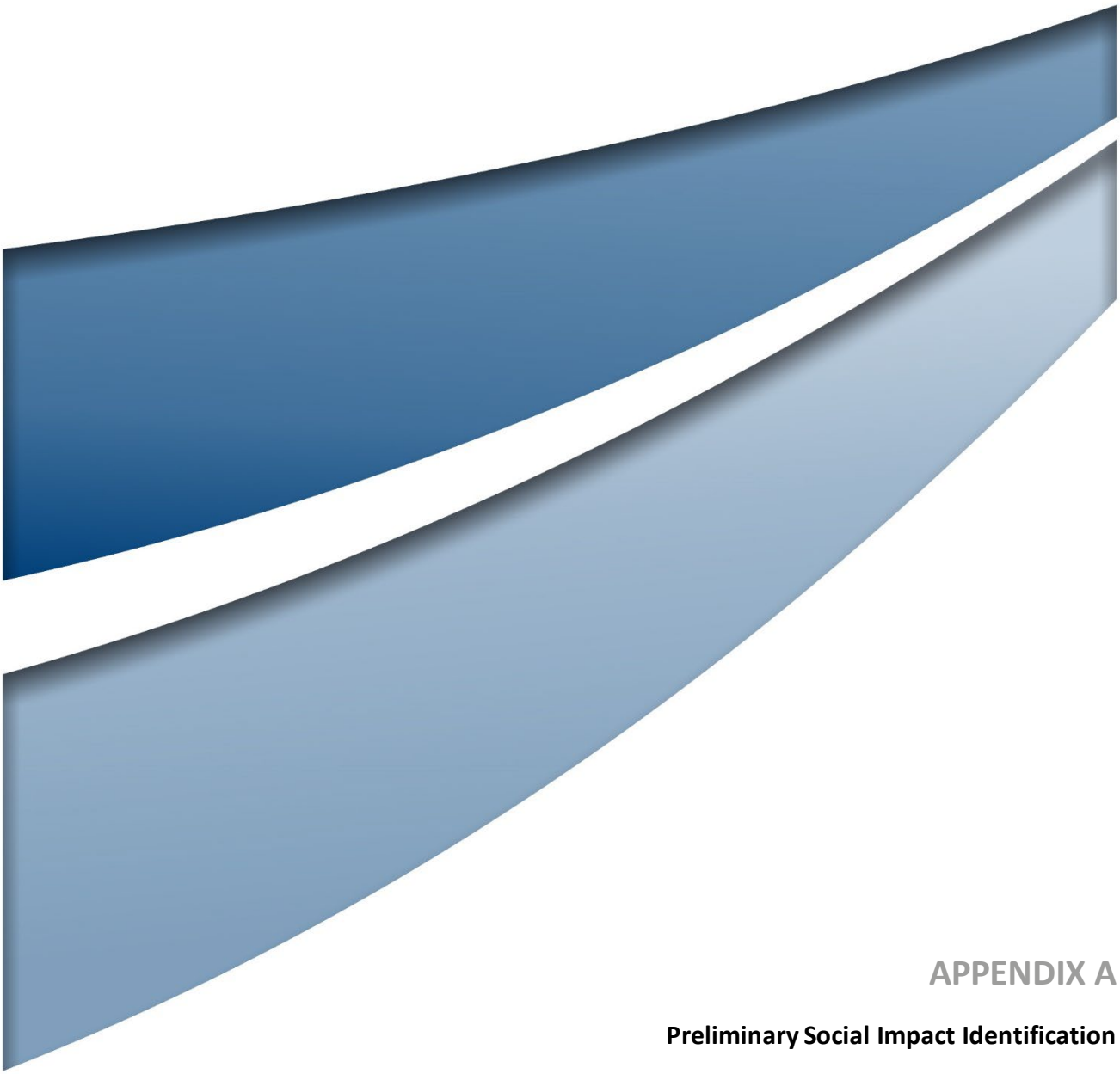
Table 4.2 contains the tasks that are proposed to be undertaken in Phase 2 (EIS preparation), however, this will be revised as required following the outcomes of Phase 1 and subsequent to the issuance of Project SEARs.

Table 4.2 EIS Preparation Implementation Plan

Engagement Mechanism	Detail	Alignment with Objectives	Stakeholder Group	Umwelt Responsibilities	BayWa r.e. Responsibilities	Timing	Required Input
Project Information Sheet 2	Second project information sheet will outline the outcomes of the Phase 1 engagement program to validate understanding of the community's perceived impacts; share additional project information and detailed plans; and provide an update on the approvals process, including the EIS and technical studies' outcomes.	1	Proximal residents Broader community	Draft content Provide input into distribution area Distribute info sheet	Review and approve content Design info sheet	TBC	Project description
Community Information Session 2 and 3	2 x information sessions will be held with attendance by Umwelt and BayWa r.e. to allow the broader community and any interested parties to review updated planning and design information (including findings of technical studies), ask the project team questions, provide feedback on the project planning and assessment. It is proposed that 2 sessions are run on different days and in different locations, to enable the wider community to access opportunities to learn about the project and provide feedback.	1, 2, 3	Broader community	Organise the session, including location, bookings, catering etc. Draft an invitation to/advertisement about the session Provide input regarding invitees Distribute the invitation/advertisements Attend the session and record outcomes	Review and approve details of the session Review and approve the invitation/ advertisements Attend the session	TBC	Project posters and information
Personal interviews/ meetings	Meetings with individual landholders to explore impacts and issues identified in Phase 1, validate their perceived impacts of the project, discuss options around mitigation measures, and evaluate any specific sensitivities to be experienced by each landholder.	2, 3, 4, 5	Host landholders Proximal residents	Draft interview guide Develop data management system Incorporate data into the SIA	Review and approve interview guide Attend meetings if requested Undertake meetings	TBC	Interview guide

Engagement Mechanism	Detail	Alignment with Objectives	Stakeholder Group	Umwelt Responsibilities	BayWa r.e. Responsibilities	Timing	Required Input
					Record outcomes of meetings Communicate any social risks the project team		
	Meetings with key community groups and/or local key stakeholders to further explore and investigate issues of the project as scoped in Phase 1 and evaluate the impact from the community or stakeholder perspective. Local service providers are likely to be targeted through these interviews to understand the existing capacity of infrastructure and services in the context of an incoming construction workforce (health, housing/accommodation, recreation etc.). Potential mitigation measures and enhancement strategies will be identified and explored through these discussions. 3 x meetings with Council to further explore any local issues and benefit sharing strategies is also likely to be included.	2, 3, 4, 5	Community/ environment/ special interest groups	Draft interview guide Develop data management system Incorporate data into the SIA	Review and approve interview guide Undertake meetings Record outcomes of meetings Communicate any social risks the project team	TBC	Interview guide
Survey	Telephone, in-person or online survey of local accommodation providers, businesses, and service providers to further explore and investigate issues of the project as scoped in Phase 1 and evaluate the impact from a stakeholder perspective. The survey will supplement in-person interviews to capture a broader group of stakeholders.	2, 3, 4, 5	Local service providers and businesses	Develop survey instrument Develop data management system Incorporate data into the SIA	Review and approve survey	TBC	Survey Instrument

Engagement Mechanism	Detail	Alignment with Objectives	Stakeholder Group	Umwelt Responsibilities	BayWa r.e. Responsibilities	Timing	Required Input
Small group discussion or collaborative assessment forum with Community Advisory Committee	1 x small group meeting or a collaborative forum with the BayWa r.e. team and key identified stakeholders, as appropriate, to work through predicted issues related to a specific impact theme (likely if any significant or complex impacts are identified in the SIA, e.g., construction workforce accommodation strategy). Mitigation and enhancement strategies relevant to the impact theme can be collaboratively developed through this forum.	2, 3, 4, 5	Key stakeholders (government agencies, Aboriginal stakeholders, local service providers)	Provide input to key stakeholders to be briefed Attend project briefings Organise project briefings Lead and record outputs of project briefings	Attend and lead project briefings	TBC	Project presentation



APPENDIX A

Preliminary Social Impact Identification

Table A1.1 Preliminary overview of social impacts

Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
Surroundings	Project establishment and operations	Negative impacts on **flora and fauna** - including the Plains Wanderer, Oolambeyan National Park	C & O[3]	Environmental groups Aboriginal Stakeholders Broader Community National Parks and Wildlife Services (NSW)	Land is important habitat for the endangered Plains Wanderer Bird. The community is invested in conservation and there are farmers who have dedicated land to preserving habitat In close proximity to the Oolambeyan National Park Plains Wanderers have dedicated Facebook groups and a sustained conservation effort	Negative [4]
Way of Life **Surroundings** **Livelihoods** **Cumulative**	Project establishment	Competing land use - the reduction in agricultural production due to multiple project developments in the area.	C & O	**Neighbouring landholders and residents** Environmental and community groups Broader Community	Agriculture is the predominant industry of the area, with high levels of employment in this sector across the LGA's (36.4% in Murrumbidgee and 23.8% in Edward River) Land use changes a key reason for opposition of other renewable projects in the region May be lower concern due to opportunities for co-occurrence between grazing and wind farms	Negative
Community Decision Making **Cumulative**	Project establishment and operations	Changes in the degree of **social acceptance** of the Project and development within the REZ more broadly due to the cumulative impacts of multiple projects	C & O	Broader Community Aboriginal Stakeholders Landholders Community Groups	Cumulative impacts of high rates of development in the area and the risk of consultation fatigue.	Negative
Community **Livelihoods** **Way of Life**	Project establishment and operations	Diversification of regional economy and income to include renewable energy delivery and supply chains	C & O	Broader community Local businesses	Agriculture is under pressure in the region due to climate change, water shortages and drought and market volatility. This represents	Positive

[3] C = Construction O = Operation P= Planning D= Decommissioning

[4] Yellow colour is a key potential negative impact. Green colour is a key potential positive impact

Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
				Landholders	an opportunity to diversify income for individual host and neighbour landholders and the broader community.	
Livelihoods	Project establishment and operations	Income received by host landholders may provide **additional sources of income**, bringing about improved outcomes for household income and community resilience	C & O	Host landholders	All localities have lower rates of household median income than the state. Income from agriculture is uneven and highly vulnerable to drought	Positive
Livelihoods Accessibility	Construction of turbines	Potential **restricted access** to properties may result in personal disadvantage and loss of agricultural productivity	C & O	Host landholders	High rates of home ownership and agriculture throughout the region - agricultural production may be impacted due to exclusion zones	Negative
Surroundings Way of life	Project construction and establishment of infrastructure	Visual amenity changes impacting perceptions of the rural landscape	C & O	**Neighbouring landholders and residents** Broader community Environmental and community groups	Cumulative impacts of a range of projects occurring at the same stage. Most of these are other renewable projects (solar especially). Relatively new announcement of REZ - may lead to drastic changes in a landscape currently dominated by agriculture. Located in flat landscape with uninterrupted view lines	Negative
Community Livelihoods	Project construction and operation	Changes to rural amenity impacting people's sense of place and community	C & O	Broader community Neighbouring landholders and residents	Emphasis on agriculture throughout the region	Negative
Surrounding Wellbeing	Production of noise and dust from construction	Increase in **construction-generated noise and dust** could cause social amenity impacts including disturbance and annoyance for nearby residents.	C	**Neighbouring landholders and residents** Broader	Periods of drought experienced throughout the area have potential to increase dust levels during construction from increased traffic. Cumulative impact of construction noise from multiple projects	Negative

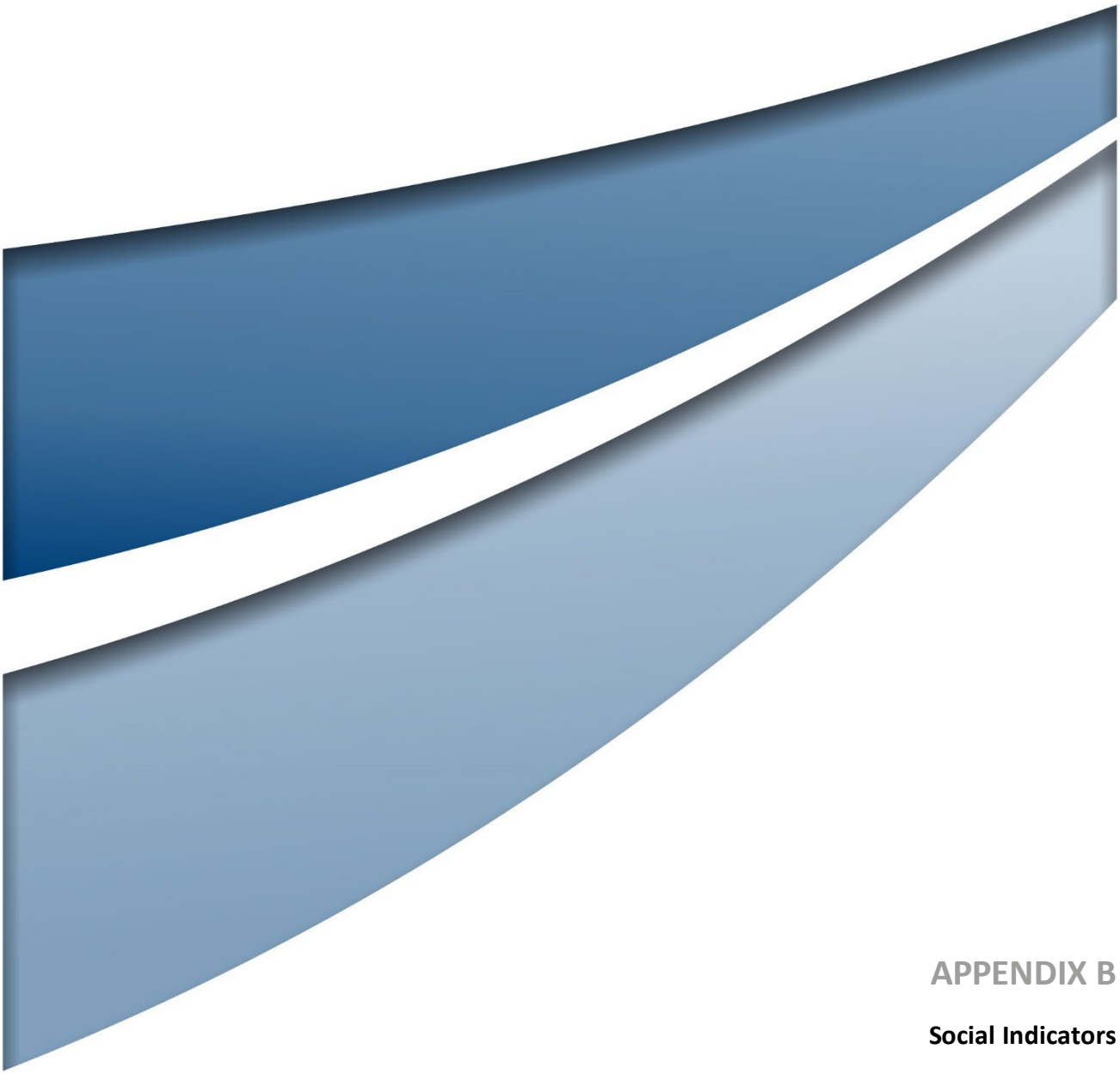
Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
				community Service Providers	Rural location likely to reduce impact on number of people	
Surroundings **Health and Wellbeing**	Project operations	**Operational noise** affecting social amenity and personal wellbeing.	O	Neighbouring landholders Host Landholders	Similar rates of psychological distress in Edward River (12.7 ASR per 100) compared to NSW (12.4), and slightly lower in Murrumbidgee (10.8) - sleep disturbances have potential to increase this.	Negative
Surroundings	Project construction	**Construction-related traffic** could cause an increase in personal disturbance caused by noise, a deterioration in road conditions, greater travel times, and heightened road safety risks - particularly important to consider cumulatively with other major projects and overlapping construction activities	C	Neighbouring landholders and residents Broader Community	Whilst the LGA is well connected to major hubs in SA, VIC and NSW, roads within the region have been criticised for a lack of maintenance. Increased traffic through towns noted as a concern with Councils considering the need to bypass certain areas in the future. Traffic incidents have seen a slight decrease in the area since 2016.	Negative
Community **Livelihoods**	Construction workforce influx	Increase in **economic activity** within local communities and townships due to an influx of workers	C	Local Businesses and Service providers Broader Community	Local areas are highly focused on agricultural production but with a growing tourism sector focused on fishing, hiking and water activities. Opportunity to support growth of recreational activities.	Positive
Community **Way of life** **Accessibility**	Construction workforce influx	Project construction will cause a temporary **rise in the population,** potentially increasing pressure on local services and infrastructure.	C	Neighbouring landholders and residents Broader Community **Local Businesses and Service Providers**	Limited rental vacancies in Edward River and lack of services throughout the region. High accommodation occupancy rates in both the Murray (58%) and Riverina (74.7%). Very few rental vacancies (Below 0.2% in Deniliquin, 0.4% in Griffith, 0.8% in Hay). Accommodation services reported difficulties in filling worker vacancies. Will they be able to support influx of workers? Will this impinge on tourism sectors?	Negative

Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
Community	Construction workforce influx	Increase in **human capital** for local communities (expertise)	C & O	Broader Community Business and Service Providers	Increase in workers with higher education levels (currently below NSW average of year 12 or equivalent school completion and bachelor qualification)	Positive
Community Livelihoods	Project establishment and operations	**Community investment initiatives and funds** to improve social outcomes for local communities	O	Neighbouring landholders and residents Aboriginal Stakeholders Community and environmental Groups Broader Community Local Businesses and Service Providers Local Government	High rates of socio-economic disadvantage throughout the region. Lack of services and resources noted by Edward River Council as a concern. An opportunity to BayWa r.e. to invest in the community increasing access to services and infrastructure	Positive
Accessibility	Construction workforce influx	Incoming Project **construction workforce accommodated locally** providing economic stimulus to service providers	C	Local Businesses and Service Providers	Construction workforce boosting local spending - hospitality, retail, accommodation Accommodation in the Murray and Riverina already has high occupancy rates (even greater in the Riverina). Very few rental vacancies (Below 0.2% in Deniliquin, 0.4% in Griffith, 0.8% in Hay).	Positive
Livelihoods	Project Construction	**Employment generation** within communities through the Project's construction can improve personal livelihoods and broader community's human and economic capital over time	C	Special Interest Groups Neighbouring landholders and residents Broader	Edward River has high unemployment rate (7.1%) compared to state average of 4.1, however it is lower in Murrumbidgee (2.1%) Already experience difficulties in filling work vacancies in the region.	Positive

Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
				Community Local Businesses and Service Providers	High rates of certificate level qualifications in the region.	
Livelihoods	Project establishment	Potential **property devaluation** impacting the ability for private property owners to buy or sell, particularly when considered cumulatively with adjacent proposed projects	C & O	Neighbouring landholders and residents	High rates of home ownership in the area, however few people with a mortgage demonstrating people have been in the area a long time. Perhaps signifying less people will want to sell Significant increase (55.5%) in the price of rural land in Edward River between 2020 and 2021. Little Australian or international evidence linking wind farms and property devaluation	Negative
Livelihoods	Construction workforce influx	**Training and education** opportunities through sourcing local employment	C & O	Broader Community Local businesses and service providers	High rates of certificate level training in the region, Collaboration of Deniliquin TAFE with local industry for training opportunities recognised as a key opportunity for Edward River.	Positive
Health and wellbeing	Project establishment	Project development may **increase stress and anxiet**y for proximal residents who feel uncertain about their futures and changes to their way of life	C & O	Neighbouring landholders and residents	Similar rates of psychological distress in Edward River (12.7) compared to NSW (12.4), and slightly lower in Murrumbidgee (10.8)	Negative
Culture	Project establishment	Impacts to **Aboriginal Cultural Heritage,** including artefacts, cultural sites, and connection to Country.	C	Aboriginal Stakeholders	Murray-Darling has been "a heartland for Aboriginal culture in South Eastern Australia" and is rich in Aboriginal heritage. High Indigenous population (Murrumbidgee 7.5%, Hay 6%). Hay Solar Farm received response submission	Negative

Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
					due to impacts on ACH Multiple Indigenous organisations in the region.	
Community	Project establishment	Incoming construction workforce may **decrease levels of community cohesion** given temporary changes in community composition	C & O	Broader community Special Interest groups Neighbouring landholders and residents	High amount of other renewable projects currently in the planning phase, increased construction workforces from these projects.	Negative
Community Livelihoods	Project establishment	**Distributive inequities** experienced through hosting infrastructure reducing **community cohesion.**	P, C & O	Neighbouring and host landholders Broader communities	Edward River noted community as being well connected, also high rates of volunteering in Murrumbidgee (29%) and Edward River (27%). Few landholders involved in the Project creating a divide between those receiving economic stimulus, and neighbours who are not.	Negative
Surroundings Safety, Health & Wellbeing	Construction of turbines	**Aero-safety** concerns due to height and quantity of turbines	C & O	Broader Community Businesses and Service Providers Neighbouring landholders Host landholders	Multiple aerial agricultural companies in the area	Negative
Surroundings Livelihoods	Project establishment	Concerns over water access and use.	C & O	Broader Community Special interest and environmental groups	Largest irrigation network in the State - TBC if some water licences revoked Experiences of both floods and droughts within the area over the past 10 years and the impact this has on ecosystems	Negative

Social impact category	Project aspect	Social impact description	Duration	Extent/affected parties	Baseline relevance	Positive / Negative
Surroundings	Decommissioning	Rehabilitation and waste production during decommissioning phase	C, O & D	Special Interest Groups Neighbouring and host landholders Broader Community Aboriginal Stakeholders	Concern raised in relation to other wind farms in NSW. Particular significance given importance of site as habitat for the endangered Plains Wanderers	Negative
Decision making	Project operation	Role in the **energy transition** and climate change reduction	C & O	Community Groups Broader Community	Designation as a REZ will increase discussion of, and opportunity for, broader energy transitions	Positive
Decision making	Project construction and operation	Lack of trust in decision making and engagement systems	C & O	All stakeholders	Some other renewable projects in the area have been criticised for their lack of engagement with the local community. Wind farm in Deniliquin received strong opposition in 2003, more recent projects haven't attracted as much attention.	Negative



APPENDIX B

Social Indicators

Appendix B – Social Indicators

Parameter	Deniliquin SA2	Jerilderie SA2	Griffith SA2	Griffith Region SA2	Edward River LGA	Hay LGA	Murrumbidgee LGA	NSW
Population Size	7,437	9,730	19,142	12,881	8,845	2,941	3,838	7,480,231
Males (%)	48	50	49	52	49	50	53	49
Proportion Indigenous Population (%)								
Median Age	45	48	36	39	45	46	41	38
0-4 years (%)	5	5	7	7	6	5	6	6
5-14 years (%)	12	12	13	15	12	13	15	12
15-19 years (%)	6	5	6	7	6	6	7	6
20-24 years (%)	6	4	6	5	5	5	5	7
25-34 years (%)	10	9	15	11	10	10	11	14
35-44 years (%)	11	10	12	12	11	9	12	13
45-54 years (%)	12	11	12	15	13	16	14	13
55-64 years (%)	15	16	11	14	15	15	14	12
65+ years (%)	24	28	17	14	22	22	17	16
Year 12 or equivalent (%)	37	35	41	37	39	38	36	59
Year 11 or equivalent (%)	12	14	7	8	12	10	10	5
Year 10 or equivalent (%)	31	30	32	37	30	30	33	23
Year 9 or equivalent (%)	12	11	8	9	11	10	10	6

Parameter	Deniliquin SA2	Jerilderie SA2	Griffith SA2	Griffith Region SA2	Edward River LGA	Hay LGA	Murrumbidgee LGA	NSW
Proportion of population with a different address one year ago (%)	12	12	14	10	12	11	9	14
Proportion of population with the same address five years ago (%)	57	57	54	63	58	58	58	54
Proportion of population who did voluntary work through an organisation or group in the last 12 months (%)	25	29	17	23	27	27	29	18
Owned outright (%)	38.5	43.7	32.8	37.9	38.6	41.3	36.2	32.2
Owned with a mortgage (%)	29.2	26.1	27.1	28.0	28.8	21.8	24.8	32.3
Rented (%)	28.8	24.9	35.3	29.1	28.3	30.4	34.4	31.8

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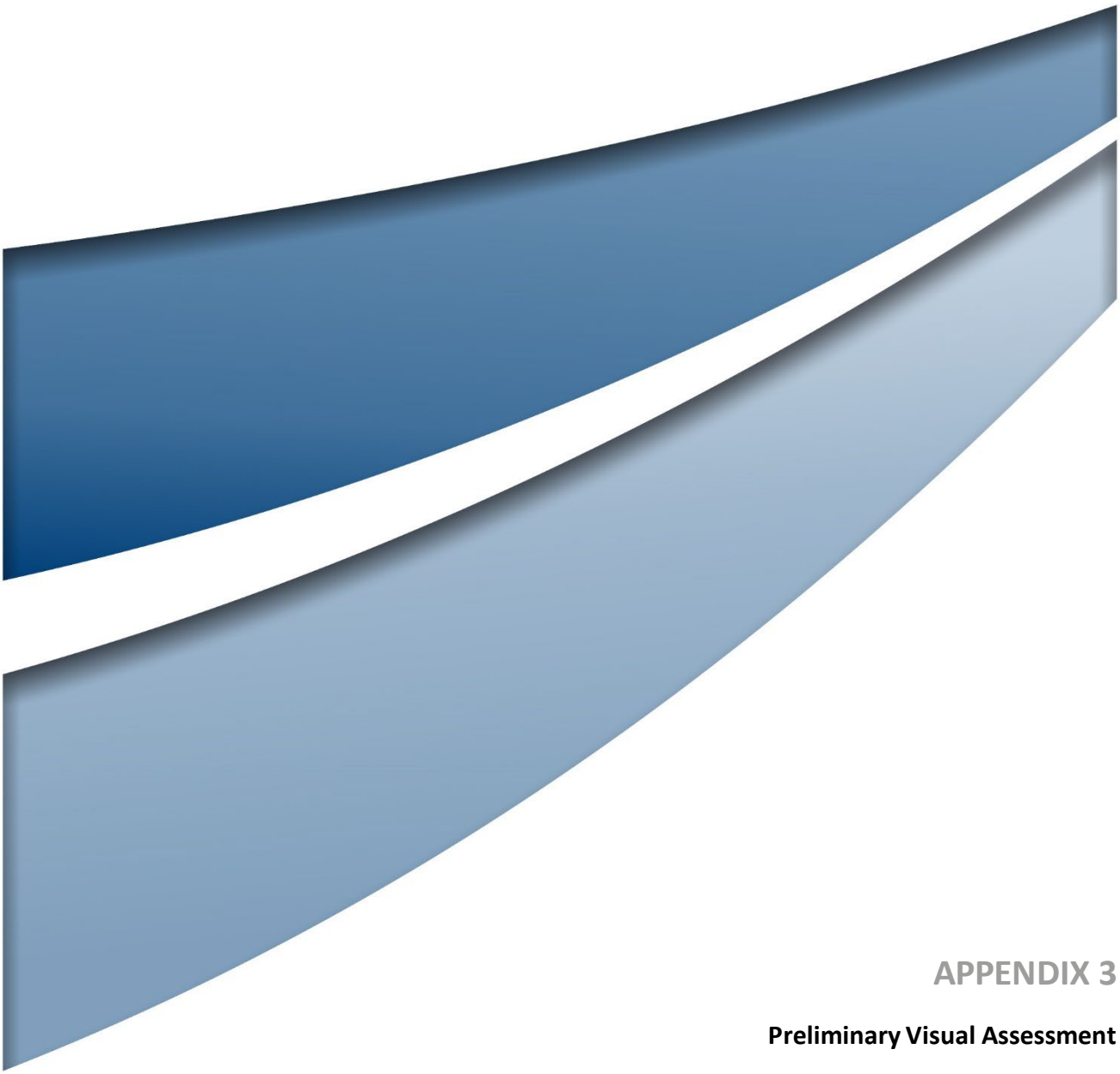

APPENDIX 3

Preliminary Visual Assessment

Preliminary Visual Impact Assessment

Bullawah Wind Farm

Prepared for: Umwelt (Australia) Pty. Limited on behalf of BayWa r.e. Projects Australia Pty Ltd.

Project No: **2131** Issue: **Rev E** Date: **27th September 2022**

DOCUMENT HISTORY AND STATUS

Project No: 2131

Project Name: Bullawah Wind Farm | Preliminary Visual Impact Assessment

Issue	Submission	Date of Issue	Author	Approved by
A	Draft Issue	19.04.2022	SB	AR
B	Revised Issue	12.05.2022	SB	AR
C	Updated for review	01.09.2022	SB	AR
D	Updated for review	12.09.2022	SB	AR
E	Updated for review	27.09.2022	SB	AR

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1.0 Introduction

1.1 Introduction

Moir Landscape Architecture (Moir LA) has been commissioned by Umwelt Australia Pty Limited (Umwelt) on behalf of BayWa r.e. Projects Australia Pty Ltd (BayWa r.e.) to prepare a Preliminary Visual Impact Assessment (PVIA) for the proposed Bullawah Wind Farm (the Project).

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

1.2 Relevant Experience

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

Moir LA is a professional design practice and consultancy specialising in the areas of Landscape Architecture, Landscape Planning and Landscape and Visual Impact. Our team has extensive experience in undertaking Landscape and Visual Impact Assessments for wind energy projects. In the context of our experience and with guidance from the Visual Assessment Bulletin we have developed methodologies to ensure a comprehensive and qualitative assessment of the Project.

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

- *Uungula Wind Farm LVIA (Wellington, NSW) - Approved May 2021*
- *Hills of Gold Wind Farm LVIA (Nundle, NSW) - EIS Submitted November 2020*
- *Thunderbolt Energy Hub Stage 1 (Kentucky, NSW) - EIS Submitted March 2022*
- *Valley of the Winds Wind Farm LVIA (Coolah, NSW) - EIS Submitted March 2022*
- *Jeremiah Wind Farm PVIA (Gundagai, NSW) - SEARs issued June 2021*
- *Barneys Reef Wind Farm PVIA (Gulgong, NSW) - SEARS issued September 2021*
- *Winterbourne Wind Farm LVIA (Walcha, NSW) - SEARs Issued September 2020*
- *Paling Yards Wind Farm PVIA (Paling Yards, NSW) - Request for SEARs issued March 2022*
- *Burrawong Wind Farm PVIA (Balranald, NSW) - SEARs issued July 2021*
- *Keri Keri Wind Farm PVIA (Keri Keri, NSW) - SEARs issued April 2022*

1.0 Introduction

1.3 Overview of Preliminary Visual Impact Assessment

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

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

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

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

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

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

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

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

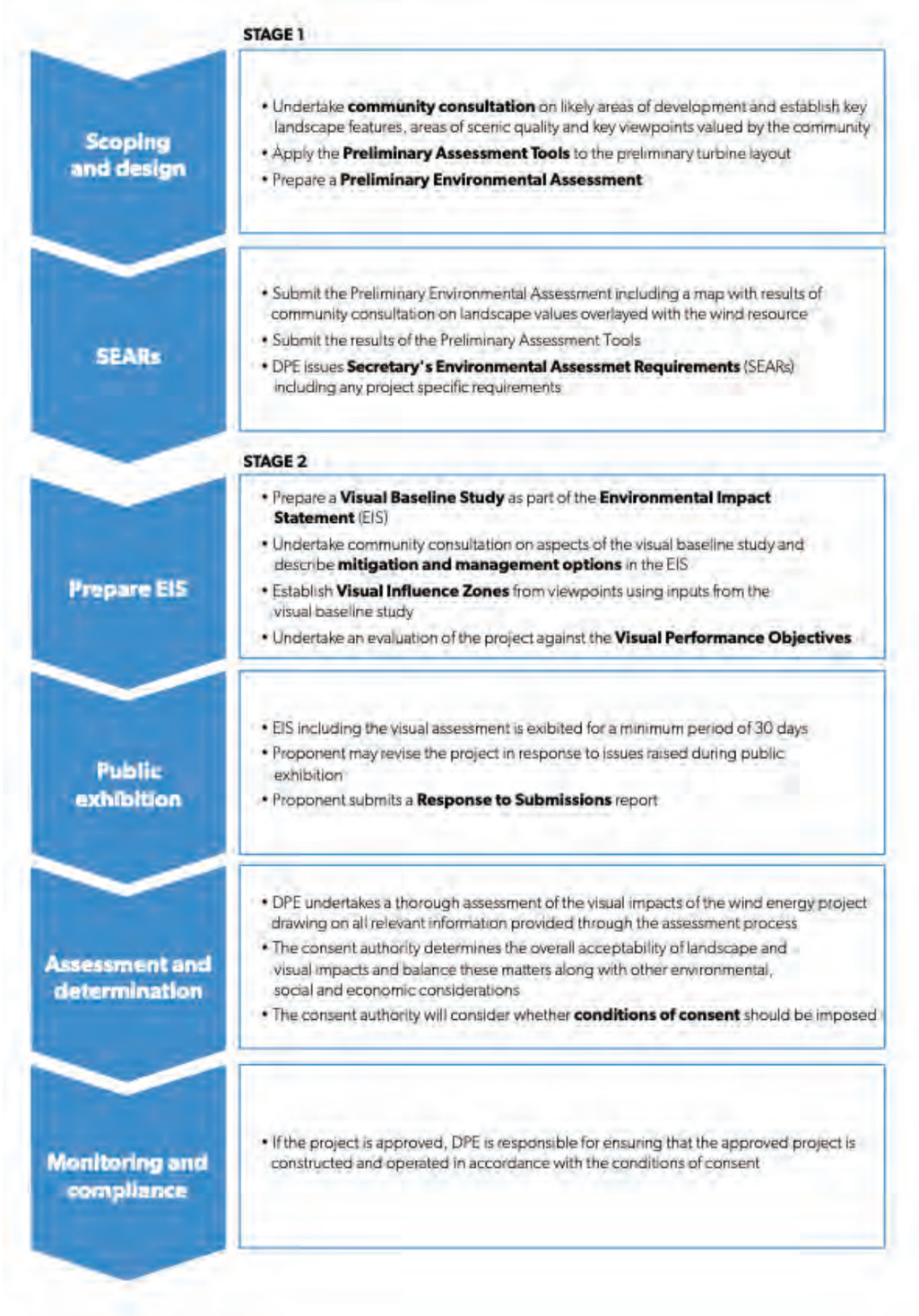


***Figure 1** Steps in Visual Assessment Process (Source: Wind Energy Visual Assessment Bulletin, 2016)*

2.0 Study Method

2.1 Study Method

The following has been undertaken to develop the PVIA:

Desktop Assessment:

- Application of Preliminary Assessment Tools to determine receptors with potential sensitivity.
- Preparation of a preliminary Zone of Visual Influence (ZVI) to establish a theoretical zone of visibility of the Project.
- Identification of key viewpoints and landscape features using available mapping and background documents.
- Identify and assess cumulative visual impacts of other proposed wind farms in the area through desktop assessment.

Site Inspection:

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

Community Consultation:

Community consultation has been undertaken through the scoping phase of the Project. A Community and Stakeholder Engagement Plan has been prepared for the Project. Results of the community consultation documented in previous studies have also been utilised to gain perspective on the landscape values held by the community to inform the PVIA.

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

2.2 Report Structure

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

Preliminary Visual Impact Assessment Report Structure:	
Bulletin Requirements:	**Addressed in report:**
• *Undertake community consultation to establish key landscape features valued by the community, key viewpoints in the area (both public and private) along with information about the relative scenic quality of the area.*	**Refer to Section 4.0:** **Community Consultation**
• *Production of a map detailing key landscape features (informed by community consultation and any ground-truthing undertaken), the preliminary wind turbine layout, the location of dwellings and key public viewpoints, and an overlay of the wind resource.*	**Refer to Section 5.0 :** **Existing Landscape Character**
• *Results of the preliminary assessment tools for both the visual magnitude and multiple wind turbine parameters.*	**Refer to Section 6.0:** **Preliminary Assessment Tools**
• *The visual assessment will involve the combination of desktop and field evaluations of the proposed wind energy project and its various components, turbines and ancillary facilities. The visual performance objectives form the principal framework and guide for assessing the proposed wind energy project when applied to individual viewpoints. All key public viewpoints and individual dwellings within the visual catchment should be identified and assessed.*	**Appendix A & B** **Preliminary Dwelling and Viewpoint Assessments**
• *The use of Geographic Information Systems (GIS) to facilitate the application of the tools will streamline the evaluation phase of a project during the pre-lodgement stage. Most GIS systems can establish the theoretical 'zone of visual influence' of the proposal (the area from which the proposal is theoretically visible or the 'visual catchment').*	**Refer to Section 7.0:** **Preliminary Zone of Visual Influence**
Summary and Recommendations - Section 10.0	

Table 1 Overview of Report Structure

3.0 Project Overview

3.1 Regional Context

The proposed Bullawah Wind Farm Project Area is located approximately 28 km southeast of the town of Hay in south west NSW. The Project Area sits at the junction of the Edward River Council, Murrumbidgee Council and Hay Shire Council's LGA boundaries. The Project Area can be accessed via Jerilderie Road, North Boundary Road and Willurah Road (refer to ***Figure 3***).

The Project Area is located within the South-West Renewable Energy Zone (REZ). South-West NSW has been identified as having high solar and wind renewable energy resource potential. The intended transmission capacity for this REZ is 2.5 GW (EnergyCo, 2022). The Project is therefore strategically located in a broad area identified as suitable for renewable energy project.

Preliminary wind studies undertaken by the Proponent have guided the development of the preliminary turbine layout for the Project. An existing 220kV electrical transmission line runs through the Project Area as shown in ***Figure 2***. It is anticipated that a new 330kV electrical transmission line will be built as a part of Project EnergyConnect to upgrade the transmission capacity of the region (Energy NSW, 2022).

The Project would comprise of approximately 170 wind turbines spread across an area of up to 32,991 hectares (ha), with a maximum capacity of approximately 1000 MW (1 GW), and the installation of a single grid-scale battery energy storage system (BESS) to allow for the capture and storage of dispatchable energy. The power generated by the wind farm (i.e., from wind turbines or released from battery storage) will feed into the electricity grid (National Energy Market, NEM) via the proposed 'Project EnergyConnect' transmission line. For the purpose of this assessment, the Project Area is defined by the extents of the Bullawah Wind Farm.

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

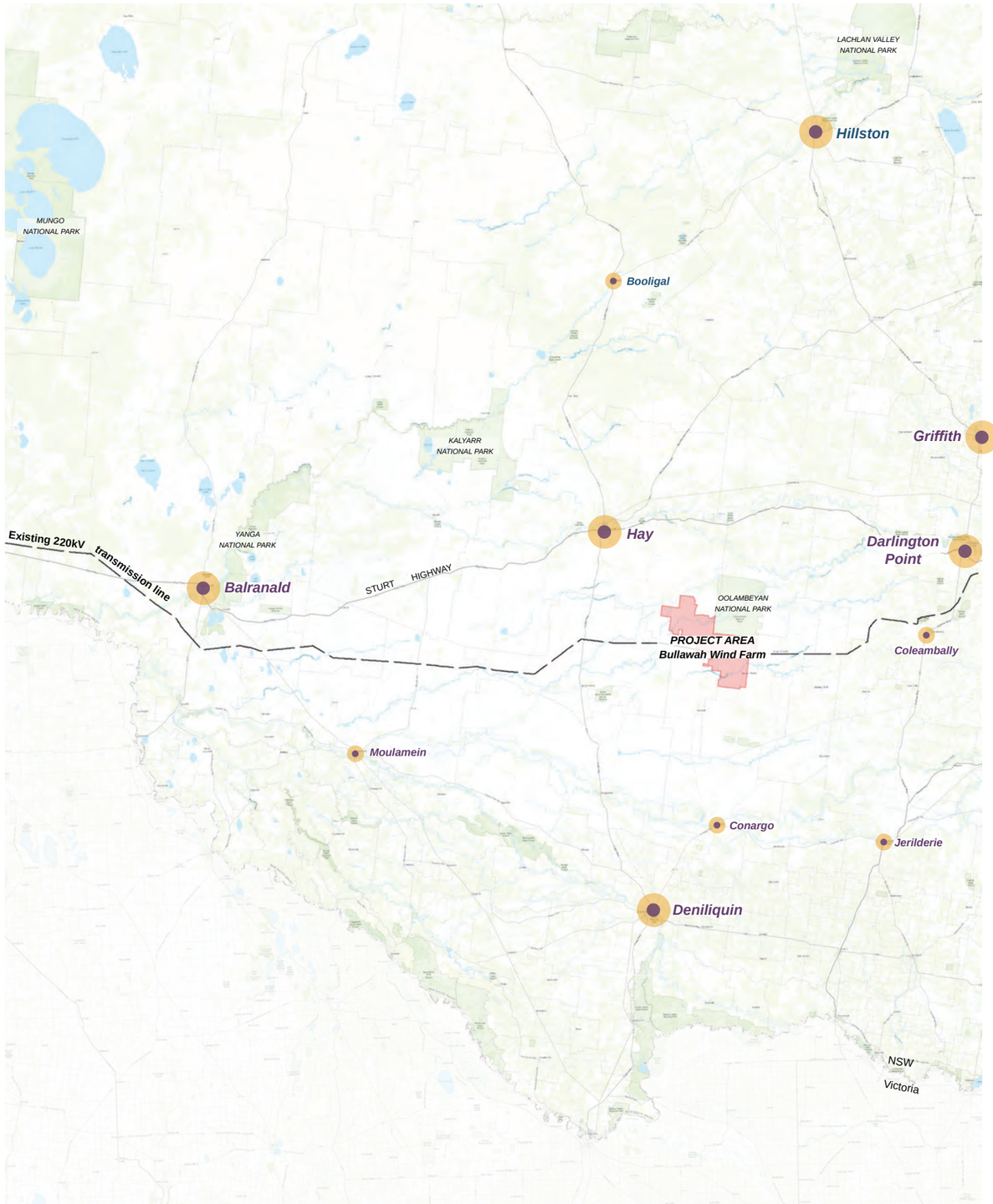


***Figure 2** The Project Area - Regional Context (Map Source: ESRI Topographic Maps)*

3.0 Project Overview

3.2 The Project Area

The Project Area encompasses four (4) properties with 110 allotments covering approximately 32,991 ha. These properties are primarily utilised for sheep and cattle grazing activities. The preliminary layout for the Project (refer to ***Figure 3***) will be subject to further review and refinement as the environmental and social impact assessment progresses.

3.3 The Study Area

Referred to in this report, the Study Area is generally defined as the Project Area and surrounding land which requires assessment. The Study Area is generally defined as the land up to 10,000 m from the nearest turbine. In accordance with the Bulletin, dwellings within 8,000m of the nearest turbine have been assessed to understand the preliminary visual impacts and viewpoints within the Study Area have been assessed to understand potential visual impacts on public viewing locations. Closest landmarks include the town of Hay, Oolambeyan National Park, and small rural properties such as Willurah and Steam Plains as shown in ***Figure 2***.

3.4 The Project

The Bullawah Wind Farm (referred to hereafter as 'the Project') includes the installation, operation, maintenance and decommissioning of approximately 170 wind turbines spread across an area of up to 32,991 ha. Associated infrastructure includes Battery Energy Storage System (BESS) facilities, ancillary infrastructure such as operation and maintenance (O&M) buildings, internal access roads, temporary facilities associated with construction and electrical infrastructure (including on-site substations/ switching stations) required to connect to the existing electricity transmission network.

The Project will have a capacity of approximately one (1) gigawatt (GW). The point of connection into the grid is expected to be via the proposed 330kV electricity transmission line that will run parallel to the existing 220kV transmission line. Currently, the existing 220kV transmission line runs through the Project Area.

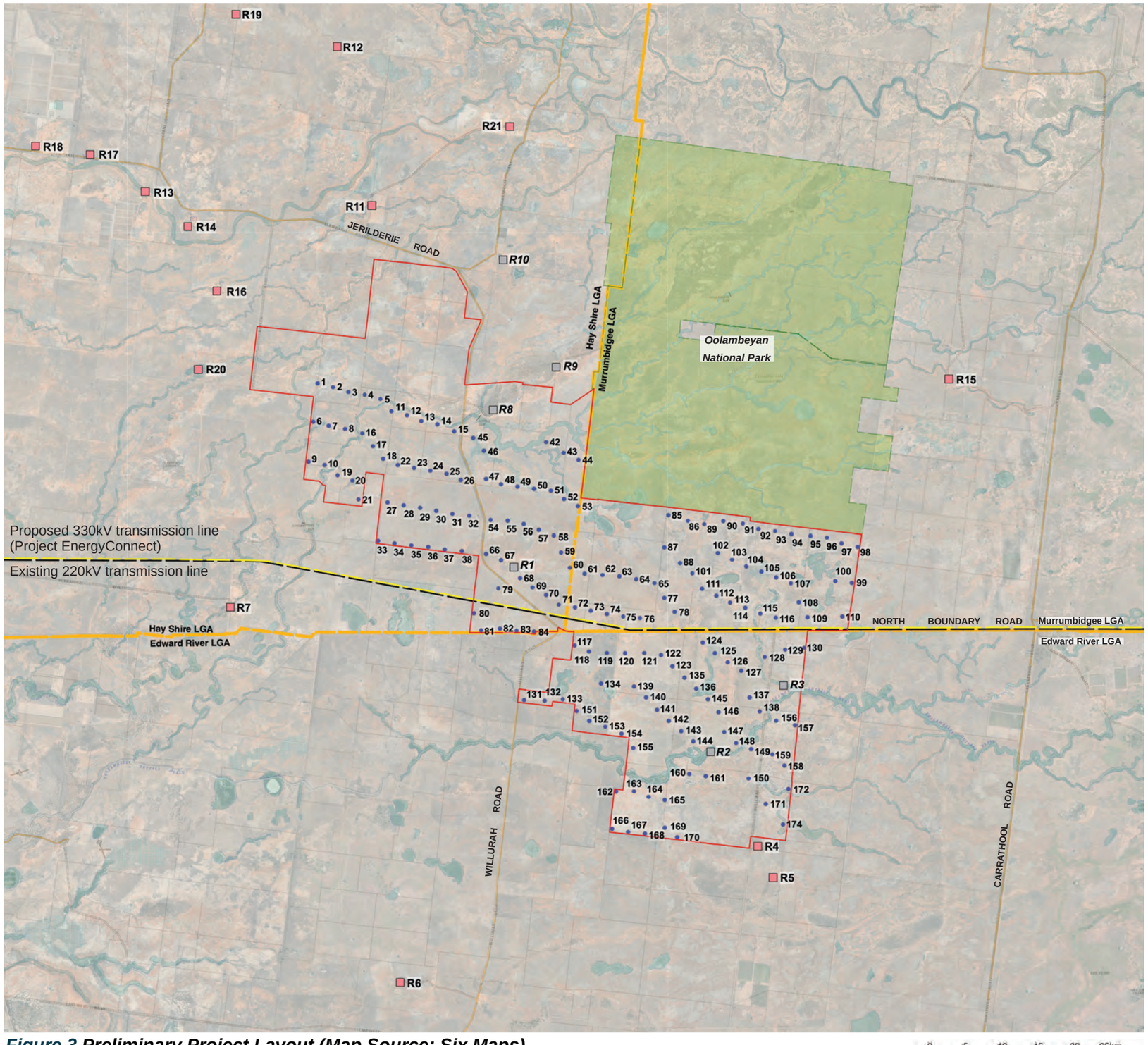
The preliminary layout for the Project (refer to ***Figure 3***) has been prepared to locate the turbines within areas identified as having high wind resources. This preliminary layout will be progressively refined during the EIS phase of the Project, having regard to the physical and environmental constraints of the site and the key landscape values of the Study Area. ***Figure 3*** also includes the locations of involved and uninvolved dwellings mapped from aerial photographs. These locations are subject to further ground-truthing.

Key components of the Project include:

- approximately 170 (3 blade steel) wind turbines with a total maximum height (tip height) of 300m AGL.
- Power infrastructure providing connection to the Project EnergyConnect transmission line, i.e., on-site substations/switchyards to connect the proposed wind turbines to the South-West REZ transmission line, that runs through the Project Area.
- Internal electrical reticulation network such as electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings.
- A single grid-scale BESS (~500 MW, up to four-hour battery).
- Temporary and permanent meteorological monitoring masts.
- Temporary construction facilities including:
    - Construction compound/s and site office buildings and storage areas
    - On-site concrete batching plants for use during the construction phase
    - Laydown areas used for wind turbine installation and storage of wind turbine components
- Targeted road network upgrades to facilitate delivery of wind turbine components to the Project Area as required.
- Provision for a temporary accommodation camp on site (if required).

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

3.0 Project Overview



Preliminary Project Layout

Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- 25 Potential 300 m Turbine Location
- R1 Involved dwellings
- R4 Uninvolved dwellings
- Access tracks
- Existing 220kV transmission line
- Proposed 330kV transmission line (Project EnergyConnect)
- Proposed 330kV internal transmission line connections
- Main Road
- Minor Road
- National Park
- LGA Boundary

Figure 3 ***Preliminary Project Layout (Map Source: Six Maps)***

4.0 Community Consultation

4.1 Overview of Community Consultation Process

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

The purpose of community consultation was to:

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

A Community and Stakeholder Engagement Plan (CSEP) has been prepared to outline the objectives and approach to community engagement which will continue through the EIS, construction and operation phases to provide the community with further opportunities to provide input into the Visual Baseline Study of the LVIA.

4.2 Results of Community Consultation

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

In accordance with the Bulletin, on-going community consultation has been undertaken by members of the BayWa r.e. Project team. This has included two community drop-in sessions in May 2022, a community survey, face-to-face meetings, a website, emails, phone calls, newsletters and newspaper articles. As of August 2022, information sessions and interviews with the community highlighted comparatively little concern about visual impact. The results of the engagement have been outlined in this section.

Most of the survey respondents explained that they were not greatly concerned about the visual impact of the turbines, with some landholders seeing them as an improvement and '*a sign of progress*'. The community's feedback referenced the visual impact in the context of a relatively homogeneous landscape.

Some stakeholders expressed that turbines would be '*not overly attractive*' (Riverina, 2022). Two (2) respondents expressed that the wind farm would have a strong negative visual impact on the landscape since '*the landscape itself is the feature and filling it with turbines will forever change the landscap*e'.

However, many of the neighbouring landholders noted that no additional measures were required to reduce the potential visual impact of the Project. Most people highlighted that the Project was well-located and that large distances from neighbouring properties meant that the visual impact would be minimised:

'*There's plenty of room out here for turbines. I can drive from Deniliquin and not see anyone so I don't think it will impact too many people*'.

Information obtained from other respondents and attendees to the presentations and information sessions, argued that the Project would capitalise on wind resources through their descriptions: '*we live in an area with a fair bit of wind and a lot of sunshine. That's the way it's going to be.'* When asked if there was any way in which the visual impact could be reduced, the neighbouring landholders noted:

'*Nothing I can think of. I have seen them around the place, and they don't worry me - they look alright. This is the ideal place to have them because there's no neighbours whinging about noise. They look good.*'

Where possible, the existing landscape features and key viewpoints have been mapped in ***Section 5.0*** of this PVIA. Additional consultation and further detailed assessment of these features and viewpoints will be undertaken during the EIS phase.

5.0 Existing Landscape Character

5.1 Overview of Bioregion

The Project sits within the Riverina Bioregion (see ***Figure 4***) in south-west NSW. The area is characterised by extensive bluebush and saltbush plains with small depressions and isolated low rises.

Topography is generally flat with very minor and isolated rises of coarse-textured aeolian material (Walker, 1991). Grey cracking clays, red brown earths and compact brown clays are predominant in the region (NPWS, 2003). The plains are dominated by saltbush with old man saltbush, cottonbush, myall and grasses. Vegetation communities in drain channels and swamps include bluebushes (*Maireana spp.*), dillonbush (*Nitraria billarderi*), nitre goosefoot (*Chenopodium nitrariaceum*) and occasionally saltbushes (*Artiplex spp*.) (Walker, 1991; Environment NSW, 2011). A detailed description of this character is defined in ***Section 5.3*** of this report. ***Images 1 - 2*** illustrate the typical character of the landscape within the Study Area.

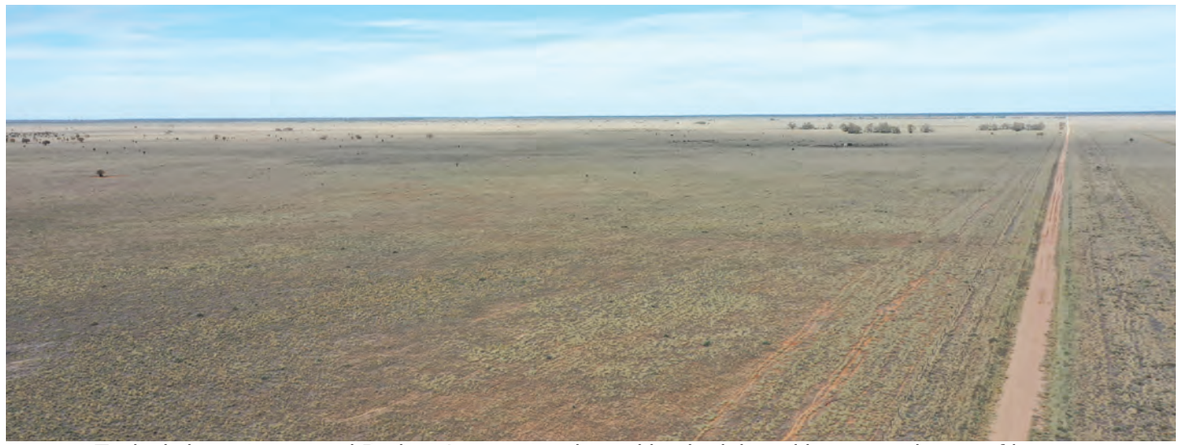


Image 1 *Typical character around Project Area: extensive saltbush plains with sparse clumps of larger canopy species.*

Image 2 *Existing vegetation character within Project Area is defined by extensively flat plains with saltbush, grasses and forbs.*

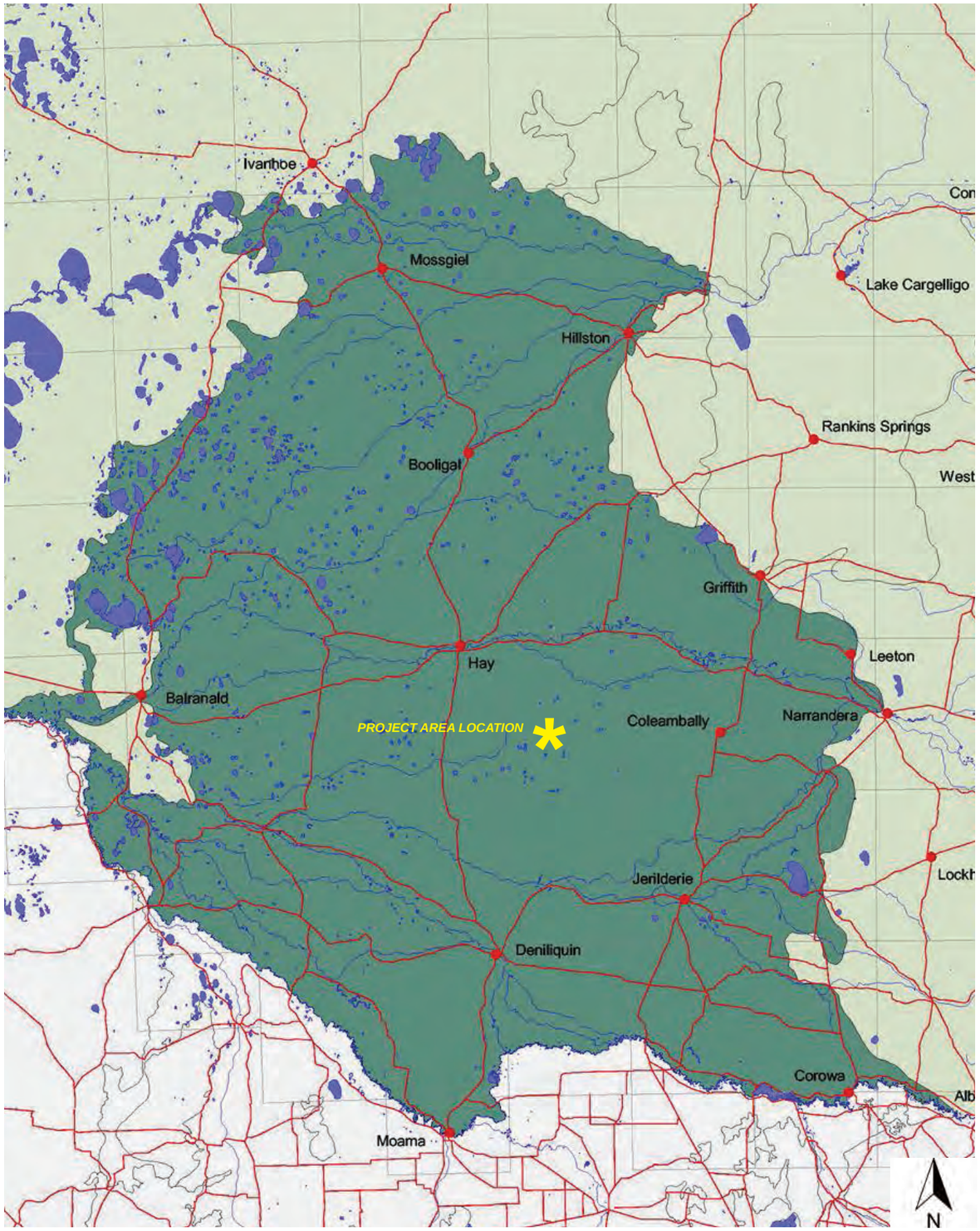


Figure 4 ***NSW Riverina Bioregion (Sources: NPWS 2016)***

5.0 Existing Landscape Character

5.2 Land Use

5.2.1 Land Use Zoning

The Project Area is located within the extents of Edward River Council, Murrumbidgee Council and Hay Shire Council. The Edward River Council utilises three different Local Environment Plans (LEPs) of which Conargo LEP 2013 is applicable to the Project. Other LEPs applicable to the Project are the Hay Shire LEP 2011 and Murrumbidgee LEP 2013. The following gives an overview of the main land use zones within the Study Area (see ***Figure 5***):

RU1 - Primary Production

The Project Area and majority of the surrounding land is zoned *RU1 - Primary Production*. Generally, the objectives of all LEPs relevant to the Project 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.* Majority of the National Park is located within the extents of Murrumbidgee Council and a small portion of the western boundary of the National Park comes under the Hay Shire Council LGA. The Project Area is adjacent to the southern and south-western boundaries 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 signifies *'expansive horizons of the Hay Plains which are one of the flattest in the world (...) and a sample of riverine plain geomorphological features of Quarternary age such as prior streams, ancestral rivers, sand dunes and level alluvial plains'* (NPWS, 2014a). The National Park's landscape, biological, and cultural values are as follows (NPWS, 2014a; NPWS, 2000):

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

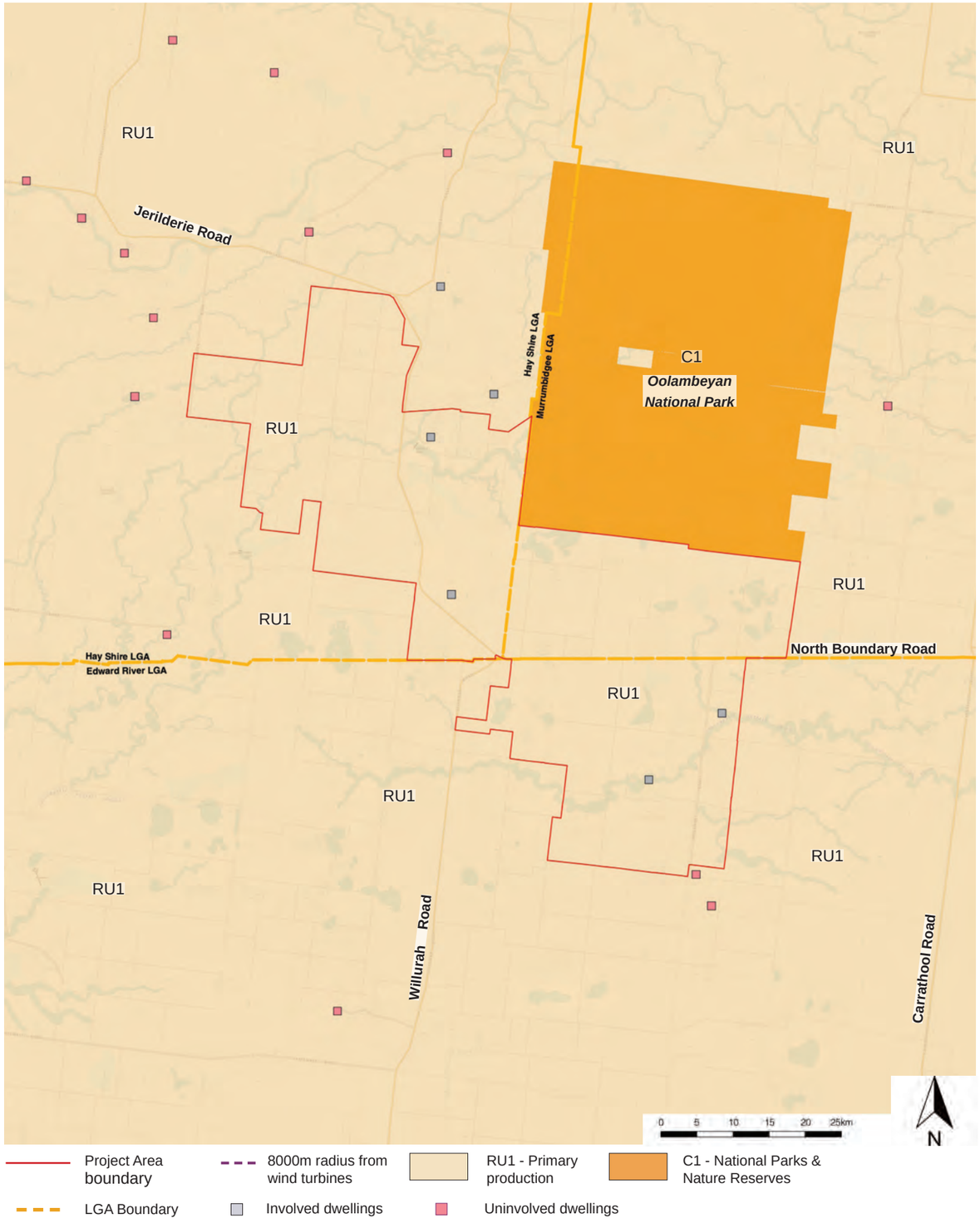


***Figure 5* Land Use Zoning**
(Sources: NPWS, Environment NSW 2016; Map Source: SIX Maps)

5.0 Existing Landscape Character

• 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.

Parts of the South West Woodland Reserve that are fragmented in areas south of the Project and closer to Conargo are also categorised as *C1-National Parks and Nature Reserve*s. The South West Woodland Nature Reserve Statement of Management Intent outlines that the reserve protects endangered ecological communities such as the Inland Grey Box Woodland and Sandhill Pine Woodlands (NPWS, 2014b). The reserve also has educational associations such as bushwalking and birdwatching.

5.2.2 Land Use

Land use within and around the Project Area is predominantly classified for agricultural production and minimal use. Land parcels within the Project Area are currently used as grazing pastures with native vegetation (see ***Figure 6***). The largest land parcel dedicated to minimal use corresponds to the extents of Oolambeyan National Park. Few tracts of lands are used for irrigated cropping, dryland cropping and modified pastures.

The flat landform is presented with a number of swamps and slow draining channels with clay-rich soils that are suitable for agricultural activity. Water channels such as the Coleambally Outfall Drain, Eurolie Creek and Abercrombie Creek are seasonal and exhibit vegetation characteristics that are unique to the Riverina region.

North Boundary Road, Jerilderie Road and Carathool Roads serve as important access corridors. These connect to Cobb Highway and Sturt Highway which provide connections to the towns of Hay, Carrathool, Conargo and Booroorban. Minor roads used to access residences in the area include Willurah Road and Bullewah Road.

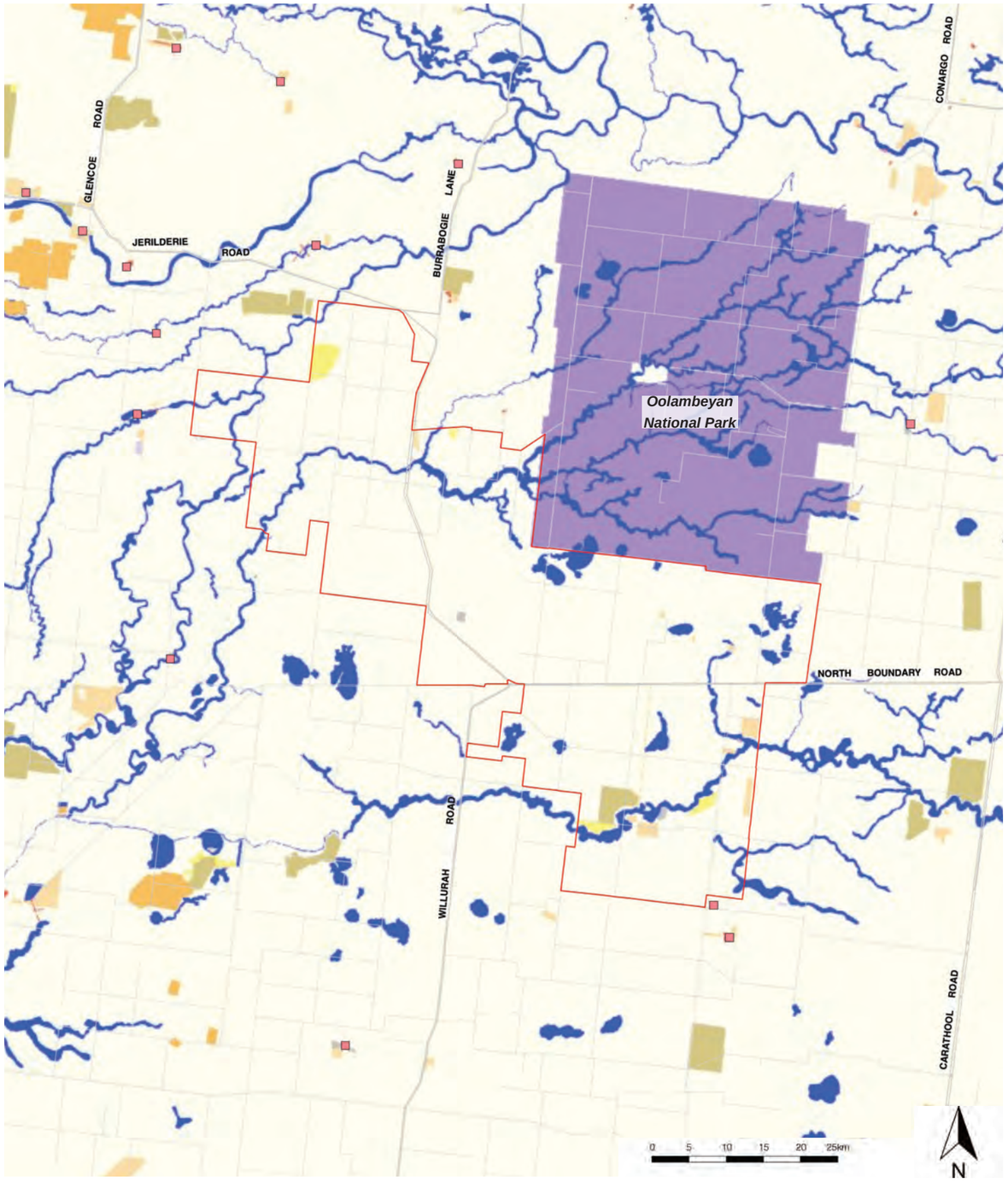


***Figure 6** Land uses within and around the Project Area (Source: Environment NSW, 2021)*

5.0 Existing Landscape Character

5.3 Key Landscape Features & Viewpoints

The Bulletin states: *proponents must identify key landscape features, dwelling locations and key public viewpoints*. The following section provides an overview of the key features identified within and around the Study Area. Refer to ***Figure 7*****.**

Geology and Landform

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

Vegetation Character

The Project Area exhibits extensive grassy plains generally characterised by isolated clumps of trees and shrubs. These include rosewood (*Heterodendrum oleifolium*) and belah (*Casuarina cristata*) along with dense bluebushes (Maireana spp.), scattered shrubs, grasses, copperburrs (*Sclerolaen*a spp.) and forbs (Environment NSW, 2011). The National Park is predominantly characterised by grasslands, semi-arid woodlands with grassy and shrubby vegetation character (NPWS, 2006). Drainage channels, swamps and floodplains in the region are seasonal, treeless and characterised by bluebushes (*Maireana* spp.), old man saltbush (*Artiplex nummularia*), grasses, copperburrs and forbs (Walker, 1991). Scattered stands of nitre goosefoot (*Chenopodium nitrariaceum*), lignum and dillon bush are also visible in freshwater wetlands and swamps (NPWS, 2006; NPWS, 2014a).

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 of the Project Area include Eurolie Creek, Eurolie Anabranch, Gundaline Creek, Delta Creek, Bublebundie Creek, Bromiumbong Swamp and Bowna Swamp. Coleambally Outfall Drain generally runs east-west for approximately 70 km and acts as a refuge for excess water in the greater Murrumbidgee floodplain. It is located in the central section of the Project Area where it spans horizontally from east to west.

Most of the water corridors are seasonal. However, the Park's water channels have been modified with the construction of dams and water points which ensure a continuous supply of water for the resident wildlife (NPWS, 2014a). The Park's southern areas are characterised by alluvial plains with channels that carry or hold water in the wet season or during floods (NPWS 2014a). These channels are typified by hummocks of bluebushes, dillonbush, nitre goosefoot and sparse saltbushes, grasses and forbs (Walker, 1991). The abundance of clay-rich soils in these areas creates opportunities for grazing for both native and introduced animals as identified in region's prevalent land uses.

National Park and Nature Reserve

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

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

Recreation Associations and Points of Interest

Significant points of interest are located within the extents of the Oolambeyan National Park. These include the Oolambeyan Homestead Picnic Area which comprises of a cricket pitch, an orchard, shearing and ram shed complexes that are surrounded by Sandhill Pine Woodlands (NPWS, 2014a). Some of these heritage structures such as shearing sheds and other farm buildings date back to the 1930s (NPWS, 2022).

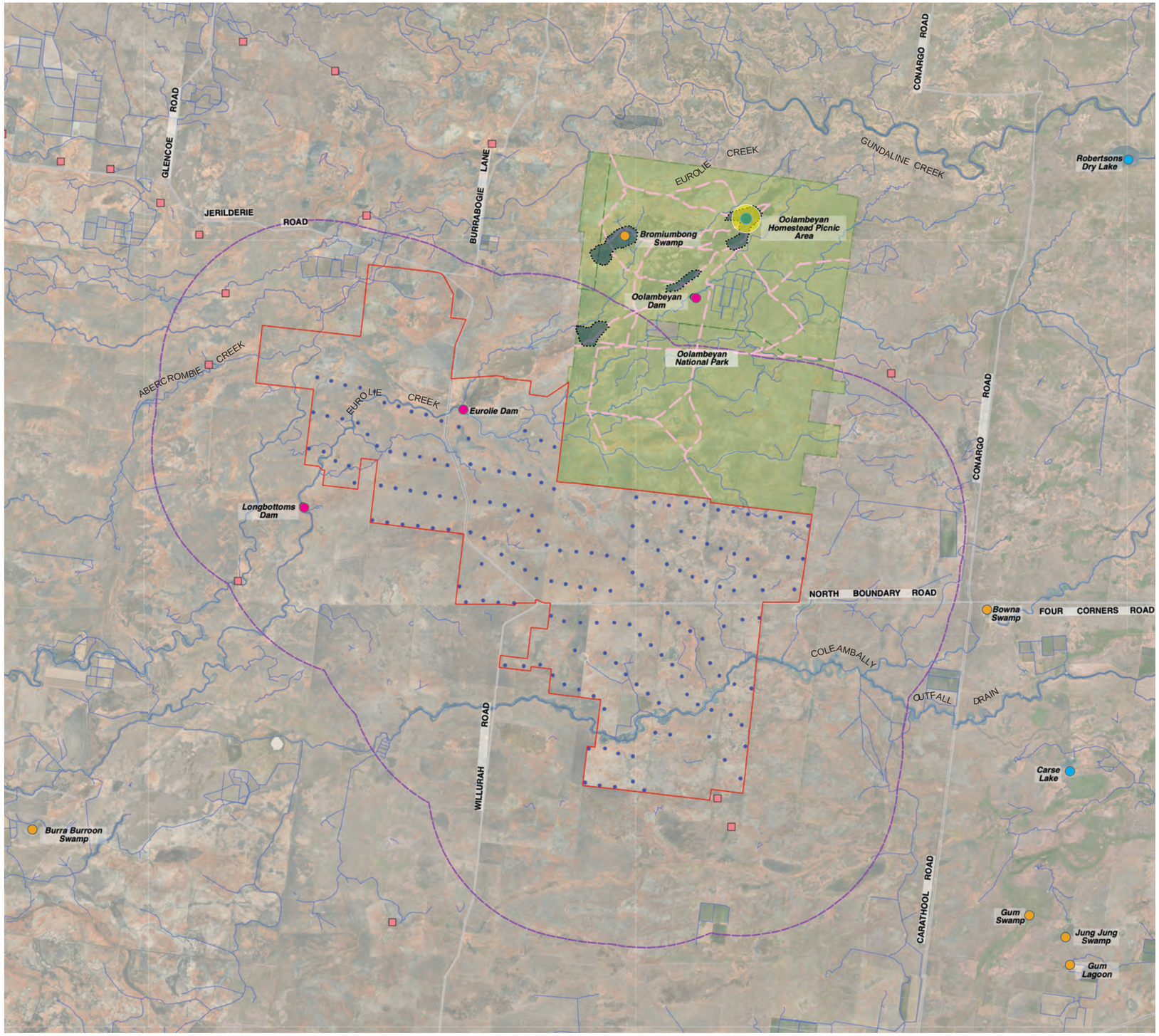
Some of the Park's management trails are also utilised for hiking and cycling. No campgrounds were identified within the extents of the Park. However, due to the close proximity of the Murrumbidgee

5.0 Existing Landscape Character

Valley Regional Park which has camping grounds in Hay and Darlington Point, visitors often visit the Oolambeyan Homestead Picnic Area for day trips (NPWS, 2014a). The presence of a significant plains-wanderer habitat and other significant wildlife attracts ecologists, nature based and bird watching groups. Visitor opportunities are generally limited to day visits which also helps to preserve natural and cultural values identified for the National Park (NPWS, 2000; NPWS, 2014a).

Minor to moderate recreational associations such as bushwalking, birdwatching and research have been identified for South West Woodland Reserve (NPWS, 2014b) but no formal trails and tracks were identified within the Reserve.

5.0 Existing Landscape Character



Existing Landscape Features
Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- Potential 300 m Turbine Location
- Uninvolved dwellings
- Main Road
- 8000 m from turbines
- National Park
- Points of Interest
- Swamps
- Dams
- Lakes
- Walking and vehicular access tracks
- Areas of significant cultural heritage
- Rivers, creeks and channels

***Figure 7** Existing Landscape Features (Map Source: ESRI Aerial Imagery)*

5.0 Existing Landscape Character

5.4 Scenic Quality Rating

The Bulletin states: *the baseline study inputs, including key landscape features and sensitive land use designations, should lead to the identification of Scenic Quality Classes. Scenic quality refers to the relative scenic or aesthetic value of the landscape based on the relative presence or absence of key landscape features known to be associated with community perceptions of high, moderate or low scenic quality. It is both a subjective and complex process undertaken by experts in visual impact assessment, taking into account community values identified in early community consultation*.

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

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

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

Table 2 Scenic Quality Frame of Reference

5.0 Existing Landscape Character

5.5 Preliminary Landscape Character Units

An assessment of existing land use and landscape features suggests that the Project Area and its surrounds exhibit a strong agricultural history of grazing and cropping along with cultural and natural associations of the Oolambeyan National Park. A number of Landscape Character typologies exist within the Study Area (refer to ***Figure 8***). As a part of the Preliminary Landscape Character Assessment, a total of five (5) key landscape typologies referred to hereafter as Landscape Character Units (LCUs) have been identified.

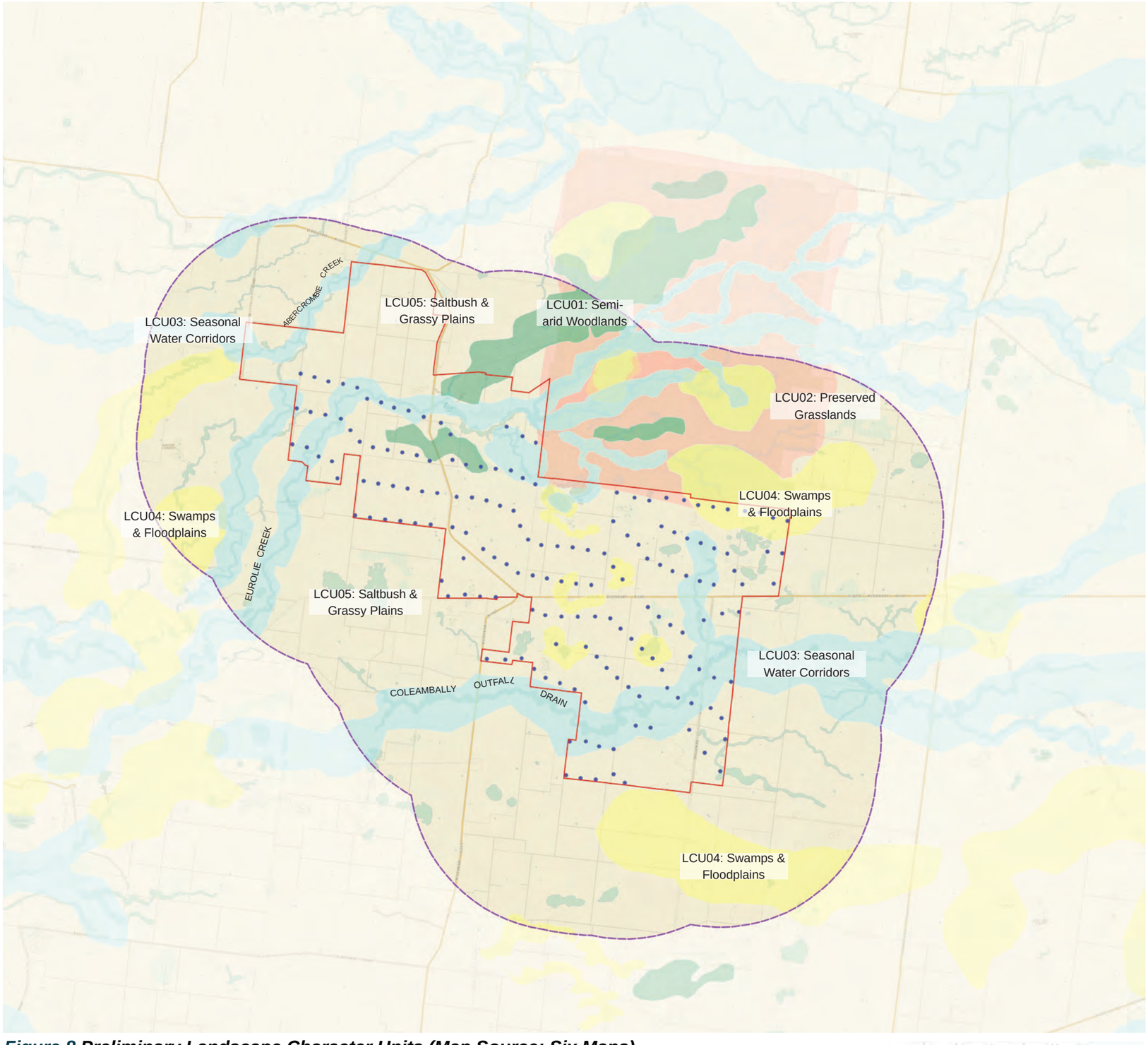
Table 3 provides an overview of the LCUs and preliminary Scenic Quality Ratings applied. These ratings have been developed using a standard frame of reference provided in the Bulletin. The LCUs and Scenic Quality Ratings will be refined in the EIS Phase of the Project to reflect input provided by the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

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

Landscape Character Units			
LCU:	**Name:**	**General Character:**	**Preliminary Scenic Quality Rating:**
LCU01	**Semi-arid Woodlands**	*Comprises of dense woodlands of boree and black box trees that are spread across the extents of Oolambeyan National Park and other areas in its immediate vicinity.*	**Low**
LCU02	**Preserved Grasslands**	*Grassy plains within the Oolambeyan National Park that are preserved and managed. Consists of low-growing and regenerating grasses and cottonbush.*	**Low**
LCU03	**Seasonal Water Corridors**	*Moderately vegetated seasonal creeks and drainage channels that run across intermittently. Very shallow embankments, almost minor depressions in some areas.*	**Moderate**
LCU04	**Swamps and Floodplains**	*Flat, sub-circular, shallow depressions characterised by water-loving grasses and forbs. These also act as wildlife refuges because they hold overflows from the creeks and drainage corridors.*	**Low**
LCU05	**Saltbush and Grassy Plains**	*Clear, flat and open areas used for grazing or cropping. Most prominent character of the region with minor to no elevation changes.*	**Low**

Table 3 Overview of Preliminary Landscape Character Units

5.0 Existing Landscape Character



Preliminary Landscape Character Units

Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- Potential 300 m Turbine Location
- Main Road
- Minor Road
- 8000 m from turbines
- LCU01: Semi-arid Woodlands
- LCU02: Preserved Grasslands
- LCU03: Seasonal Water Corridors
- LCU04: Swamps and Floodplains
- LCU05: Saltbush and Grassy Plains

***Figure 8** Preliminary Landscape Character Units (Map Source: Six Maps)*

5.0 Existing Landscape Character

LCU01: Semi-arid Woodlands

This LCU is characterised by open woodlands within the extents of the Oolambeyan National Park. Land is subjected to minimal use and represents vegetation including dense boree and black box woodlands with a grassy understorey on flat topography. The Oolambeyan Homestead Picnic Area and precinct has significant recreational associations identified in the region.

Scenic quality rating: Low

See Images 3 and 4.

Image 3

View of the Oolambeyan National Park semi-arid woodlands. Typical character comprises of clumps of trees and shrubs with grassy understorey.

Image 4

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

LCU02: Preserved Grasslands

The Preserved Grasslands LCU comprises of flat land parcels that are within the extents of the Oolambeyan National Park. Isolated stands of tree cover are interspersed around the grasslands. No recreational associations were identified with this LCU and it falls in the minimal land use category. Views in the LCU are generally open and expansive due to lack of intervening elements.

Scenic quality rating: Low

See Images 5 and 6.

Image 5

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

Image 6

Aerial view of grasslands. Typical vegetation communities includes grasses, cottonbush and isolated stands of black box trees, lignum and nitre goosefoot species.

5.0 Existing Landscape Character

LCU03: Seasonal Water Corridors

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

Scenic quality rating: Moderate

See Images 7 and 8.

Image 7

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

Image 8

View of Eurolie Creek characterised by dense clumps of black box, boree, lignum, saltbush, grasses and forbs in gently undulating to flat tracts of lands.

LCU04: Swamps and Floodplains

The LCU is defined by flat, shallow sub-circular depressions that accommodate water flows. Edges of the LCU are utilised for dam construction due to topographical changes that favour water collection. Characterised by dry, grey cracking clays with water-loving grasses, groundcovers and forbs. Prominent vegetation includes stands of nitre goosefoot and lignum shrubs, saltbush, canegrass and dillonbush.

Scenic quality rating: Low

See Images 9 and 10.

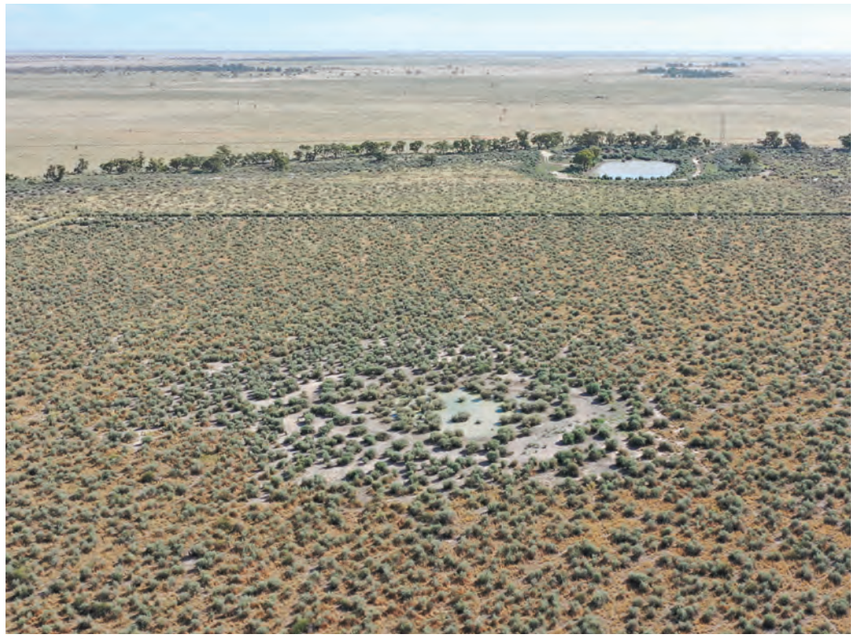


Image 9

Open, generally flat land parcels with saltbush and water-loving grasses and forbs typical of the LCU.

Image 10

Stands of trees along Bowna Swamp's boundary segregates the landscape unit from surrounding parcels of grasses and saltbush.

5.0 Existing Landscape Character

LCU05: Saltbush and Grassy Plains

The Saltbush and Grassy Plains LCU is defined by vast, open land parcels that are utilised for sheep, cattle, emu and kangaroo grazing. The LCU forms the most dominant character in the region. It comprises of open plains with scattered or no tree cover and vast extents of saltbushes, speargrass, and forbs. Common land uses include grazing, dryland cropping, modified and irrigated pastures.

Scenic quality rating: Low

See Images 11 and 12.

Image 11

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

Image 12

View of land parcels within and around the Project Area typically represent grazing pastures with saltbush varieties.

5.0 Existing Landscape Character

Landscape Character Units		
LCU:	**Name:**	**Preliminary Visual Impact Assessment**
LCU01	**Semi-arid Woodlands**	Views from this LCU are often contained by the dense vegetation that defines this LCU. Despite the flat topography, dense woodlands will help reduce and mitigate views towards the Project. Recreational sites such as the Oolambeyan Picnic Area will have minor or no visual impact due to this LCU's vegetation.
LCU02	**Preserved Grasslands**	Views towards the Project will be available within this LCU because of the relatively flat topographic character and elevated position of the turbines. Patches of vegetation in some areas may, however, help limit views in certain areas.
LCU03	**Seasonal Water Corridors**	The LCU's vegetation character acts as an effective visual barrier. Views from within the LCU are likely to be limited due to topographical changes and the dense vegetation cover. It plays an important role in limiting views from dwellings that are located in close proximity of this LCU
LCU04	**Swamps and Floodplains**	Views of the Project from the Swamps and Floodplains LCU are likely to be available from most locations. The flat, low-lying character allows open views. Existing shrubs may help reduce the visual impact in certain areas.
LCU05	**Saltbush and Grassy Plains**	The Project is located within this LCU which is also the most prominent character of the region. Isolated dwellings are scattered across grassy plains. Agricultural activities include grazing pastures and dryland cropping. Views are generally open with limited obtrusive elements.

Table 4 Overview of Preliminary Visual Impact Assessment of LCUs

6.0 Preliminary Assessment Tools

6.1 Overview of Preliminary Assessment Tools

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

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

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

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

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

6.2 Preliminary Assessment Tool 1: Visual Magnitude

The Visual Magnitude Threshold is based on the height of the proposed wind turbines to the tip of the blade and distance from dwellings or key public viewpoints as shown in ***Figure 9.***

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 *300 metres*. The 'black line' intersects at a distance of *4,000 metres* and the 'blue line' intersects at *5,900 metres*.

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

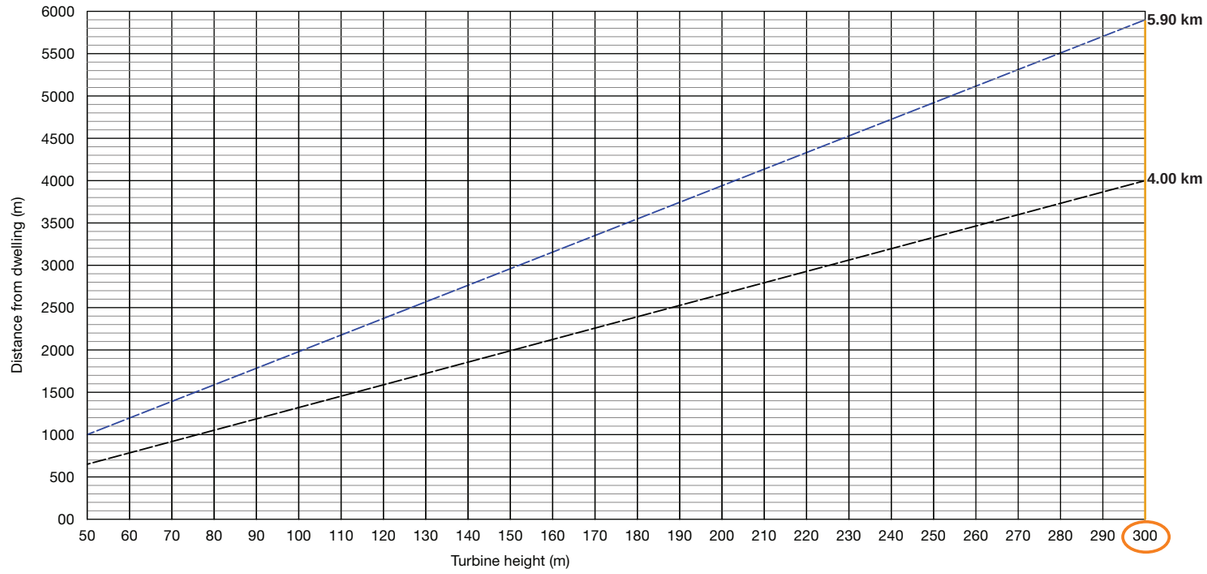


Figure 9 *Visual Magnitude thresholds for Bullawah Wind Farm Project Layout*

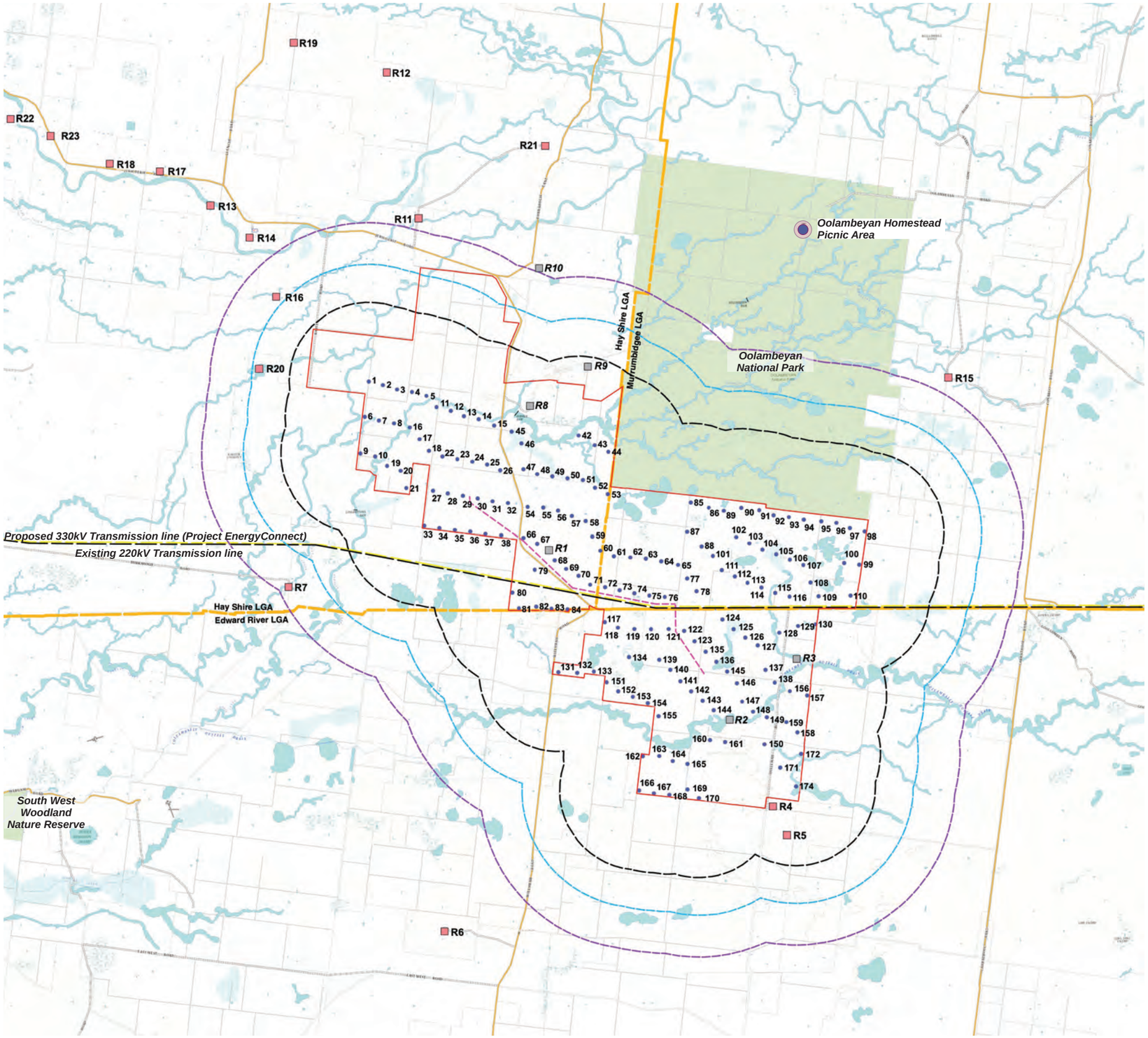
(Source: Adapted from Visual Assessment Bulletin)

6.3 Results of Preliminary Assessment Tool 1: Visual Magnitude

Application of the Preliminary Assessment Tools to the Bullawah Wind Farm identified dwellings which require further assessment in accordance with the Bulletin. Uninvolved dwellings identified within 8,000 metres of the nearest proposed turbine are shown on ***Figure 10*****.**

- Two (2) uninvolved dwellings have been identified within 4,000 metres of the proposed wind turbine locations (within black line of visual magnitude). These are R4 and R5. Both dwellings are uninhabitable.
- One (1) uninvolved dwelling has been identified within 5,900 metres of the proposed wind turbine locations (within blue line of visual magnitude). This is dwelling R20.
- Additionally, two (2) uninvolved dwellings have been identified within 8,000 metres of the proposed turbine locations. These are R7 and R16.
- Preliminary site assessment identified that existing vegetation would partially reduce visibility from five (5) uninvolved dwellings, these being R4, R5, R20, R7 and R16. Preliminary assessments of these five (5) uninvolved dwellings has been included in ***Appendix A***. Further detailed assessment and site inspections of sensitive receptors to ground-truth this analysis will be undertaken during the EIS phase.

6.0 Preliminary Assessment Tools



Visual Magnitude

Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- 25 — Potential 300 m Turbine Location
- R10 — Uninvolved dwellings
- *R1* — Involved dwellings
- Key public viewpoints
- Main Road
- Minor Road
- 4000 m from turbines
- 5900 m from turbines
- 8000 m from turbines
- LGA Boundary
- Existing 220kV transmission line
- Proposed 330kV transmission line (Project EnergyConnect)
- Proposed internal 330kV transmission line
- National Park / Nature Reserves

Note:

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

N

0 5 10 15 20 25km

***Figure 10** Preliminary Assessment Tool 1: Visual Magnitude - Bullawah Wind Farm (Map Source: Six Maps)*

6.0 Preliminary Assessment Tools

6.4 Preliminary Assessment Tool 2: Multiple Wind Turbine Tool

The Multiple Wind Turbine Tool provides a preliminary indication of potential cumulative impacts arising from the proposed Project. To establish whether the degree to which dwellings or key public viewpoints may be impacted by multiple wind turbines, the proponent must map into six sectors of 60° any proposed turbines, and any existing or approved turbines within eight (8) kilometres of each dwelling or key public viewpoint. No key public viewpoints were identified within 8,000 m of the nearest turbine. However, the Oolambeyan Homestead Picnic Area which is located approximately 16.78 km northeast of the nearest proposed turbine is a key public viewpoint. ***Figure 11*** provides examples of where a dwelling or key public viewpoint may have views to turbines in multiple 60° sectors.

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

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

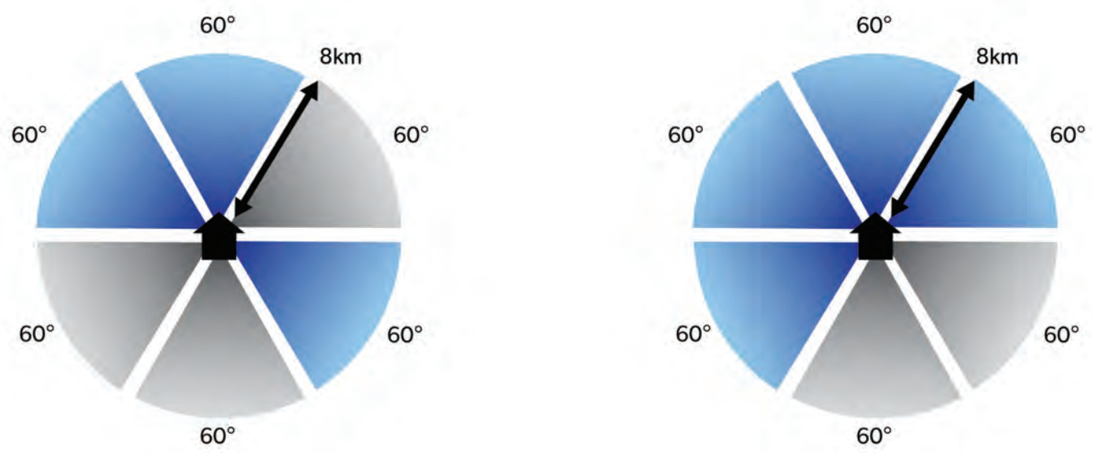


Figure 11 *Preliminary Assessment Tool: Multiple Wind Turbines*

(Source: Visual Assessment Bulletin)

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

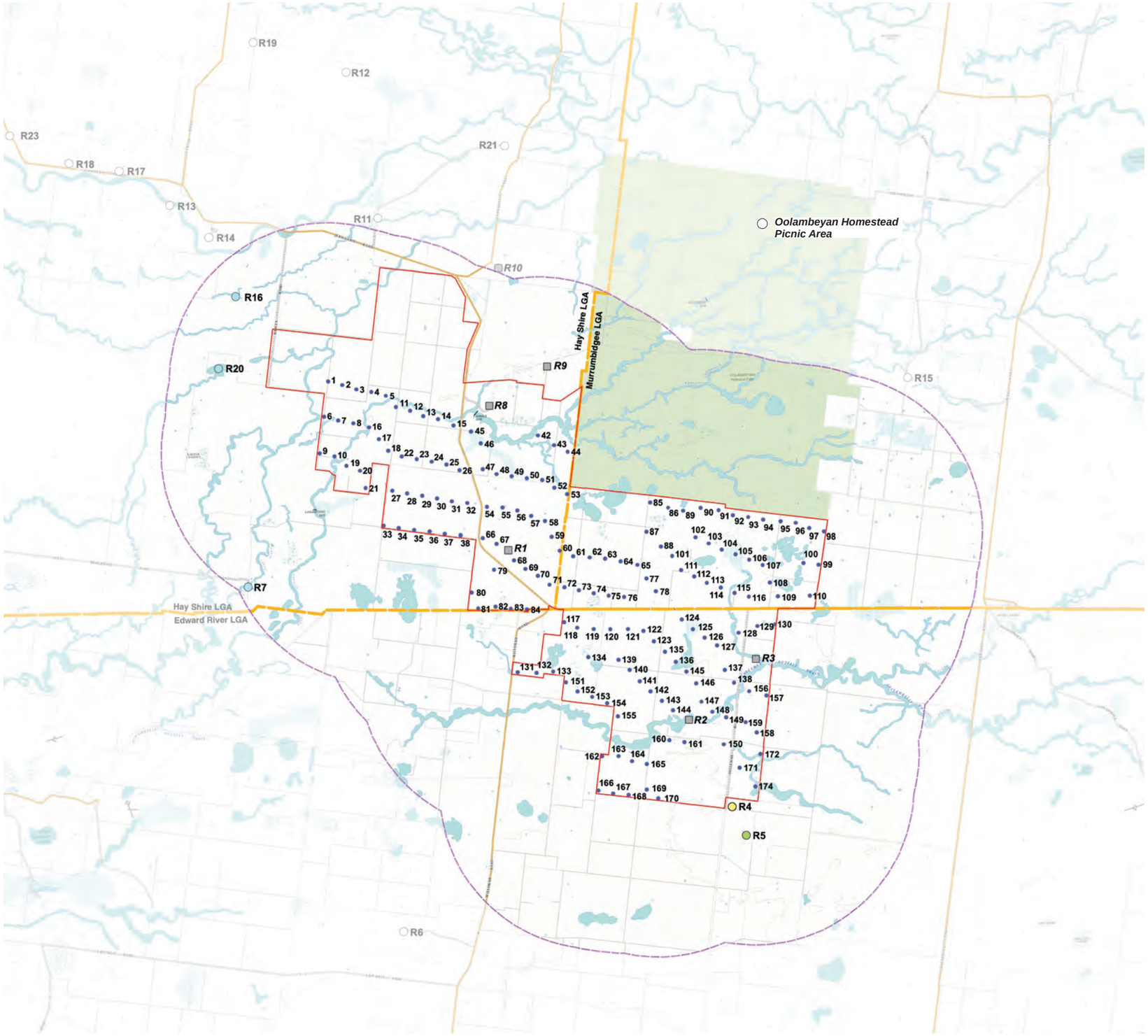
When applied to the Project, the 2D Multiple Wind Turbine Tool (see ***Figure 12***) identified the following:

- One (1) uninvolved dwelling, i.e. dwelling R4, with three (3) sectors of visible turbines.
- One (1) uninvolved dwelling, i.e. dwelling R5, with two (2) sectors of visible turbines.
- The remaining three (3) uninvolved dwellings within 8000 m of the proposed wind turbines, i.e. R7, R16 and R20 are likely to have views to turbines in up to one (1) 60 degree sector which is deemed acceptable. ***Table 4*** provides an overview of preliminary assessment of these dwellings.

Since the Oolambeyan Homestead Picnic Area is located outside of the 8,000 m radius from the wind turbines, the viewpoint will theoretically not have any 60 degree sector views. An assessment of potential visual impacts on a viewpoint that represents the picnic area has been discussed in ***Appendix B***.

Further assessment of these dwellings using 3D topographic mapping has delivered the same results. Existing screening factors (including vegetation and structures) may reduce visibility of the turbines. A preliminary assessment of these dwellings has been included in ***Appendix A***.

6.0 Preliminary Assessment Tools



Multiple Wind Turbine Tool

Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- 25 — Potential 300 m Turbine Location
- R1 — Involved dwellings
- Main Road
- Minor Road
- 8000 m from turbines
- National Park

MWTT Results for Uninvolved Dwellings & key viewpoints:

- Dwellings or viewpoints in excess of 8,000 m
- One (1) 60º Sector (60º)
- Up to two (2) 60º Sectors (120º)
- Up to three (3) 60º Sectors (180º)

Note:

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

N

0 5 10 15 20 25km

Figure 12 ***Preliminary Assessment Tool 2: Multiple Wind Turbine Tool (Map Source: Six Maps)***

7.0 Preliminary Zone of Visual Influence

7.1 Overview of Preliminary Zone of Visual Influence

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

A Zone of Visual Influence (ZVI) diagram has been prepared for the Project to illustrate the theoretical visibility of the proposed turbines from the blade tip height. ***Figure 13*** depicts the areas of land from which the proposed development may be visible and provides an indicative number of wind turbines based on the blade tip height of 300 metres.

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

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

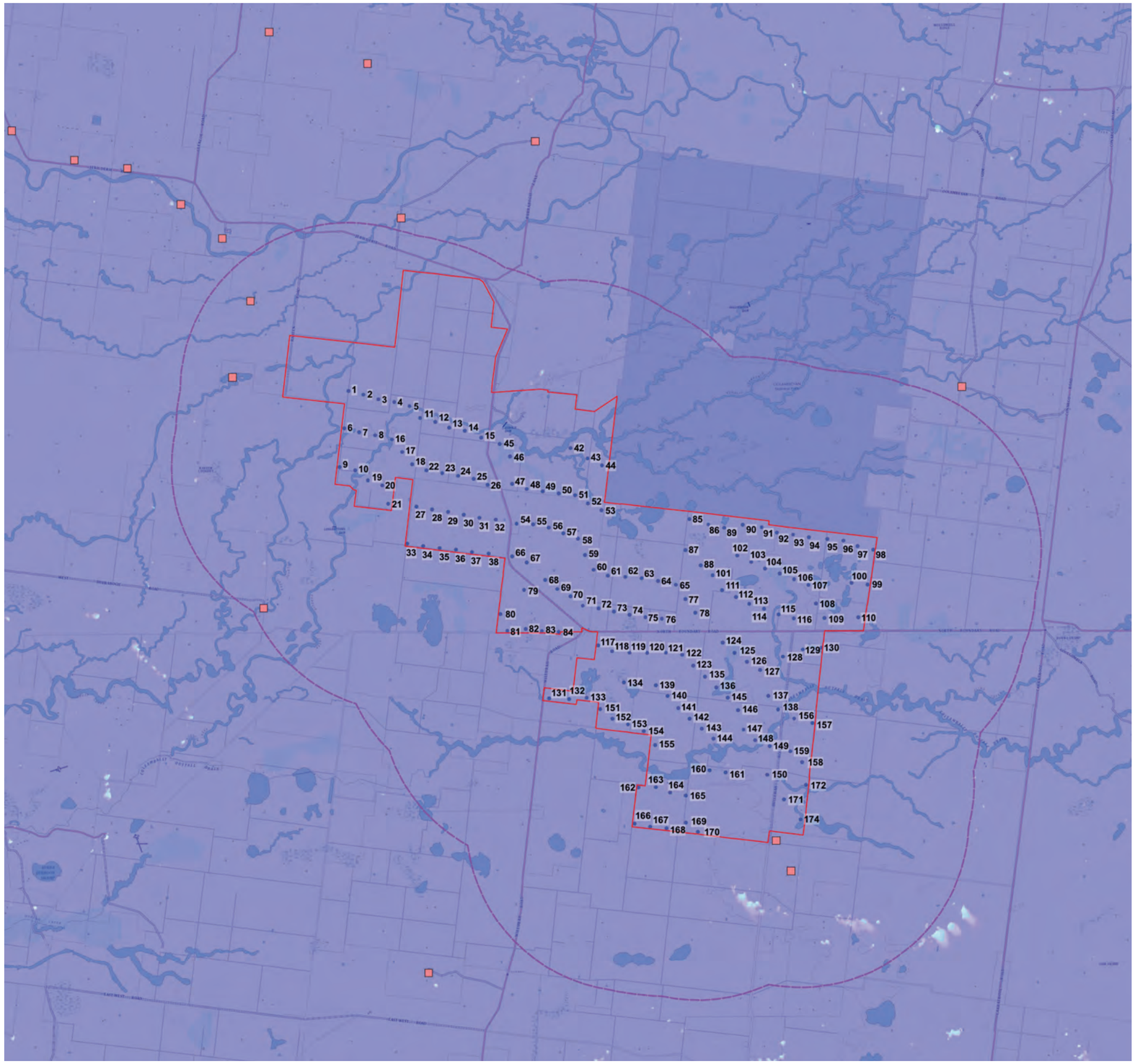
7.2 Summary of Preliminary Zone of Visual Influence

The following provides a summary of the Zone of Visual Influence diagrams prepared for the Preliminary Layout of Bullawah Wind Farm.

- Due to the relatively flat topography that characterises this landscape, the majority of turbines associated with the Project are likely to be visible from most areas around the Project Area.
- Certain areas located on the southern and western sides of the Project that are associated with creek corridors, swamps and floodplains have been identified in the ZVI to have limited views due to topographical differences between them and the Project Area.
- Views to the majority of turbines associated with the Project are likely to be available for all dwellings within eight (8) kilometres of the wind turbines. This assessment is based on a consideration of topography alone and does not consider intervening elements such as vegetation and existing structures.
- Following the development of the ZVI, detailed site investigations (in the form of a viewpoint analysis inventory and dwelling assessments) have been undertaken to ground-truth the findings (see ***Appendix B***). Preliminary viewpoint analysis [from 16 public locations and one (1) private location] and assessment of three (3) representative sensitive receptors have been included in ***Appendix A*** and ***Appendix B***.
- Further detailed assessment from areas identified in the ZVI will be undertaken in the EIS Phase of the assessment.

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

7.0 Preliminary Zone of Visual Influence



Zone of Visual Influence
Blade Tip Height 300 m
Proposed Bullawah Wind Farm

LEGEND

- Project Area boundary
- 25 Potential 300 m Turbine Location
- Uninvolved dwellings
- 8000 m from turbines

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

- 0
- 1-70
- 71-140
- 141 and above

Note:

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

N

0 5 10 15 20 25km

***Figure 13** Zone of Visual Influence - Blade tip Height 300 metres*

8.0 Preliminary Dwelling and Viewpoint Assessments

8.1 Preliminary Assessment of Dwellings

Examples of the preliminary assessment tools applied to five (5) uninvolved dwellings (as shown on ***Figure 14***) within 8,000 m of the nearest turbine have been included in ***Appendix A***.

The preliminary assessment identifies existing vegetation surrounding many of the dwellings which would reduce the potential visual impacts identified by the preliminary assessment tools and Zone of Visual Influence. A summary of these findings is provided in ***Table 4***.

8.2 Preliminary Assessment of Public Viewpoints

Appendix B provides preliminary assessments from Public Viewpoints. A total of 17 preliminary viewpoints have been selected to illustrate the varying landscape character typologies throughout the Study Area and provide a preliminary assessment of the potential visibility of the Project (as shown on ***Figure 14***).

Uninvolved dwellings within 4,000 metres of nearest WTG (Black Line of Visual Magnitude)					
Dwelling ID:	**Location**	**Approx distance to nearest WTG (km)**	**Nearest WTG**	**Number of 60º sectors (Based on 2D Assessment)**	**Approx. number of potentially visible WTGs (Based on ZVI)**
Uninvolved dwellings					
R4	**'Willurah Back Station', Bullewah Road**	**1.54 km**	**174**	**3**	**170**
	Views likely to be available of all proposed turbines to the northwest. Existing vegetation in the dwelling's foreground in this direction will help fragment some of the views.				
R5	**'Waterloo', Bullewah Road**	**2.50 km**	**174**	**2**	**170**
	Views likely to be available of all proposed turbines to the northwest. Existing vegetation in the dwelling's foreground in this direction will help fragment some of the views.				
Uninvolved dwellings within 5,900 metres of nearest WTG (Blue Line of Visual Magnitude)					
Uninvolved dwellings					
R20	**'Raheen', off Raheen Road**	**5.55 km**	**1**	**1**	**170**
	Views towards the Project are likely to be available in the southeast. Existing vegetation to the south in the dwelling's foreground is likely to fragment some views. Views towards the east/southeast, however, are likely to be partially available.				
Uninvolved dwellings within 8,000 metres of nearest WTG					
R7	**'West Burrabogie', West Burrabogie Road**	**7.48 km**	**1**	**1**	**170**
	Views towards the Project are likely to be available in the northeast. Existing vegetation associated with Nyangay Creek is likely to fragment most views.				
R16	**'Glenmore', off Raheen Road**	**6.29 km**	**1**	**1**	**170**
	Views towards the Project are likely to be available in the southeast. Lack of intervening elements will allow views of the Project which are likely to be limited to one (1) 60 degree sector.				

Table 4 *Overview of Preliminary Assessment for uninvolved dwellings*

8.0 Preliminary Dwelling and Viewpoint Assessments

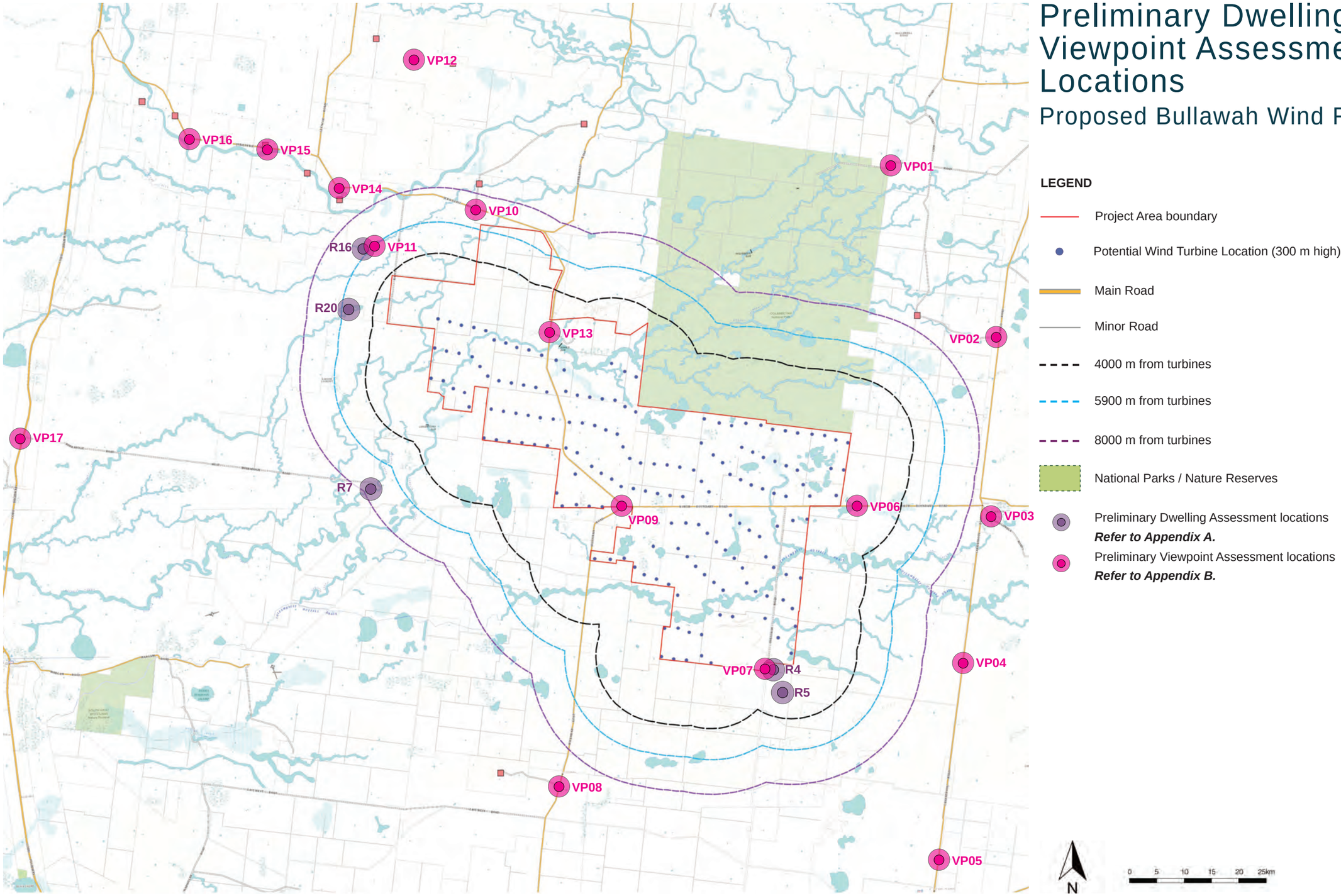


***Figure 14** Preliminary Dwelling and Viewpoint Assessment Locations (Map Source: Six Maps)*

9.0 Cumulative Visual Impact Assessment

9.1 Overview of Cumulative Visual Impacts

The Project is located within the eastern region of the South West Renewable Energy Zone (REZ). The REZ has been identified by the NSW Governments Electricity Strategy (refer ***Figure 15***). The REZ is expected to play a vital role in delivery of affordable energy to the community across NSW (Energy NSW, 2022).

The existing landscape character of the region allows for optimum harvest of wind energy due to the flat terrain and large expanses of uninhabited land with minimal obstructions in the landscape. These characteristics are beneficial to the output of wind energy and as such, it is highly likely that over time this will be utilised for the development of wind farm projects. ***Figure 15*** shows the wind farms that are currently proposed within the extents of the REZ. The potential to tap into wind energy sources is centred around the western part of the REZ near the towns of Hay, Balranald and Kyalite.

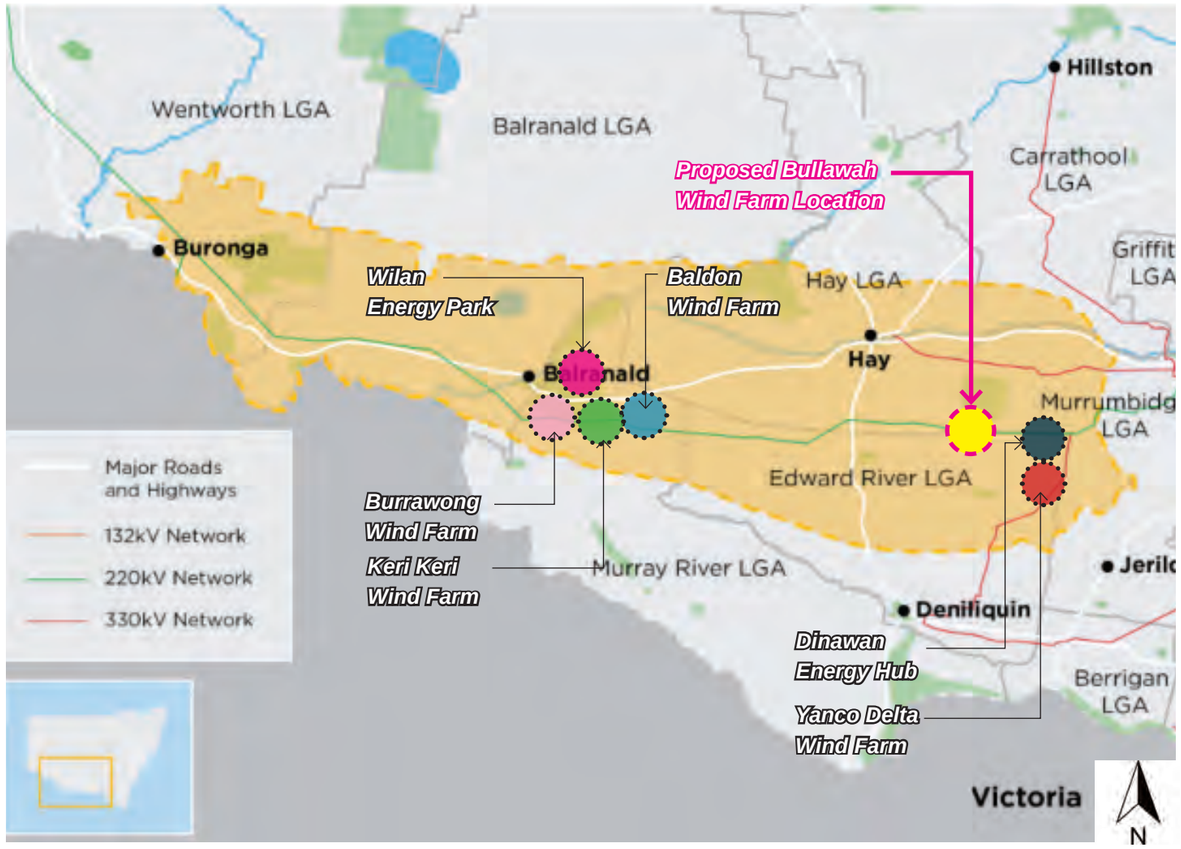


***Figure 15** South West Energy Zone (Map Source: Energy NSW, 2022)*

9.2 Nearby Wind Farm Projects

Currently, seven (7) other wind farm projects have been proposed in the area (refer ***Figure 15***):

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

Of these, two (2) proposed wind farm projects located approximately 10-16 km east/southeast of Bullawah Wind Farm (BWF) (refer ***Figure 16***). Consideration of cumulative impacts of the Yanco Delta Wind Farm (YDWF) and Dinawan Energy Hub (DEH) is therefore, critical for the Project.

Yanco Delta Wind Farm:

Yanco Delta Wind Farm (YDWF)'s preliminary layout comprises of 216 turbines spread across an area of approximately 41,900 ha (GBD Landscape Architecture, 2022). The wind farm would be potentially located 12.5 km north of Jerilderie and 35 km southwest of Coleambally. The Project is located approximately 16 km northwest of YDWF. SEARs were issued for the YDWF Project in May 2022. There is potential to view YDWF and the Project simultaneously due to the existing landscape character. The cumulative impacts of both wind farms will be assessed in detailed during the EIS Phase.

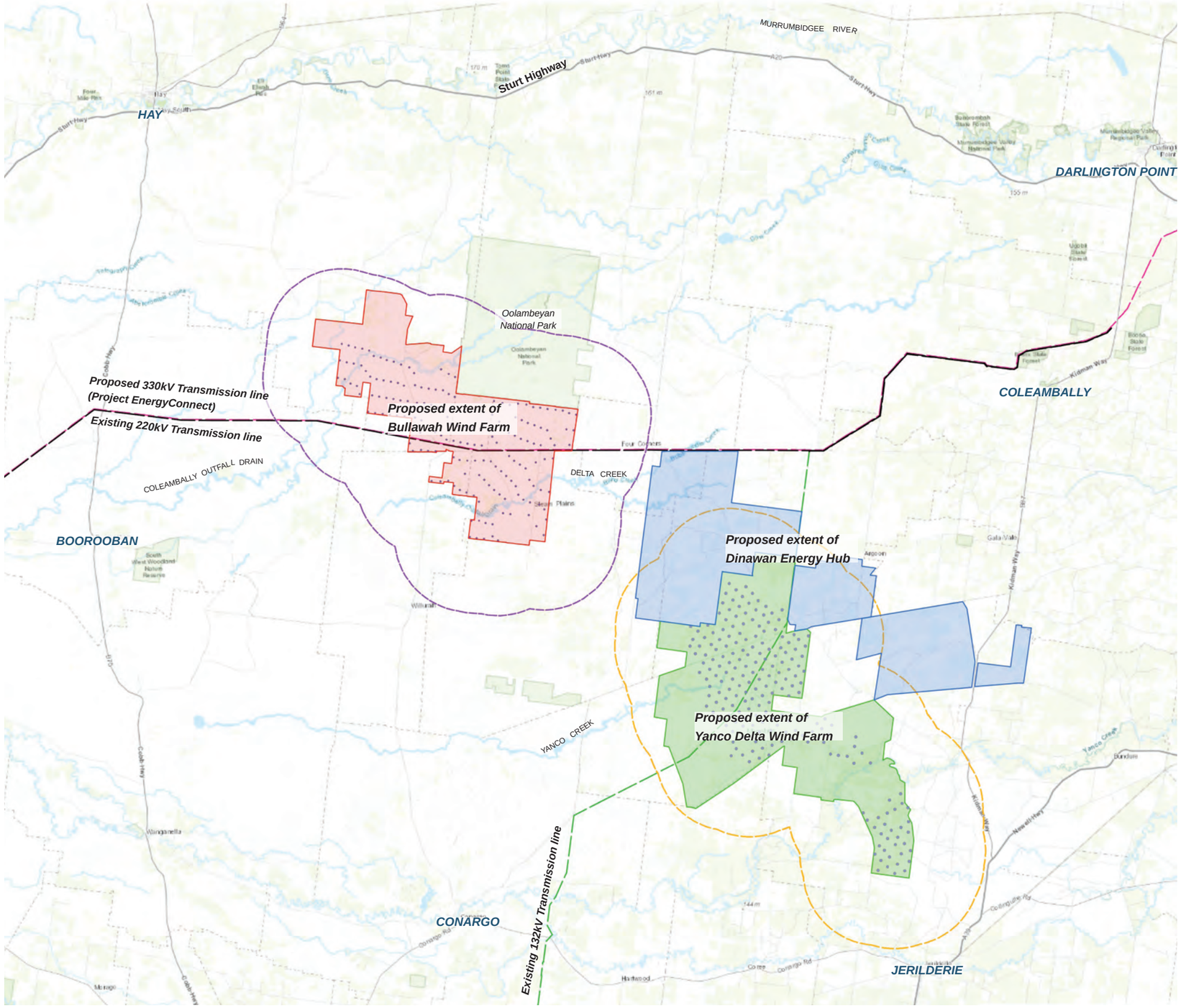
Dinawan Energy Hub:

Dinawan Energy Hub (DEH) is in its preliminary planning stages and will potentially comprise of wind, solar and battery storage facilities (Spark Renewables, 2022). DEH would be potentially located 10 km east of BWF. Based on information on the project website (as of August 2022), the DEH Project is in the preliminary stages and no scoping report has been issued. The potential to view DEH and the Project simultaneously exists and will be assessed in detailed during the EIS Phase.

Other Wind Farm projects:

Other wind farm projects in the area that are currently preparing EIS's include the Burrawong Wind Farm, Baldon Wind Farm and Keri Keri Wind Farm. These are located approximately 80 km west of the Project and therefore, the potential to view these projects simultaneously is limited.

9.0 Cumulative Visual Impact Assessment



Nearby Wind Farm Projects

Proposed Bullawah Wind Farm

LEGEND

- Project Area (Bullawah Wind Farm)
- Project Area (Yanco Delta Wind Farm)
- Project Area (Dinawan Energy Hub)
- Proposed Bullawah Wind Turbine Location (up to 300 m high)
- Proposed Yanco Delta Wind Turbine Location (up to 270m high)
- Roads
- 8000 m from Bullawah Wind Farm turbines
- 8000 m from Yanco Delta Wind Farm turbines
- Existing 220kV electrical transmission line
- Existing 123kV electrical transmission line
- Proposed 330kV electrical transmission line (Project EnergyConnect)
- National Parks / Nature Reserves / SCA

***Figure 16** Nearby Wind Farm Projects (Map Source: ESRI Topographic Maps)*

9.0 Cumulative Visual Impact Assessment

9.3 Cumulative Impact on Broader Landscape Character

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

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

10.0 Summary and Recommendations

10.1 Summary of Preliminary Visual Impact Assessment

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

Community Consultation

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

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

Next Steps:

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

Existing Landscape Character

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

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

Next Steps:

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

Application of the Preliminary Assessment Tools

The purpose of the Preliminary Assessment Tools in the PVIA is to identify ‘sensitive receptors’ for further assessment in the EIS Phase of the Project.

- The Multiple Wind Turbine Tool (MWTT) was applied to all five (5) uninvolved dwellings within 8000m of the nearest proposed turbine.
- The MWTT identified one (1) uninvolved dwelling [R4] with views in up to three (3) 60 degree sectors. It also identified one (1) uninvolved dwelling [R5] with views of turbines in up to two (2) 60 degree sectors. The remaining three (3) dwellings [R7, R16 and R20] have turbines in up to one (1) 60 degree sector. A preliminary assessment of these dwellings has been included in ***Appendix A***.
- Oolambeyan Homestead Picnic Area was identified as a key public viewpoint but it is located approximately 16.78 km away from the Project. An assessment of the potential visual impact on a representative viewpoint is discussed in ***Appendix B***.

Next Steps:

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

Zone of Visual Influence

A Zone of Visual Influence (ZVI) has been prepared to illustrate the theoretical visibility of the Project and to assist in defining the visual catchment. A Preliminary ZVI have been prepared from the blade tip height of 300 m to illustrate areas which have potential visibility of the Project.

10.0 Summary and Recommendations

Next Steps:

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

Cumulative Visual Impacts of Surrounding Wind Farms

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

Next Steps:

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

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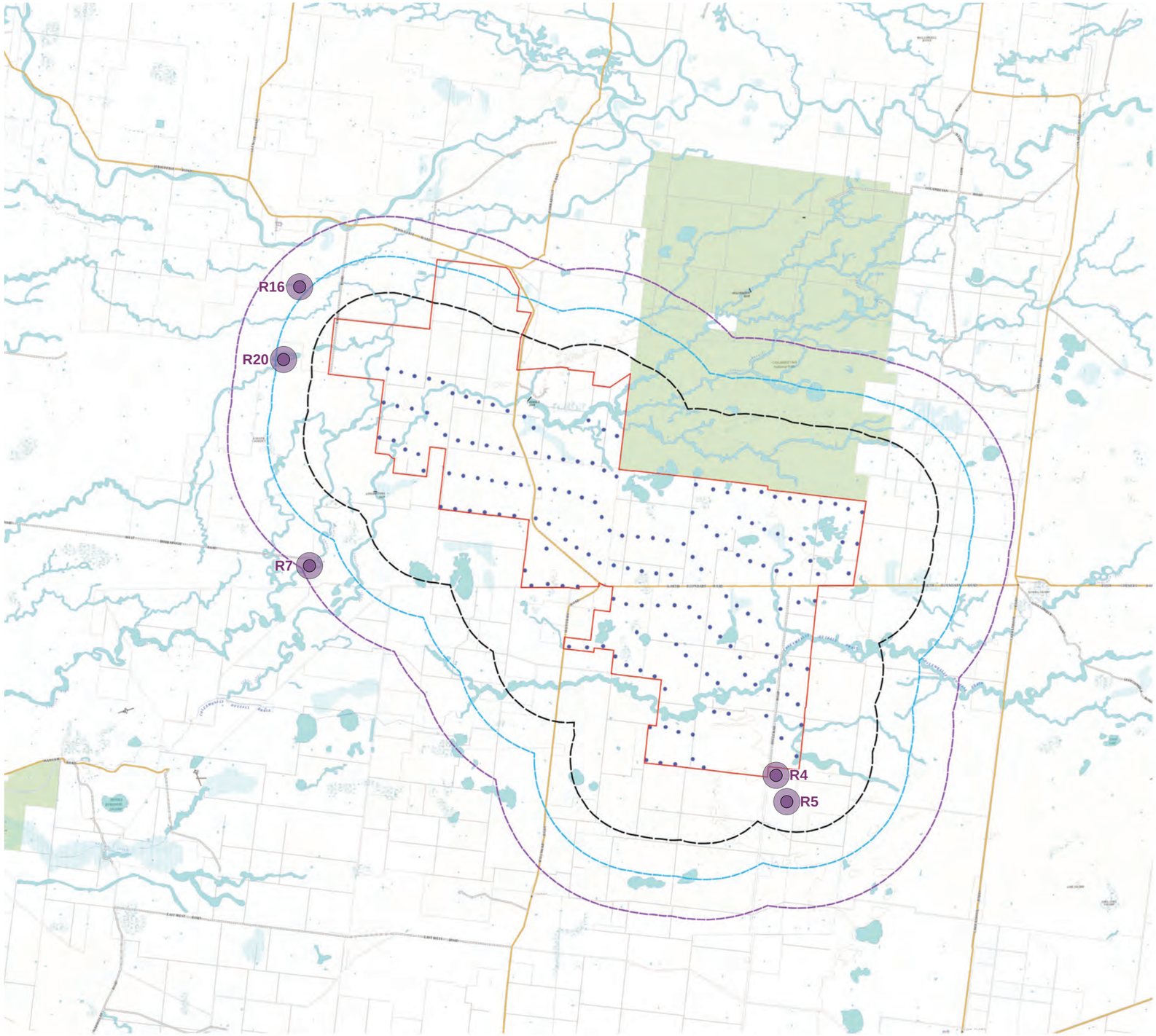
Appendix A

Preliminary Dwelling Assessments

Appendix A



Preliminary Dwelling Assessment Locations

Proposed Bullawah Wind Farm

LEGEND

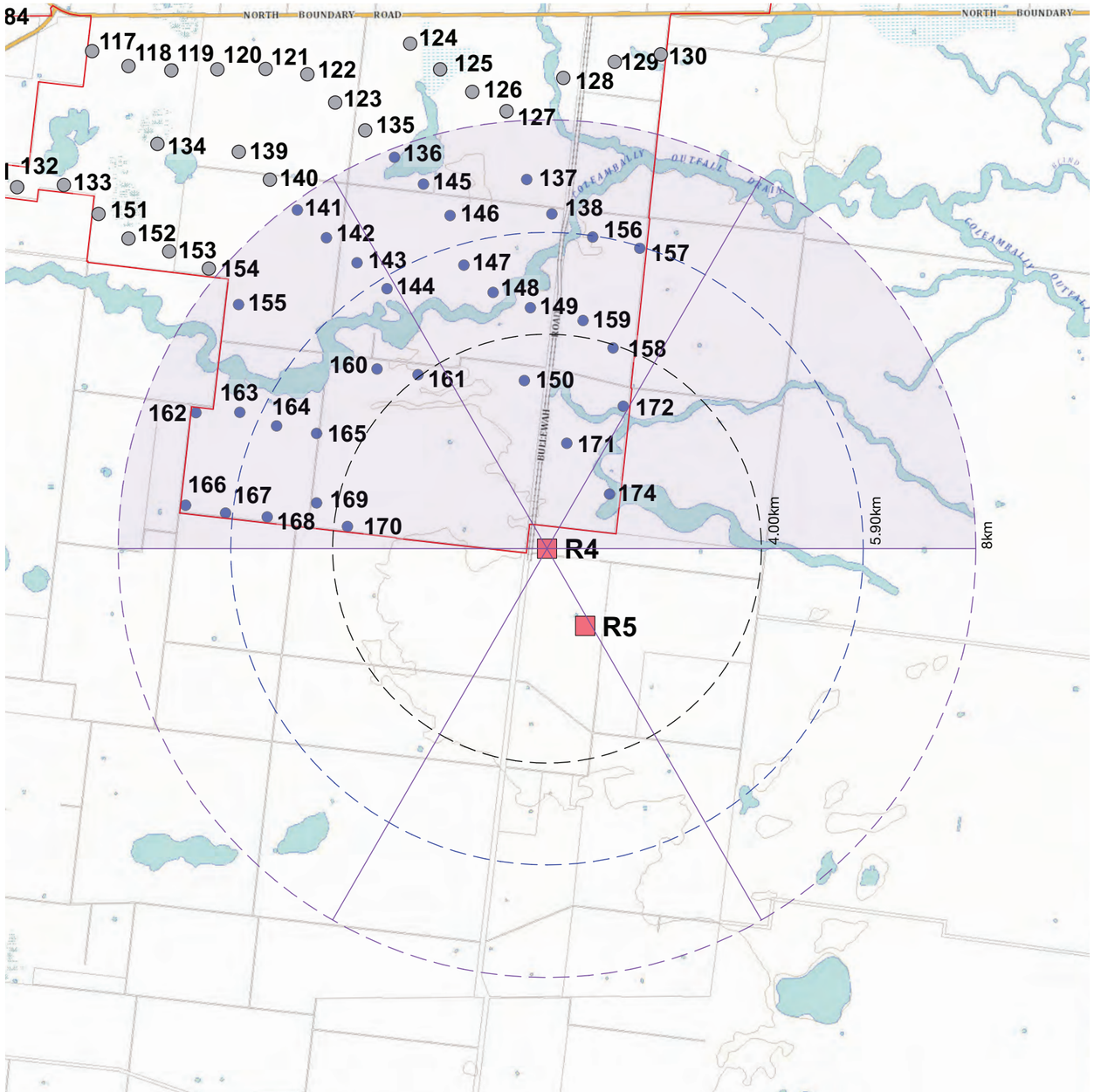
- Project Area boundary
- Potential Wind Turbine Location (300 m high)
- Main Road
- Minor Road
- 4000 m from turbines
- 5900 m from turbines
- 8000 m from turbines
- National Parks / Nature Reserves
- Preliminary Dwelling Assessment locations

N

0 5 10 15 20 25km

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

A.1. Dwelling R4



LEGEND

- Project Area
- Proposed Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Uninvolved Dwelling
- 4,000 m from nearest turbine (Black Line)
- 5,900 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector
- 60º sector with turbines

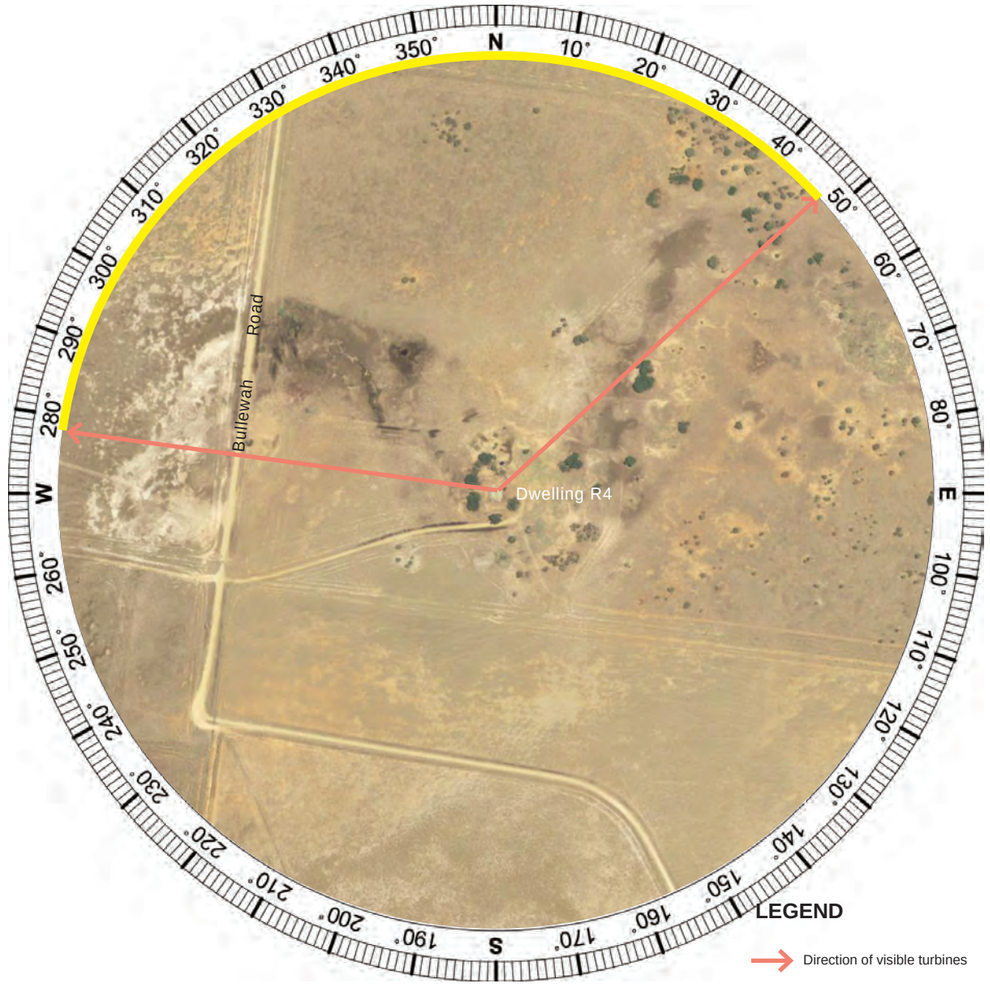
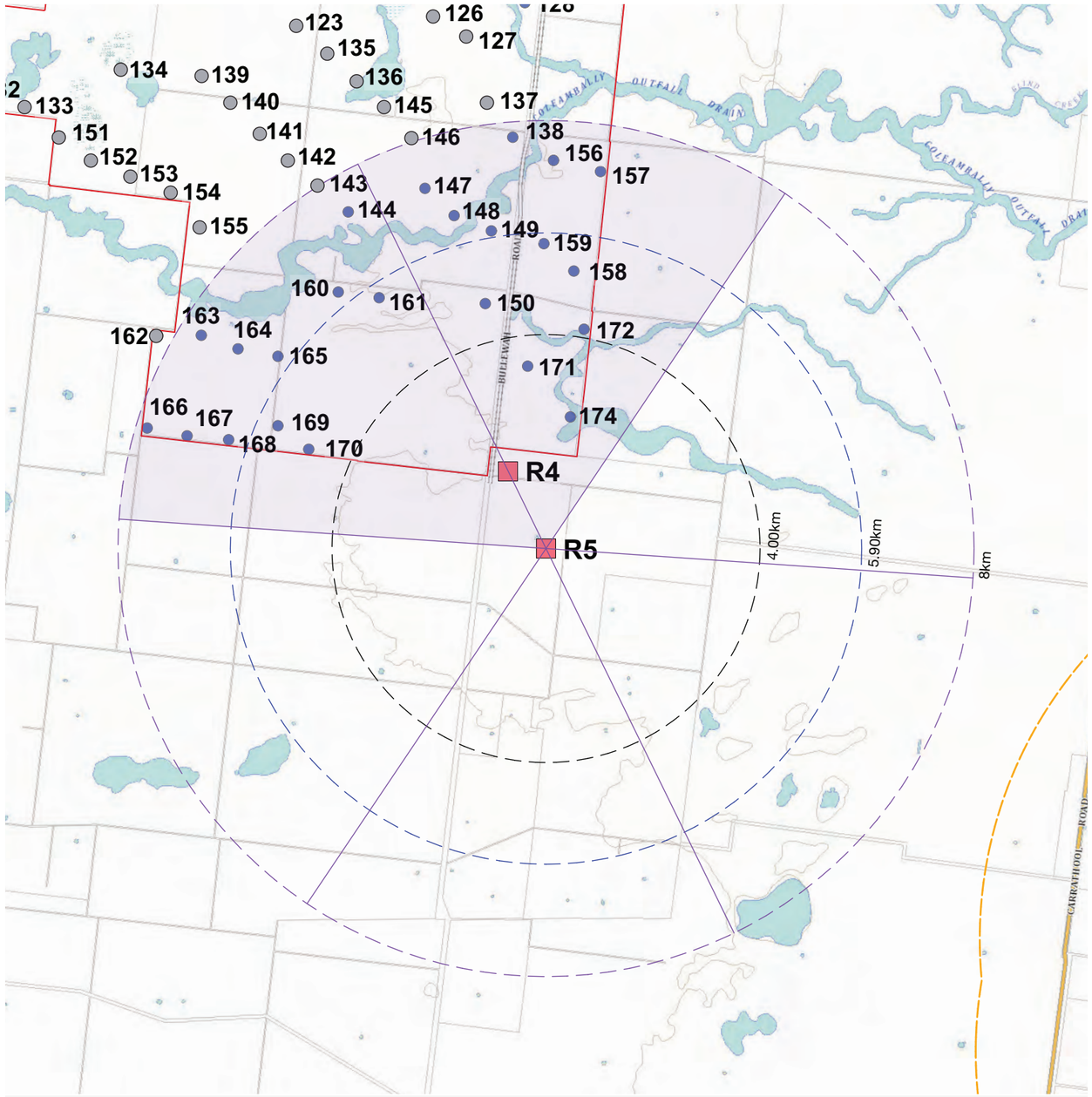


Figure A.1 Aerial Image Dwelling R4 *(Aerial Image Source: SixMaps)*

Summary of Preliminary Assessment Tools:	
Distance to Nearest Turbine:	**1.54 km**
Number of proposed turbines within the black line (4,000 m) of visual magnitude:	**6**
Number of theoretical 60º sectors (Based on 2D assessment):	**3**
Number of potentially visible turbines within 8,000m (based on topography alone):	**170 Turbines (All at tip height)**

A.2. Dwelling R5



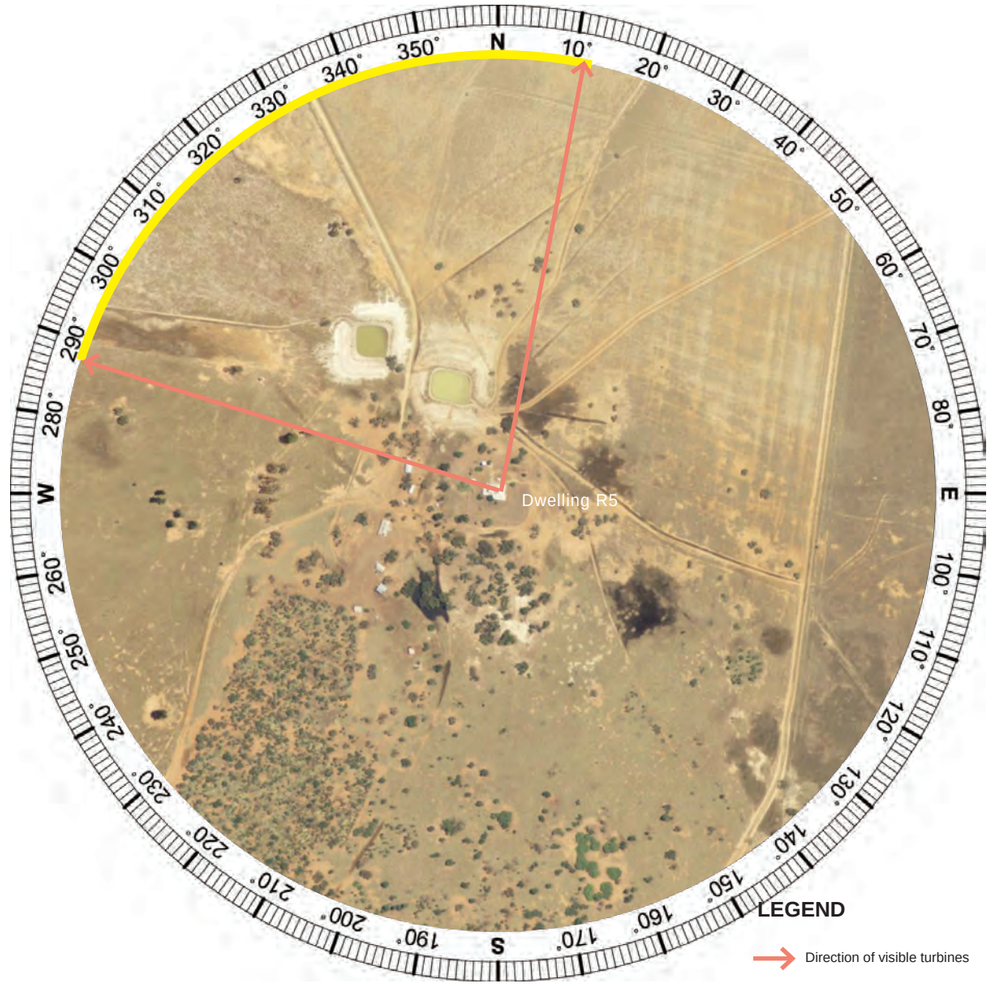
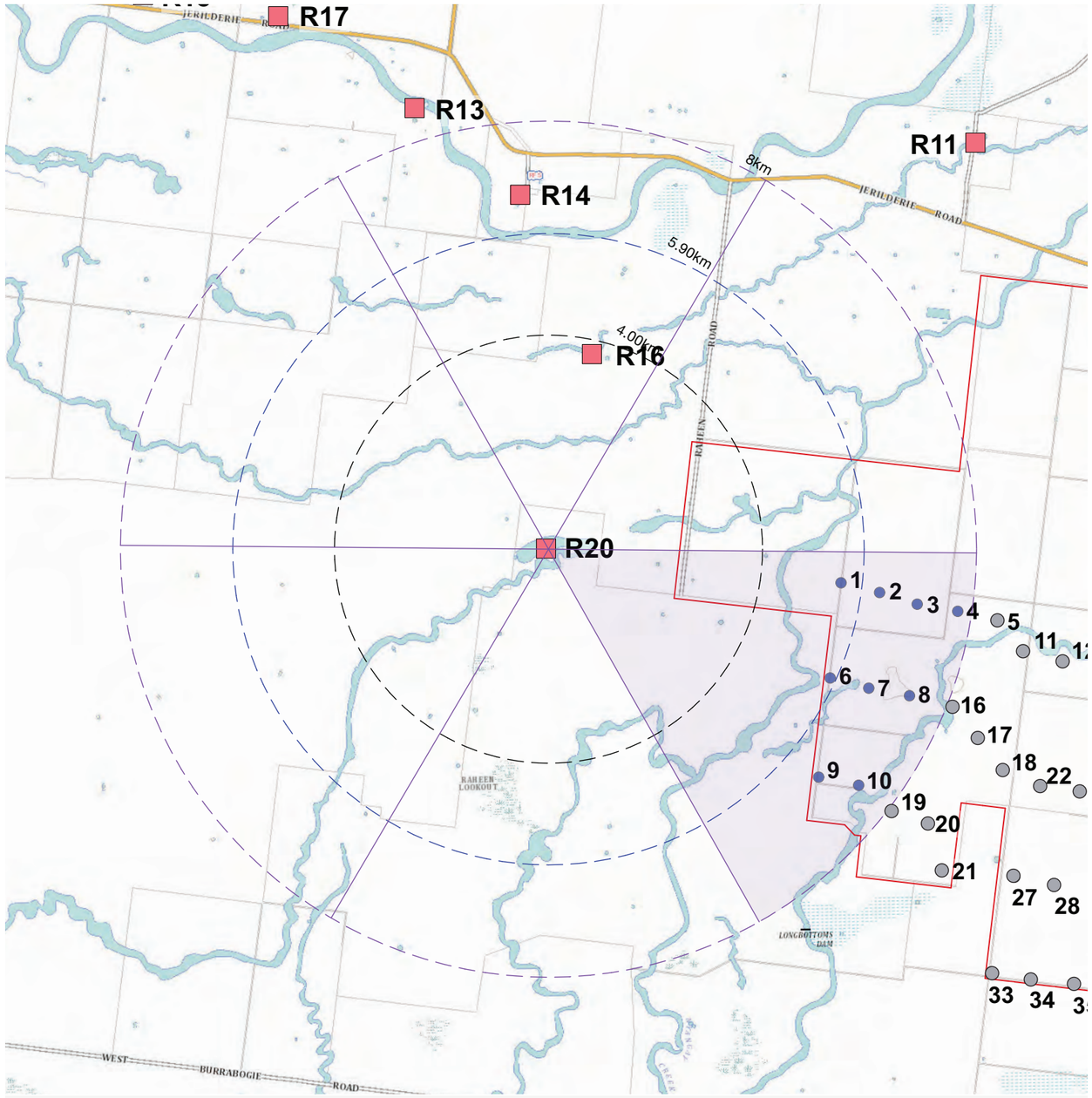


Figure A.2 Aerial Image Dwelling R5 *(Aerial Image Source: SixMaps)*

Summary of Preliminary Assessment Tools:	
Distance to Nearest Turbine:	**2.50 km**
Number of proposed turbines within the black line (4,000 m) of visual magnitude:	**2**
Number of theoretical 60º sectors (Based on 2D assessment):	**2**
Number of potentially visible turbines within 8,000m (based on topography alone):	**170 Turbines (All at tip height)**

A.3. Dwelling R20



LEGEND

- Project Area
- Proposed Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Uninvolved Dwelling
- 4,000 m from nearest turbine (Black Line)
- 5,900 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector
- 60º sector with turbines

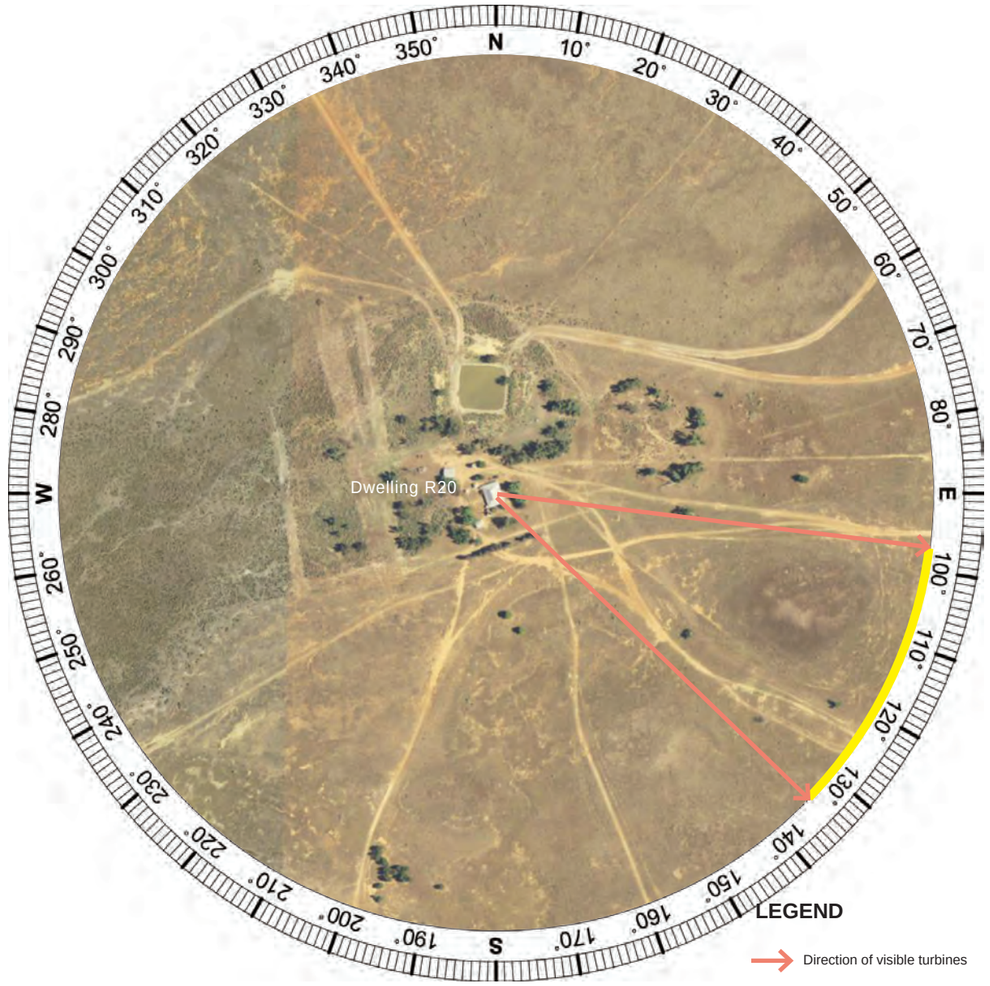
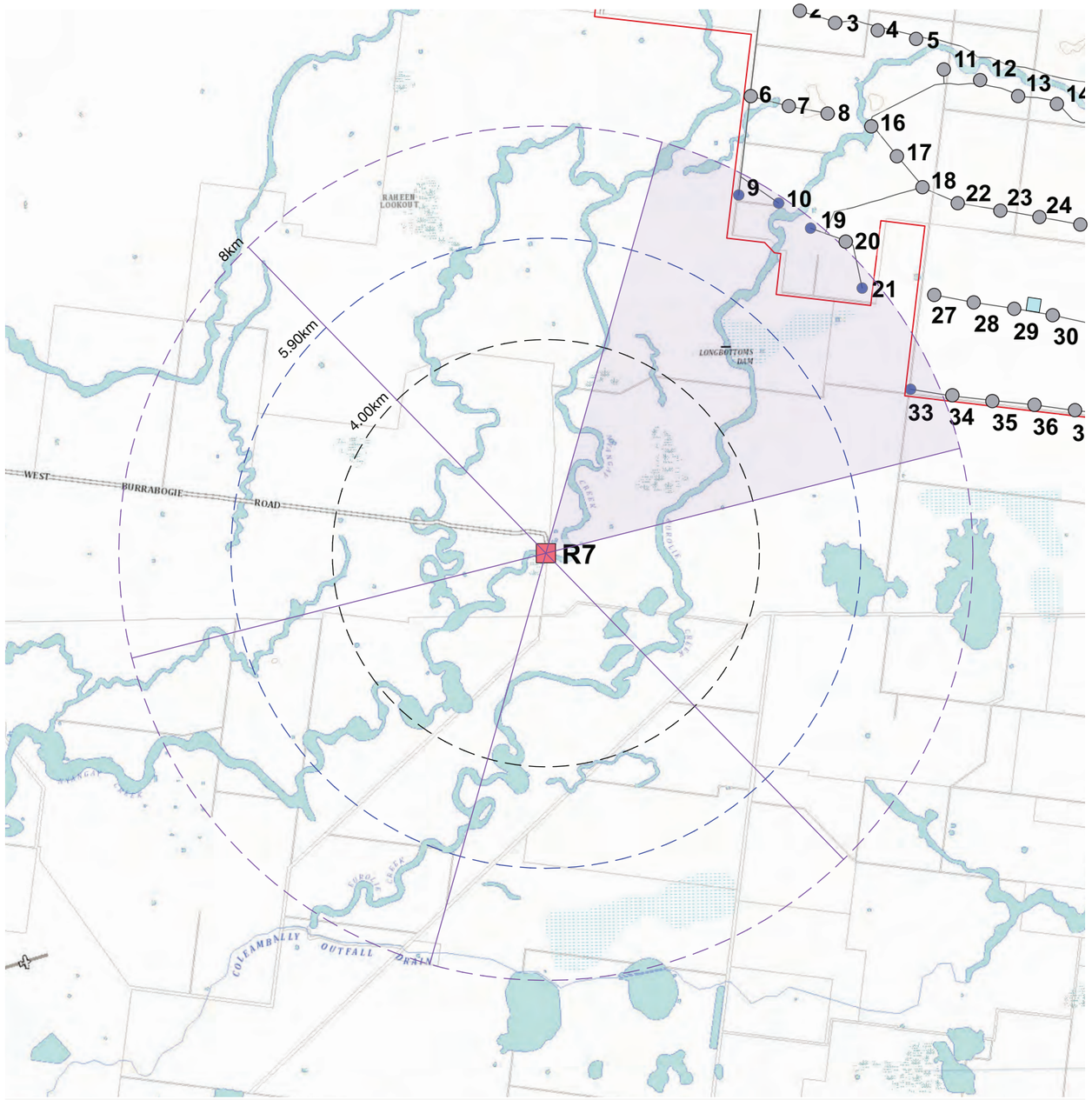


Figure A.3 Aerial Image Dwelling R20 *(Aerial Image Source: SixMaps)*

Summary of Preliminary Assessment Tools:	
Distance to Nearest Turbine:	**5.55 km**
Number of proposed turbines within the blue line (5,900 m) of visual magnitude:	**2**
Number of theoretical 60º sectors (Based on 2D assessment):	**1**
Number of potentially visible turbines within 8,000m (based on topography alone):	**170 Turbines (All at tip height)**

A.4. Dwelling R7



LEGEND

- Project Area
- Proposed Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Uninvolved Dwelling
- 4,000 m from nearest turbine (Black Line)
- 5,900 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector
- 60º sector with turbines

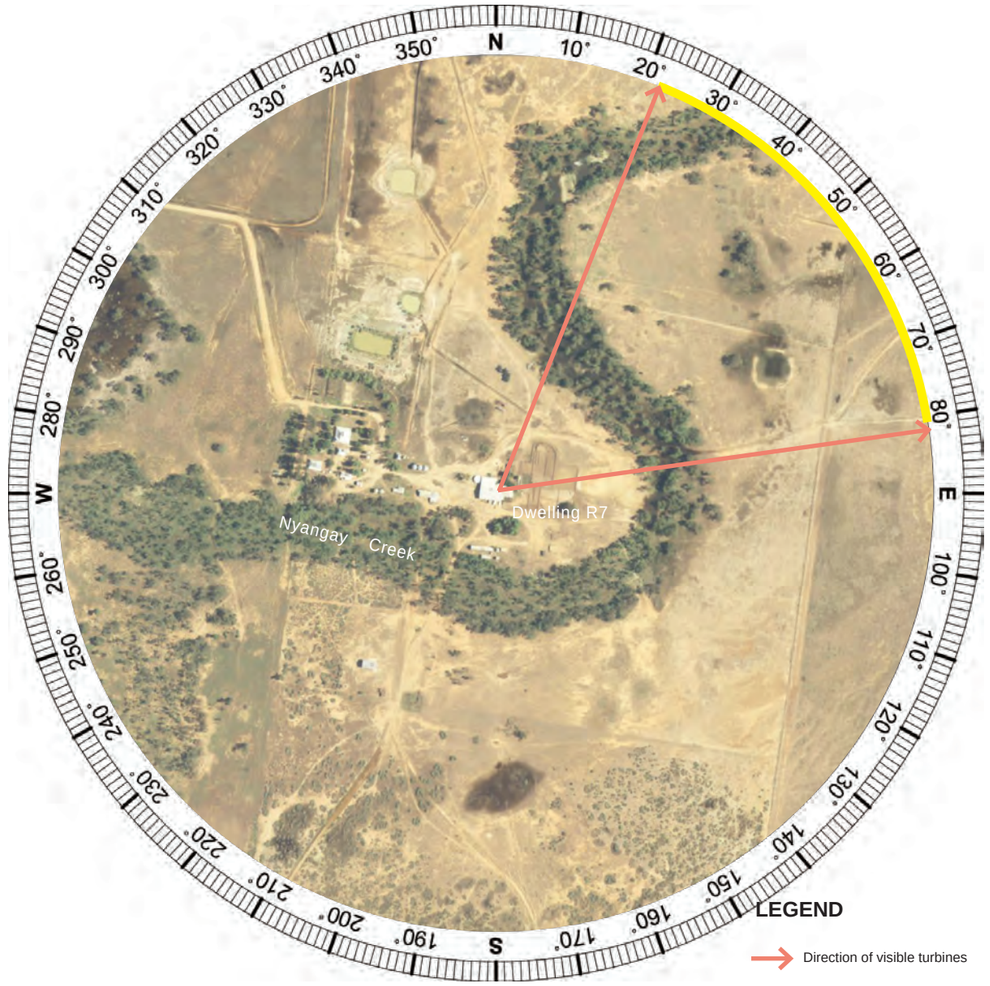
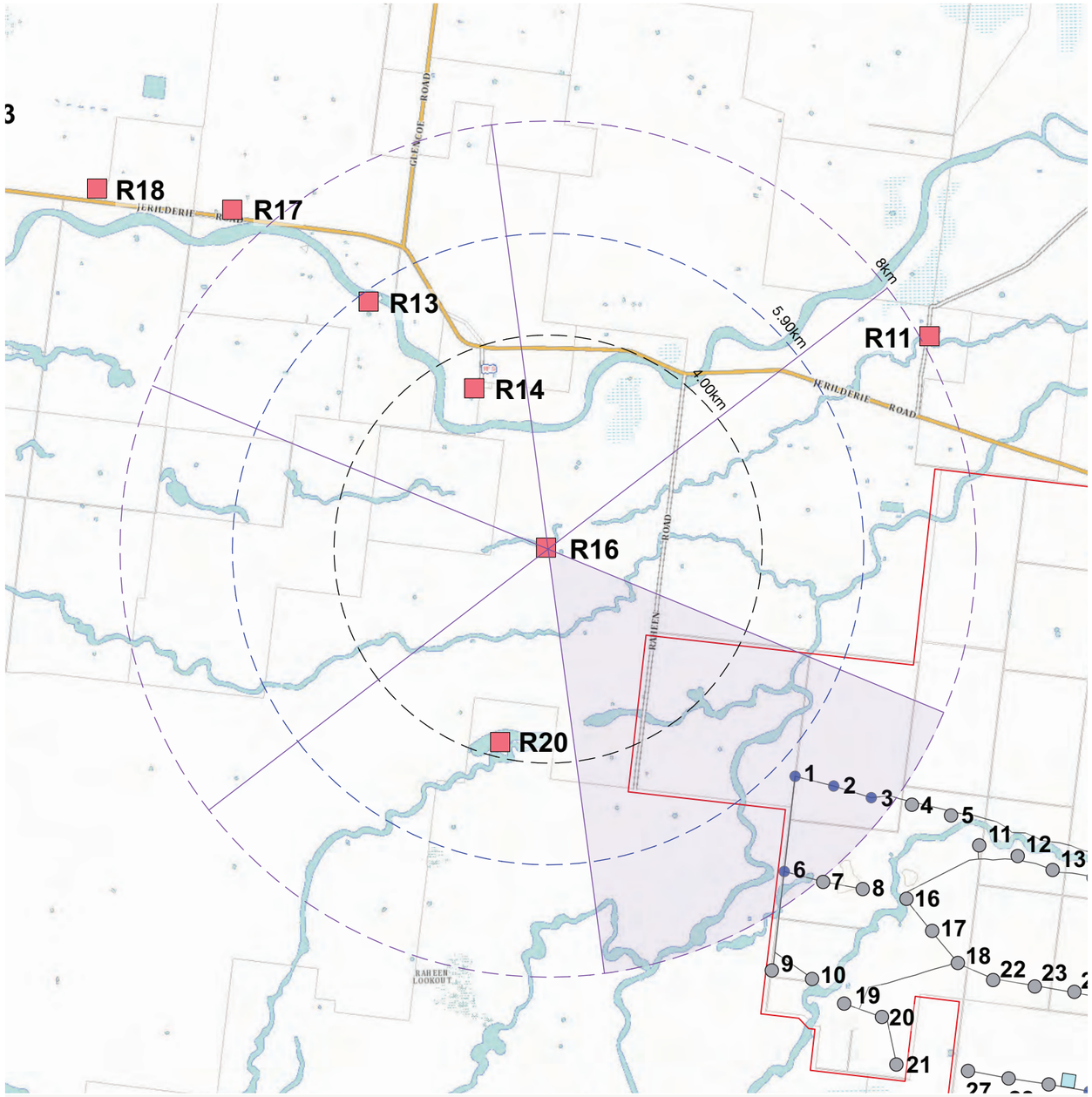


Figure A.4 Aerial Image Dwelling R7 *(Aerial Image Source: SixMaps)*

Summary of Preliminary Assessment Tools:	
Distance to Nearest Turbine:	**7.48 km**
Number of proposed turbines within 8,000 m of visual magnitude:	**4**
Number of theoretical 60º sectors (Based on 2D assessment):	**1**
Number of potentially visible turbines within 8,000m (based on topography alone):	**170 Turbines (All at tip height)**

A.5. Dwelling R16



LEGEND

- Project Area
- Proposed Turbine Location
- Proposed Turbine in excess of 8000 m from dwelling
- Uninvolved Dwelling
- 4,000 m from nearest turbine (Black Line)
- 5,900 m from nearest turbine (Blue Line)
- 8,000 m from nearest turbine
- 60º sector
- 60º sector with turbines

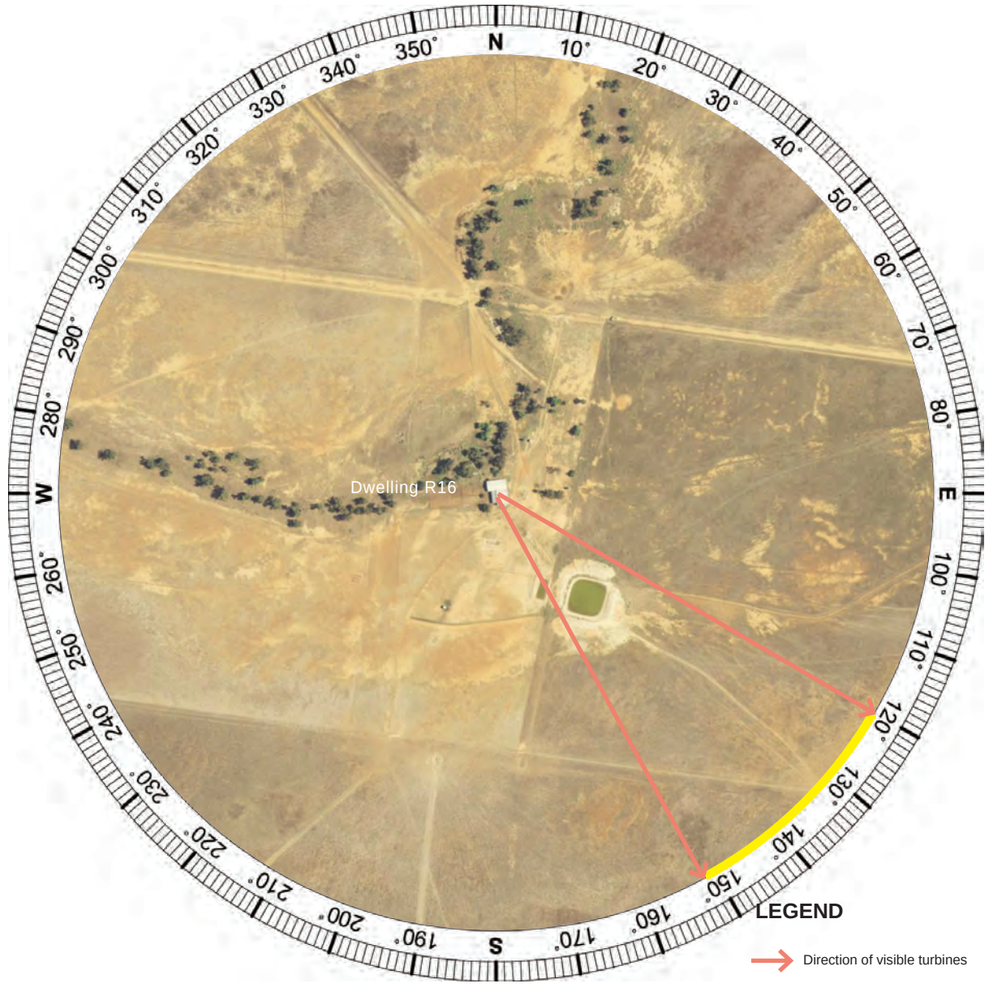


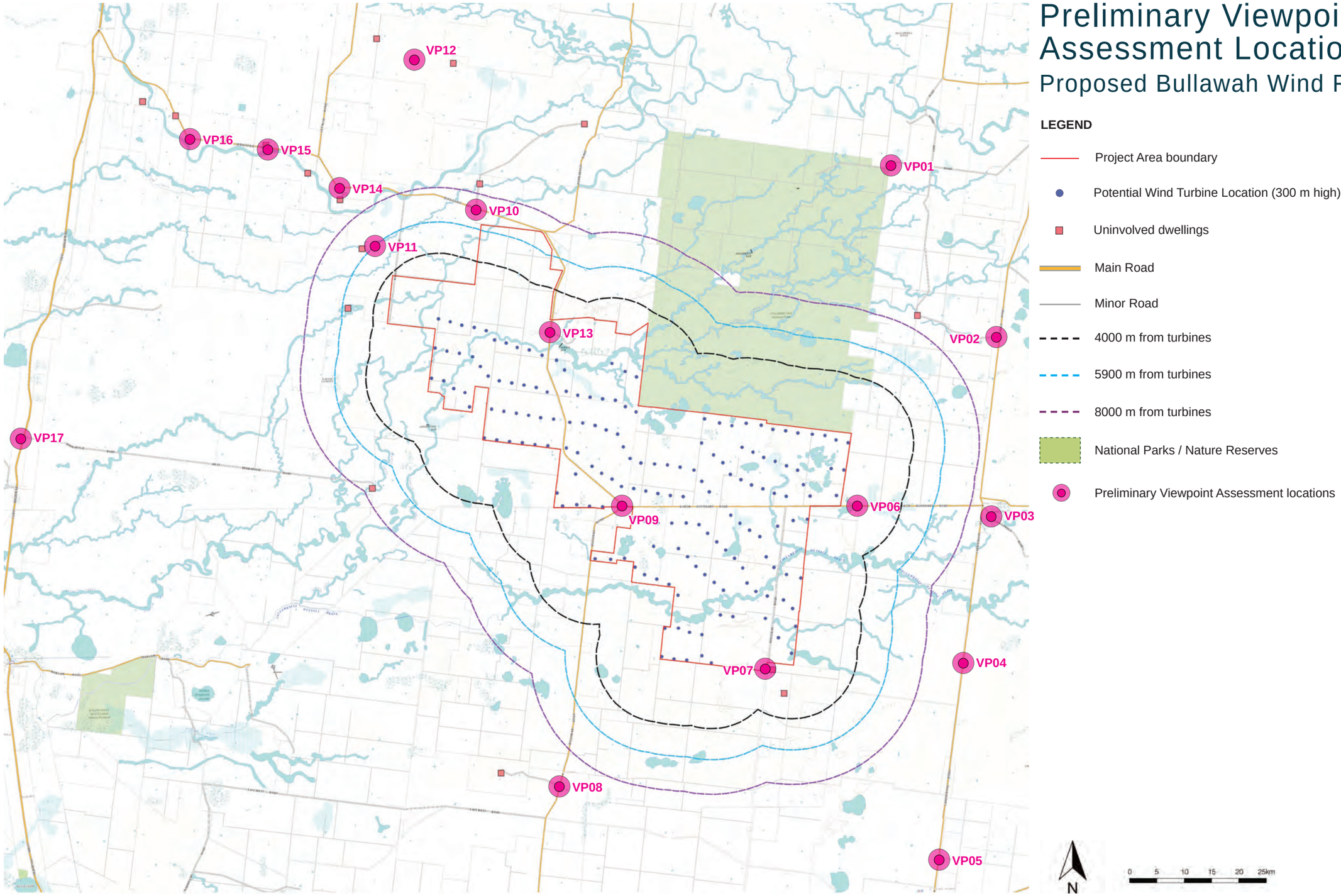
Figure A.5 Aerial Image Dwelling R16 *(Aerial Image Source: SixMaps)*

Summary of Preliminary Assessment Tools:	
Distance to Nearest Turbine:	**6.29 km**
Number of proposed turbines within the 8,000 m of visual magnitude:	**4**
Number of theoretical 60º sectors (Based on 2D assessment):	**1**
Number of potentially visible turbines within 8,000m (based on topography alone):	**170 Turbines (All at tip height)**

Appendix B

Preliminary Public Viewpoint Assessments

Appendix B



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

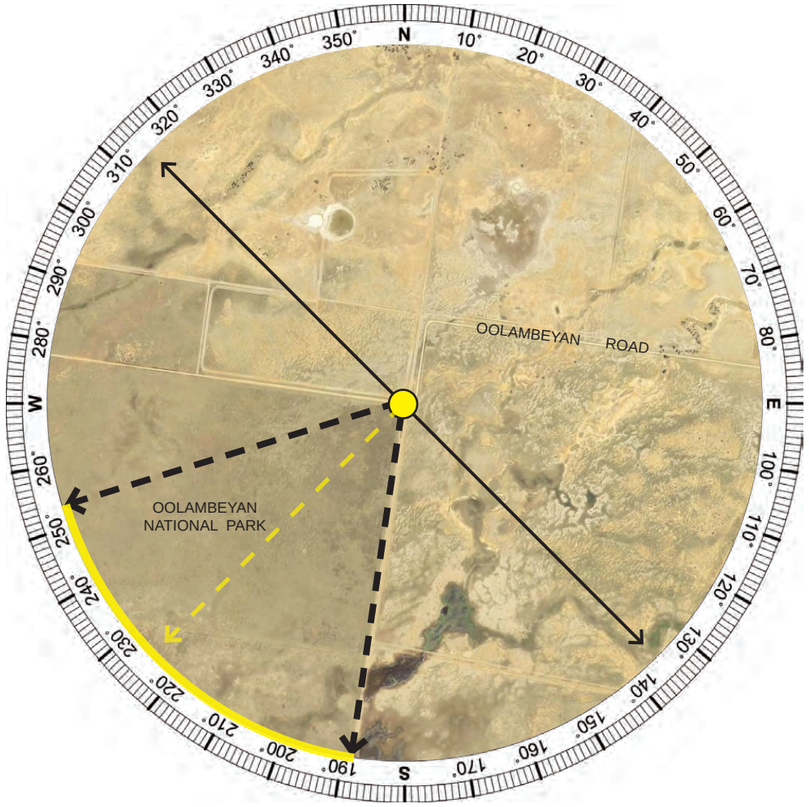
VP01 Oolambeyan Road, Oolambeyan National Park, Carrathool

Approximate extent of potentially visible turbines

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

LEGEND

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



Aerial Image VP01 (Aerial Image Source: Six Maps)

VIEWPOINT VP01

Viewpoint Summary:	
Location:	Elevation:
Oolambeyan Road, Oolambeyan National Park, Carrathool	140 m
Coordinates:	Viewing Direction:
34°40'4.33"S 145°21'28.16"E	Southwest
Distance to nearest WTG:	Visibility Distance Zone:
16.78 km	**Mid Background (MB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU02: Preserved Grasslands	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:

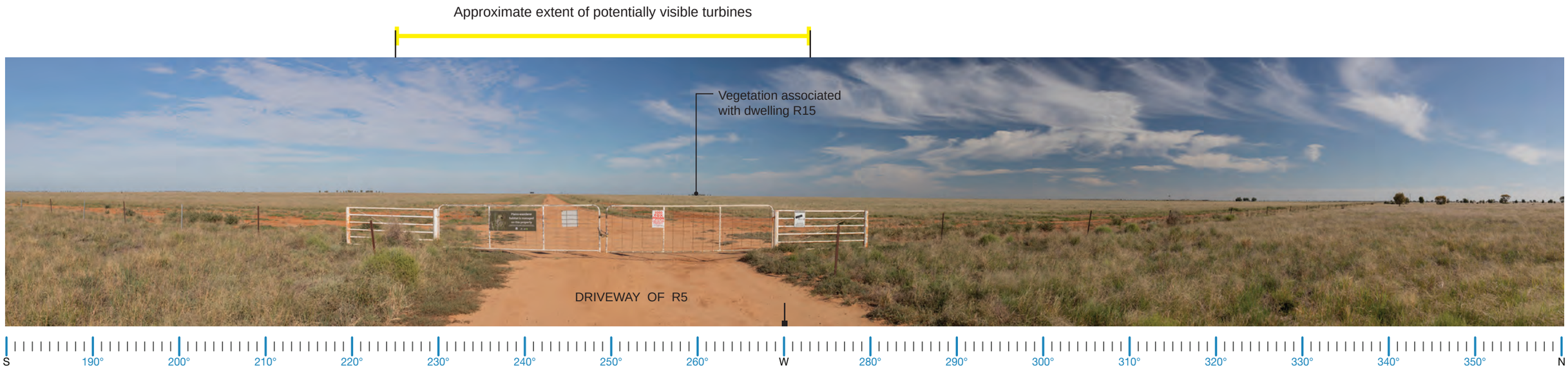
This viewpoint is located on Oolambayen Road at the gate of the Oolambeyan National Park and represents views from the Oolambeyan Homestead Picnic Area. Due to restricted access at the time of visit, the photograph was taken from the entrance gate to represent views from the National Park.

Oolambeyan National Park is known for its significant natural and cultural values and the Homestead Picnic Area is usually visited by tourists on day trips. Surrounding land is generally used for grazing and cropping. Land use within the National Park is minimal. Most land parcels within the National Park are characterised by grasslands with intermittent or no tree cover. Views are, therefore, open and expansive. Predominant vegetation communities include grasses, forbs and occasional stands of shrubs.

Potential Visual Impact:

Open and flat grasslands define the character extensively. It is likely that the Project will not be visible at this viewpoint due to the distance between this location and the Project. Aerial imagery indicates that the Oolambeyan Homestead Picnic Area is surrounded by sparse to dense tree cover and this is likely to help reduce the potential visual impact on the heritage structures and picnic area.

VP02 Mailbox of ‘Singorimbah’ at 3806 Carrathool Road, Carrathool



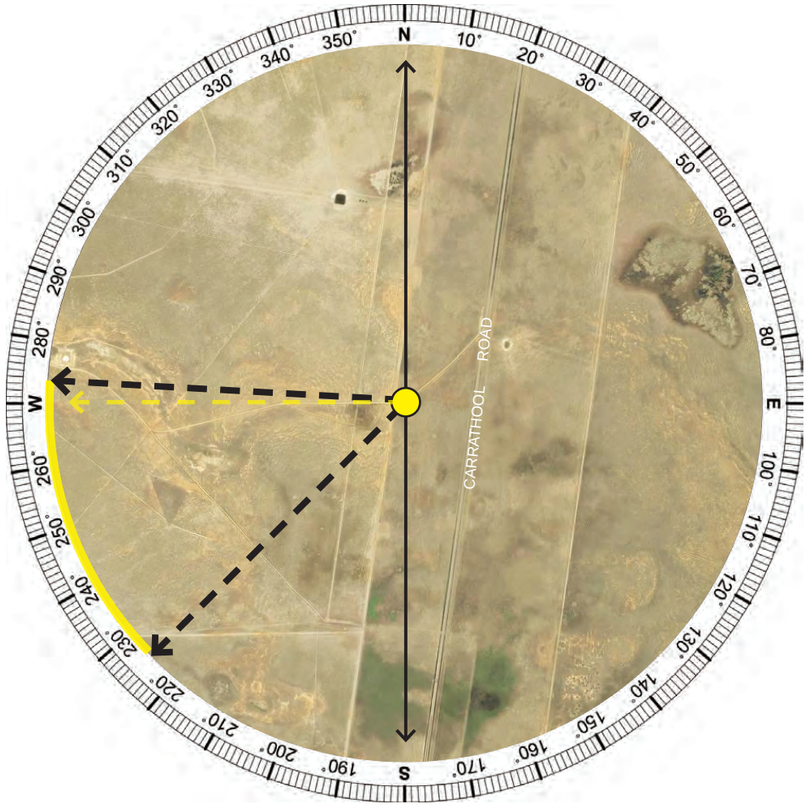
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



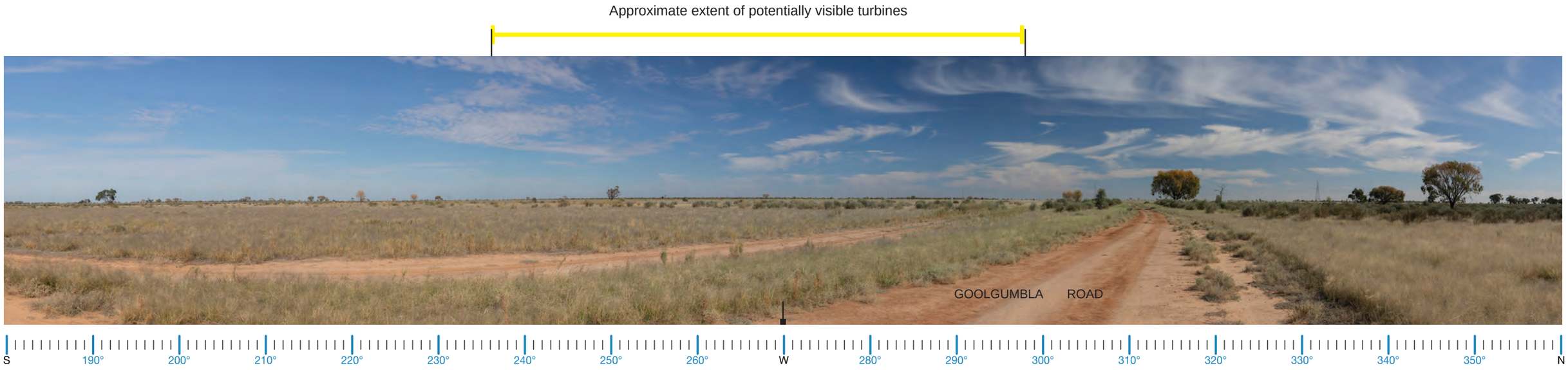
Aerial Image VP02 (Aerial Image Source: Six Maps)

VIEWPOINT VP02

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Singorimbah’ at 3806 Carrathool Road, Carrathool	133 m
Coordinates:	Viewing Direction:
34°45’42.46”S 145°25’32.43”E	West
Distance to nearest WTG:	Visibility Distance Zone:
11 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Major Road	**Low**
LCU:	Scenic Quality Rating:
LCU02: Seasonal Water Corridors	**Moderate**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:
The viewpoint was taken at 3806 Carrathool Road to represent views from dwelling R15. Surrounding lands are extensively used for grazing over native pastures. The terrain is generally flat. Stands of tree cover associated with dwellings and the Coleambally Outfall Drain are visible in the background. Predominant vegetation on surrounding lands includes grasses and saltbush varieties. Lack of intervening elements allows open and clear views in all directions.
Potential Visual Impact:
Views are open and expansive due to lack of tree cover or other intervening elements at this viewpoint. However, aerial imagery indicates that dwelling R15 is surrounded by vegetation in all directions in its foreground. This will help reduce the potential impact on the views from the dwelling.

VP03 Goolgumbla Road, Four Corners



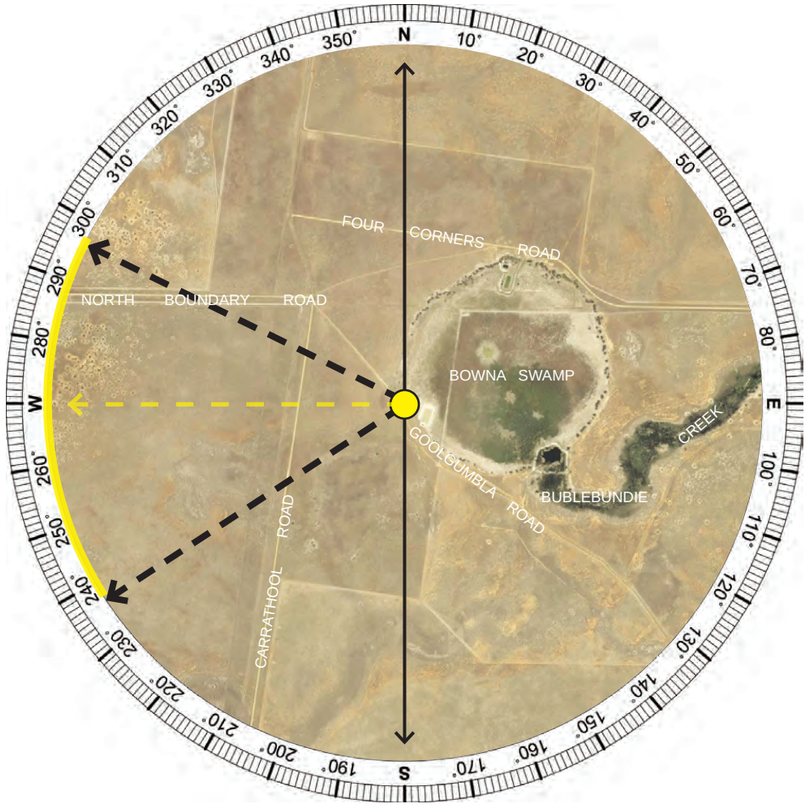
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



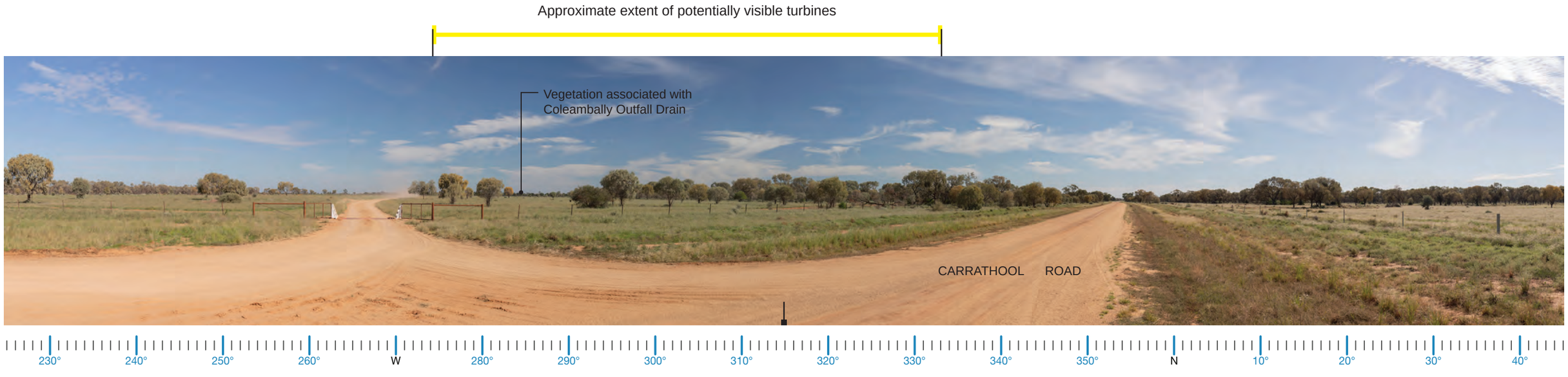
Aerial Image VP03 (Aerial Image Source: Six Maps)

VIEWPOINT VP03

Viewpoint Summary:	
Location:	Elevation:
Goolgumbla Road, Four Corners	112 m
Coordinates:	Viewing Direction:
34°51'35.93"S 145°25'20.06"E	West
Distance to nearest WTG:	Visibility Distance Zone:
9.495 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Wetlands and Swamp	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:
This viewpoint is located on Goolgumbla Road and is a representation of dwellings in Four Corners. The surrounding terrain is flat to gently sloping near Bowna Swamp. Vegetation character is defined by grasses, saltbush and forbs and intermittent stands of tree cover associated with the swamp as visible in the northwest. Lands are predominantly used for grazing and cropping. Lack of intervening elements allows clear, open views in the west. Goolgumbla Road is a low use road that provides access to rural residences in the area.
Potential Visual Impact:
Open and flat lands used for grazing define the character extensively. Views towards the west are open, clear and expansive. It is likely that the majority of the Project will be visible from this location.

VP04 Carrathool Road, Steam Plains



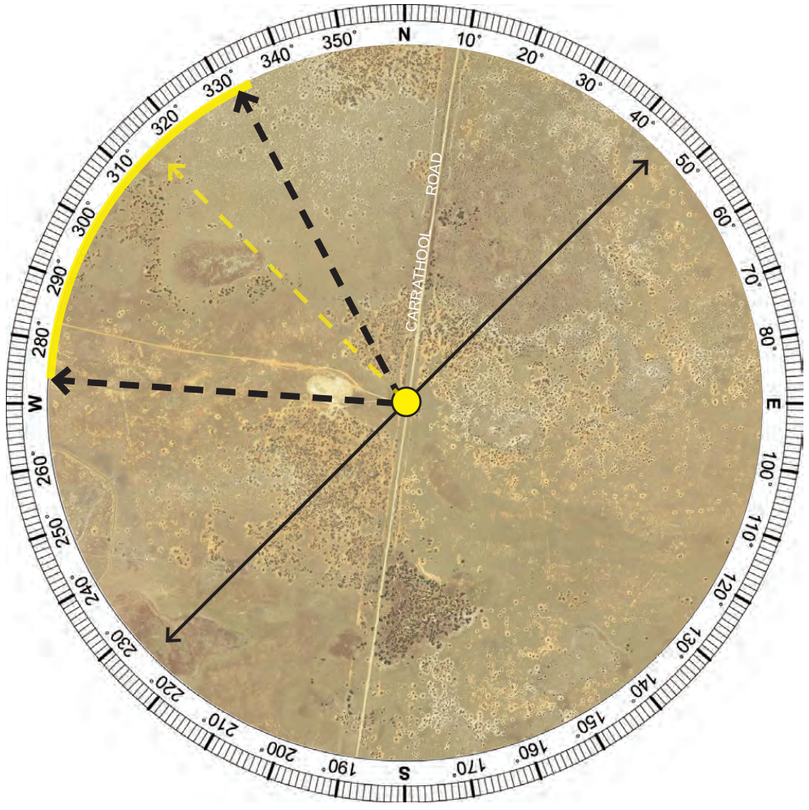
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



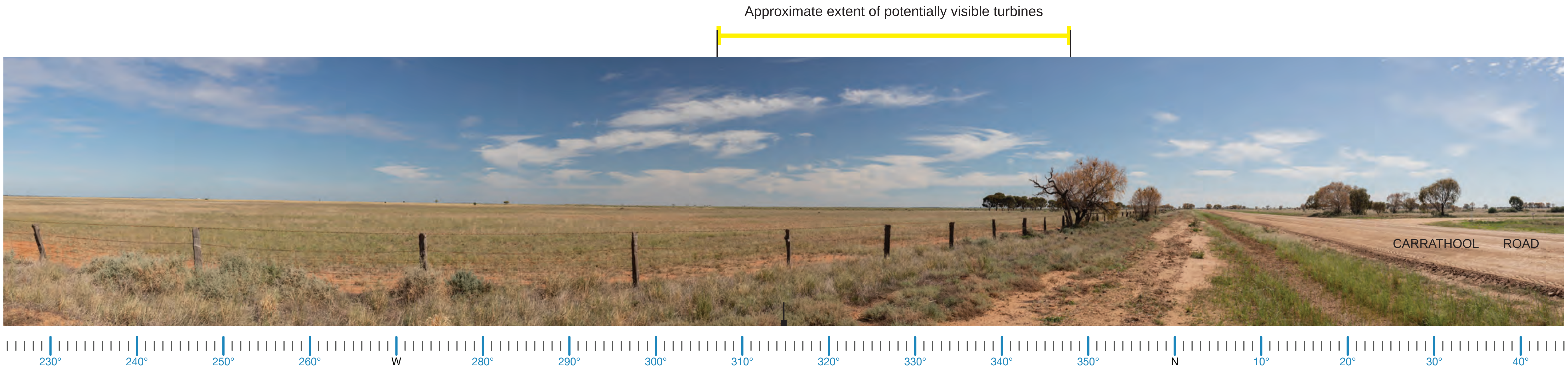
Aerial Image VP04 (Aerial Image Source: Six Maps)

VIEWPOINT VP04

Viewpoint Summary:	
Location:	Elevation:
Carrathool Road, Steam Plains	106 m
Coordinates:	Viewing Direction:
34°56'25.88"S 145°24'6.34"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
10.54 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Major Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

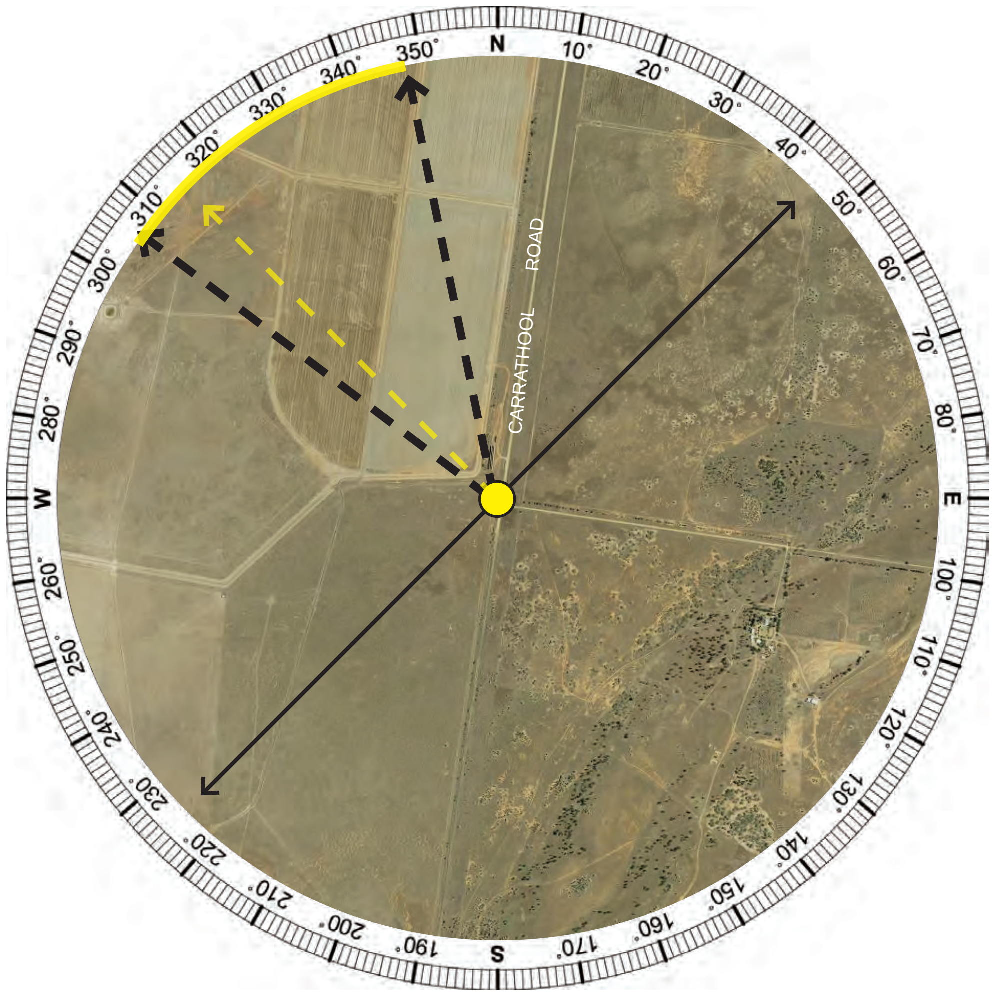
Existing Landscape Character Description:
The viewpoint is located on Carrathool Road which connects Carrathool to Conargo. The viewpoint represents views from dwellings around the area. Surrounding terrain is generally flat and utilised for agricultural activities such as livestock grazing and cropping. A row of vegetation is visible in the middleground towards the west. Predominant vegetation character is defined by black box and myall bushlands with grassy understorey along with saltbush communities.
Potential Visual Impact:
Views towards the northwest are generally open but limited by existing vegetation in the middleground. It is likely that the Project will be visible from this location.

VP05 Carrathool Road, Steam Plains



LEGEND

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



Aerial Image VP05 (Aerial Image Source: Six Maps)

VIEWPOINT VP05

Viewpoint Summary:	
Location:	Elevation:
Carrathool Road, Steam Plains	115 m
Coordinates:	Viewing Direction:
35° 2'52.60"S 145°22'59.03"E	Northwest
Distance to nearest WTG:	Visibility Distance Zone:
15.45 km	**Far Background (FB)**
Land Use:	Viewer Sensitivity Level:
Major Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

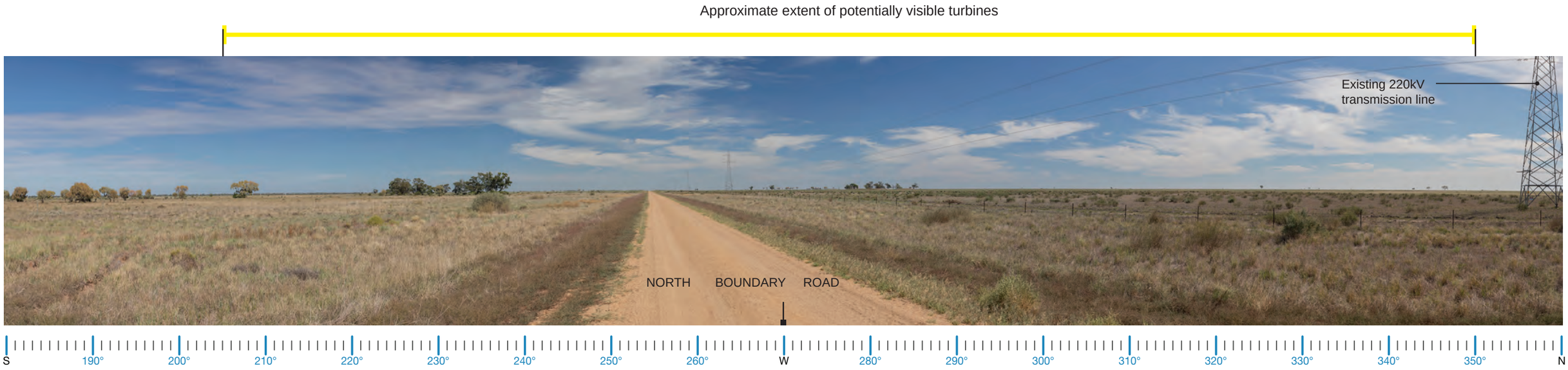
Existing Landscape Character Description:

This photograph was taken from Carrathool Road near 'Steam Plains' and 'Barrabool' to represent views from these dwellings. Landscape character is typically defined by modified, flat land parcels that are used for agricultural activity such as sheep and cattle grazing. Vegetation is generally scattered amidst paddocks or along the roadside as visible in this photograph's middleground. Views of the Project are likely to be available in the northwest direction which lacks intervening elements. Aerial imagery, however, indicates that both dwellings are surrounded by vegetation which will potentially help reduce visual impact.

Potential Visual Impact:

Views of the Project are likely to available in the northwest direction. Views are open, expansive and partially limited by existing patch of vegetation towards the north.

VP06 North Boundary Road, Steam Plains



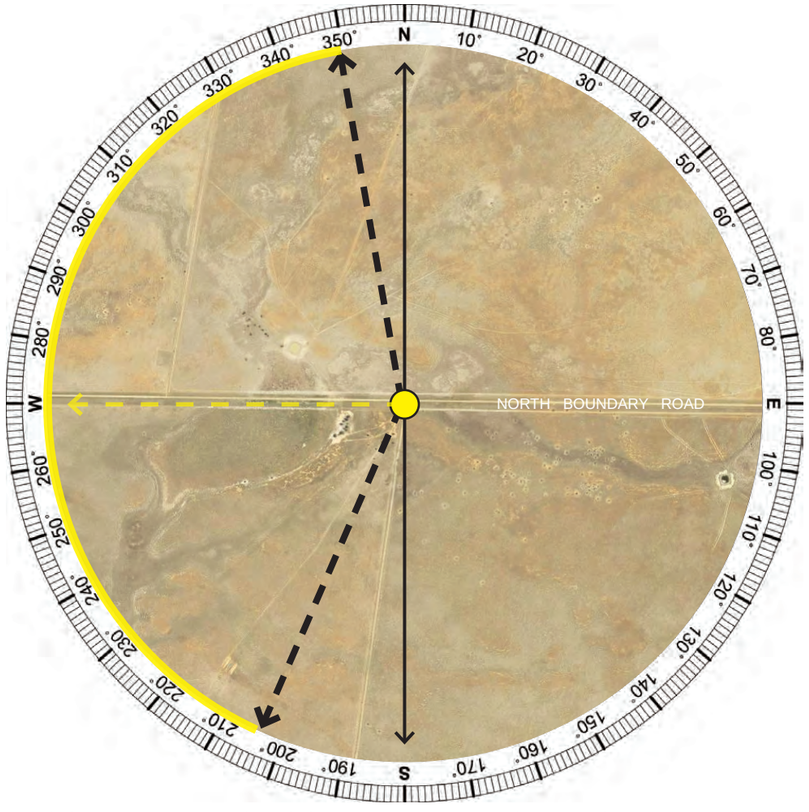
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



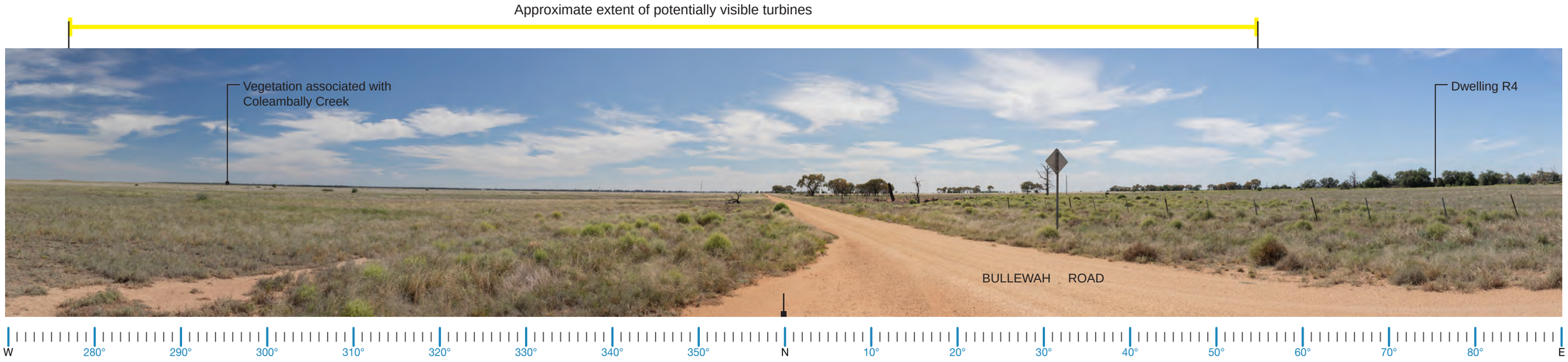
Aerial Image VP06 (Aerial Image Source: Six Maps)

VIEWPOINT VP06

Viewpoint Summary:	
Location:	Elevation:
North Boundary Road, Steam Plains	88 m
Coordinates:	Viewing Direction:
34°51'11.98"S 145°20'1.64"E	West
Distance to nearest WTG:	Visibility Distance Zone:
1.56 km	**Far Foreground (FF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
Three (3) 60º Sectors with turbines within 8000 m.	

Existing Landscape Character Description:
The viewpoint was taken from North Boundary Road. It is a low use road that provides access to scattered rural dwellings in the area. Surrounding landscape is defined by flat parcels of land that are used for sheep, emu, kangaroo and cattle grazing. Intermittent stands of tree cover are sparsely distributed amidst the paddocks. However, these do not limit views. Clear, open views will be available in the west.
Potential Visual Impact:
Lack of intervening elements creates opportunity for clear, open views. The Project is likely to dominate the visual catchment at this location due to the close proximity of the turbines.

VP07 Mailbox of ‘Willurah Back Station’, Bullewah Road, Steam Plains



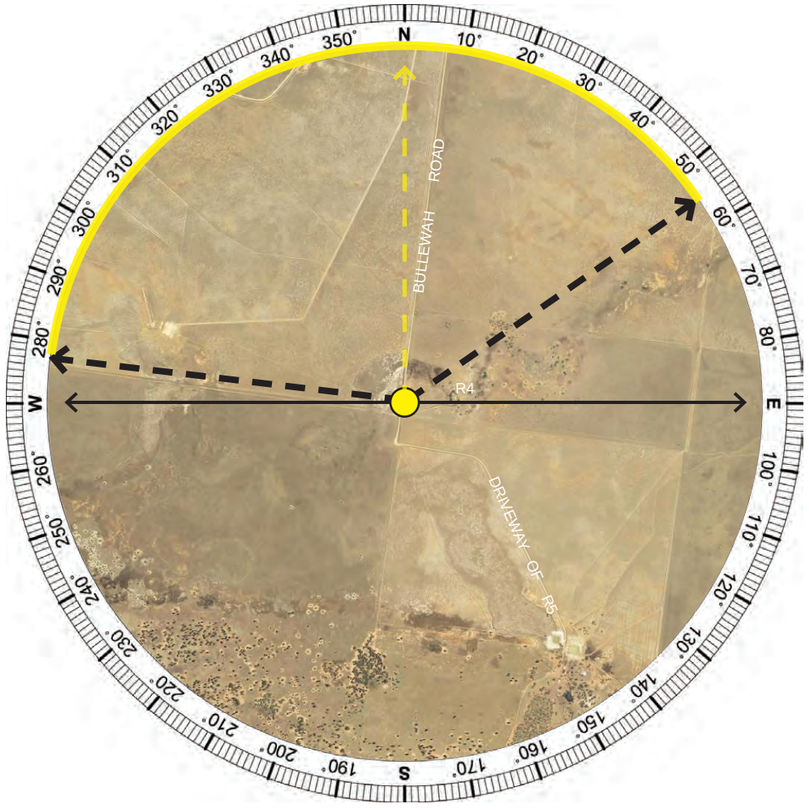
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



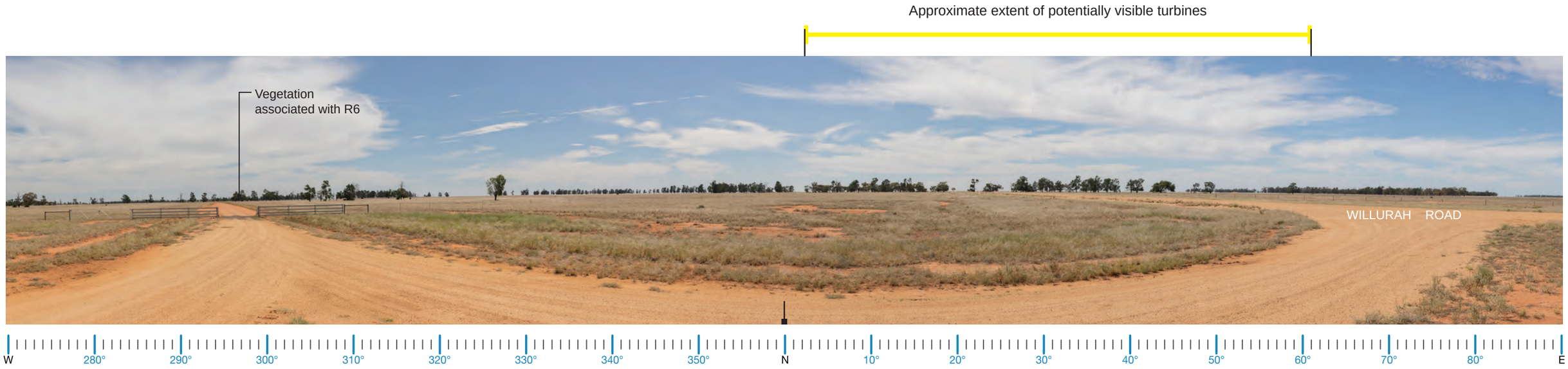
Aerial Image VP07 (Aerial Image Source: Six Maps)

VIEWPOINT VP07

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Willurah Back Station’, Bullewah Road, Steam Plains	90 m
Coordinates:	Viewing Direction:
34°56’33.38”S 145°16’14.16”E	North
Distance to nearest WTG:	Visibility Distance Zone:
1.78 km	**Far Foreground (FF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
Three (3) 60º Sectors with turbines within 8000 m.	

Existing Landscape Character Description:
This viewpoint is located on Bullewah Road near the mailbox of ‘Willurah Back Station’, i.e., dwelling R4 and dwelling R5. It represents views from both these dwellings. Surrounding lands are used for livestock grazing and cropping. Bullewah Road is a low use road that provides access to these dwellings. Views are generally open and not limited by vegetation. The flat topography allows expansive views. Dwelling R4, as visible in the foreground in the northeast, is surrounded by dense vegetation and this will limit views of the Project. Aerial imagery indicates that R5 is also surrounded by dense vegetation which will help limit views.
Potential Visual Impact:
Views from the road are open due to the lack of tree cover. It is likely that majority of the Project will be visible at this location. Views from the dwellings, however, are likely to be limited by existing vegetation that surrounds them.

VP08 Mailbox of ‘Willurah’, Willurah Road, Willurah



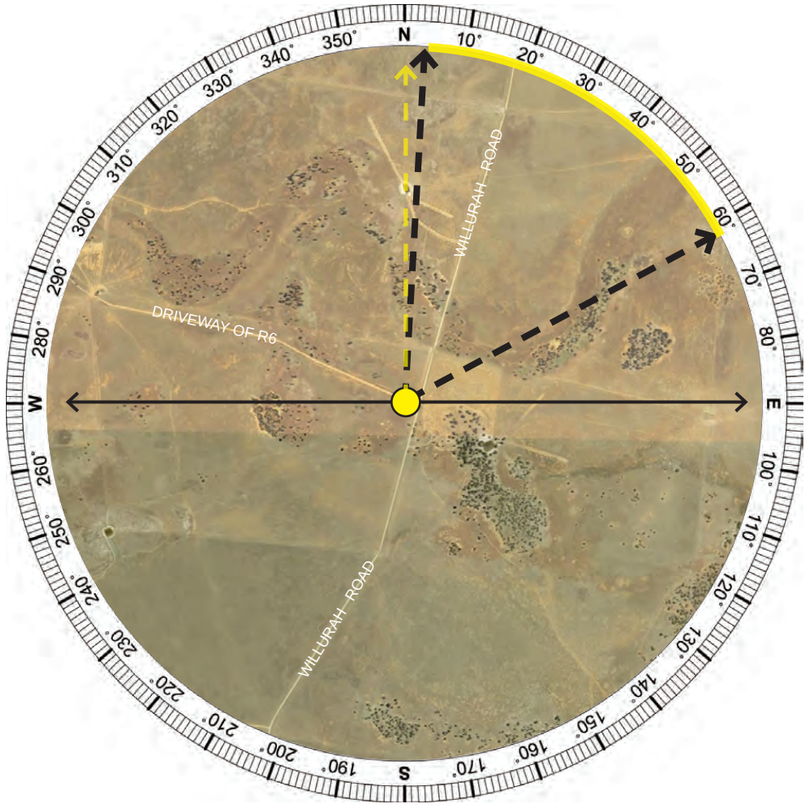
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP08 (Aerial Image Source: Six Maps)

VIEWPOINT VP08

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Willurah’, Willurah Road, Willurah	101 m
Coordinates:	Viewing Direction:
35° 0’16.10”S 145° 7’47.23”E	North
Distance to nearest WTG:	Visibility Distance Zone:
10.10 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

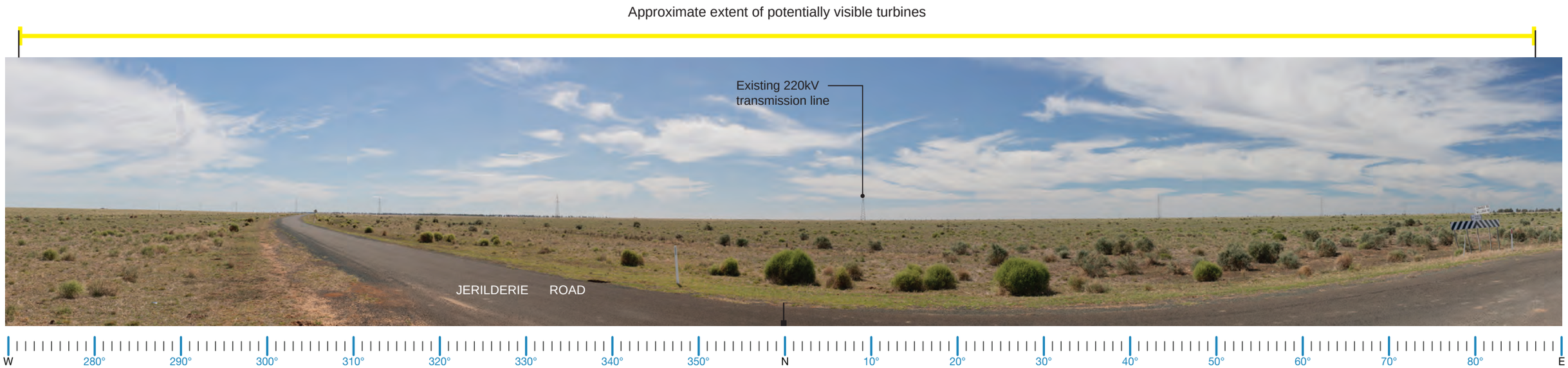
Existing Landscape Character Description:

This viewpoint was taken near the mailbox of ‘Willurah’, i.e., dwelling R6 off Willurah Road. The landscape character is predominantly defined by grazing pastures with native grasses and saltbush. Clumps of trees are scattered across the flat parcels of land and these are mostly associated with dwellings or remnant creek corridors or wetlands. Views are generally open but limited by the row of vegetation visible in the middleground. Aerial imagery indicates that the dwelling is surrounded by dense vegetation which will help limit views of the Project.

Potential Visual Impact:

Views of the Project are likely to be available in the north. Existing vegetation, however, may help fragment some views of the Project.

VP09 Intersection of Willurah Road and Jerilderie Road, Hay South



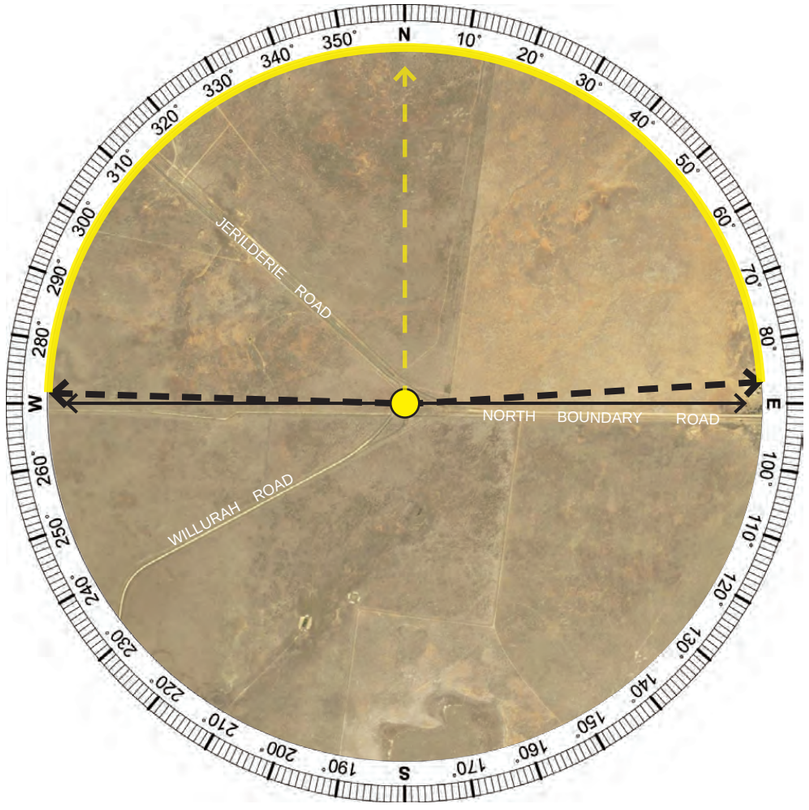
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP09 (Aerial Image Source: Six Maps)

VIEWPOINT VP09

Viewpoint Summary:	
Location:	Elevation:
Intersection of Willurah Road and Jerilderie Road, Hay South	102 m
Coordinates:	Viewing Direction:
34°51'1.18"S 145°10'29.85"E	North
Distance to nearest WTG:	Visibility Distance Zone:
1.12 km	**Near Foreground (NF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
Five (5) 60º Sectors with turbines within 8000 m.	

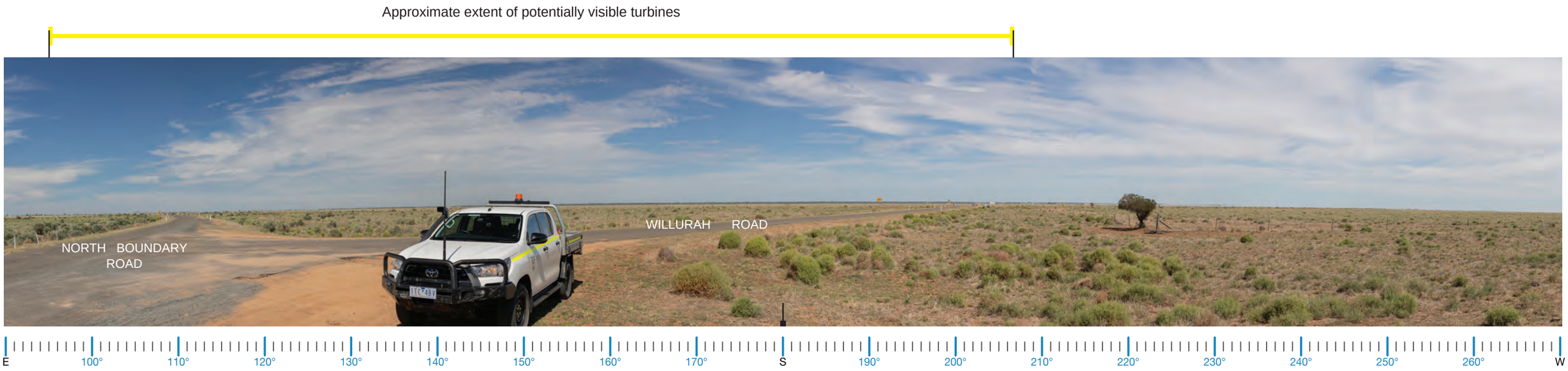
Existing Landscape Character Description:

This viewpoint is located at the intersection of Willurah Road and Jerilderie Road / North Boundary Road. Surrounding lands are utilised for grazing and are characterised by flat, planar topography. Vegetation character comprises of tracts of saltbush, grasses, forbs and intermittent patches of lignum. No tall canopy cover has been identified in the vicinity of the viewpoint. View are, therefore, open and expansive.

Potential Visual Impact:

Open and flat lands used for grazing define the character extensively. The Project will dominate the visual catchment at this location because of the close proximity of the turbines. However, it is noted that this viewpoint represents a public road within the Project Area. There is one involved dwelling (R1) located approximately 3.5 km northwest of this viewpoint and there are no significant points of interest at this location.

VP09 Intersection of Willurah Road and Jerilderie Road, Hay South



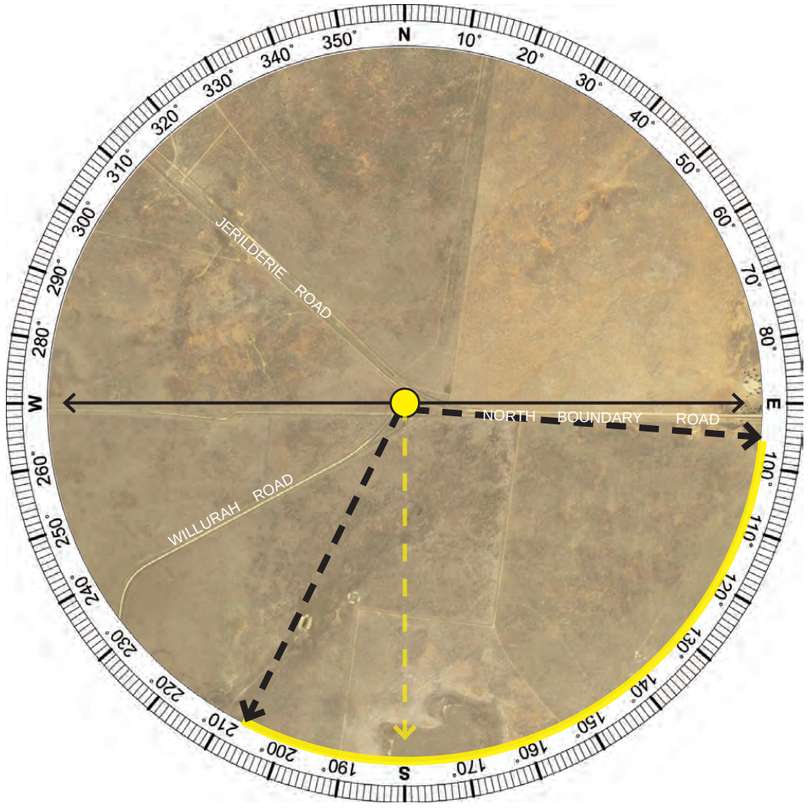
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP09 (Aerial Image Source: Six Maps)

VIEWPOINT VP09

Viewpoint Summary:	
Location:	Elevation:
Intersection of Willurah Road and Jerilderie Road, Hay South	102 m
Coordinates:	Viewing Direction:
34°51'1.18"S 145°10'29.85"E	North
Distance to nearest WTG:	Visibility Distance Zone:
1.05 km	**Near Foreground (NF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
Five (5) 60º Sectors with turbines within 8000 m.	

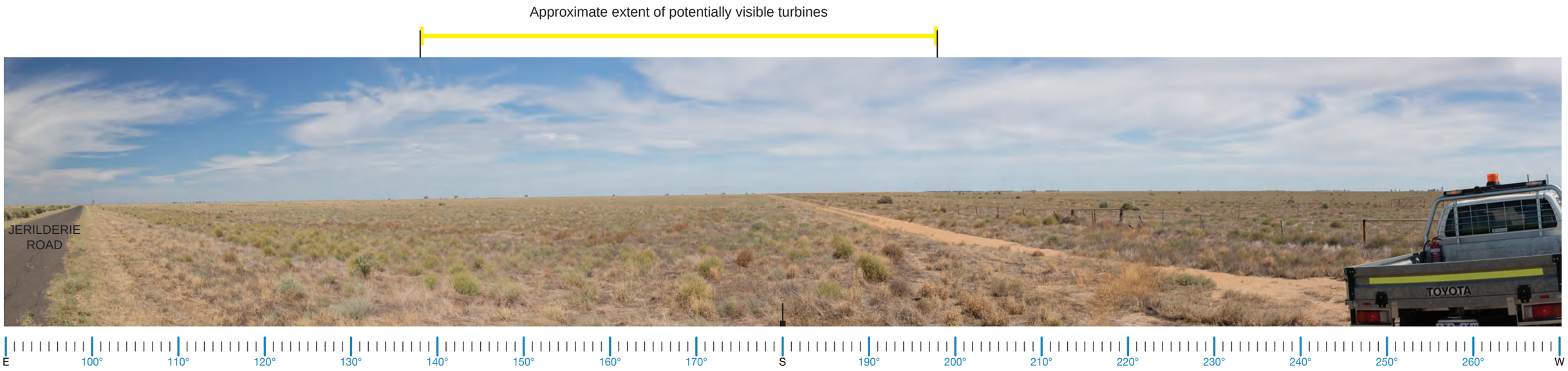
Existing Landscape Character Description:

This viewpoint is located at the intersection of Willurah Road and North Boundary Road. Surrounding lands are utilised for grazing and are characterised by flat, planar topography. Vegetation character comprises of tracts of saltbush, grasses, forbs and intermittent patches of lignum. No tall canopy cover has been identified in the vicinity of the viewpoint. View are, therefore, open and expansive.

Potential Visual Impact:

Open and flat lands used for grazing define the character extensively. The Project will dominate the visual catchment at this location because of the close proximity of the turbines. However, it is noted that this viewpoint represents a public road within the Project Area. There is one involved dwelling idwelling (R1) located approximately 3.5 km northwest of this viewpoint and there are no significant points of interest such as lookouts at this location.

VP10 Mailbox of ‘Elginbah’, Jerilderie Road, Hay South



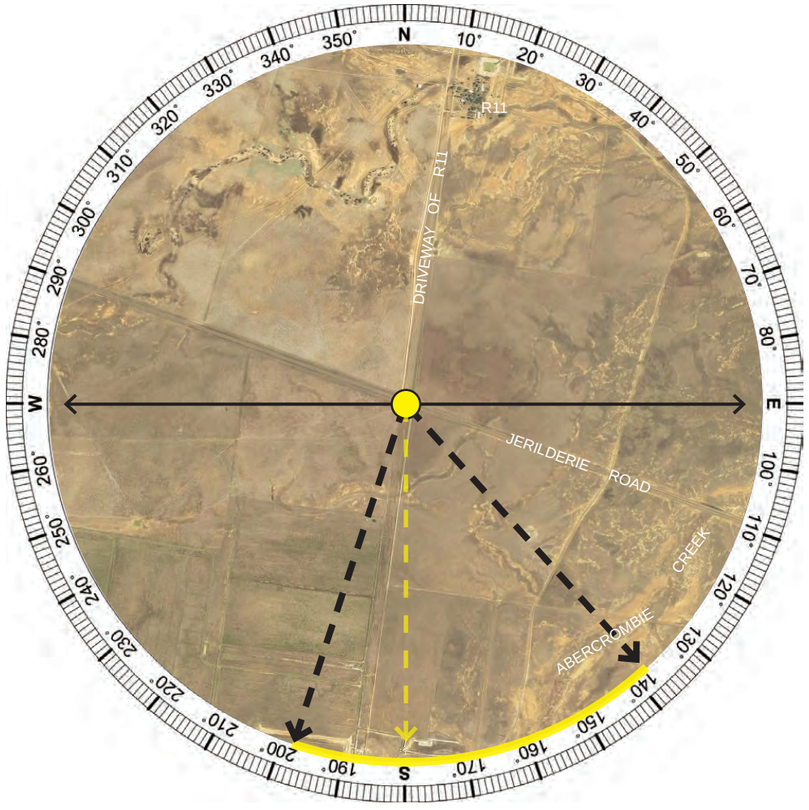
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



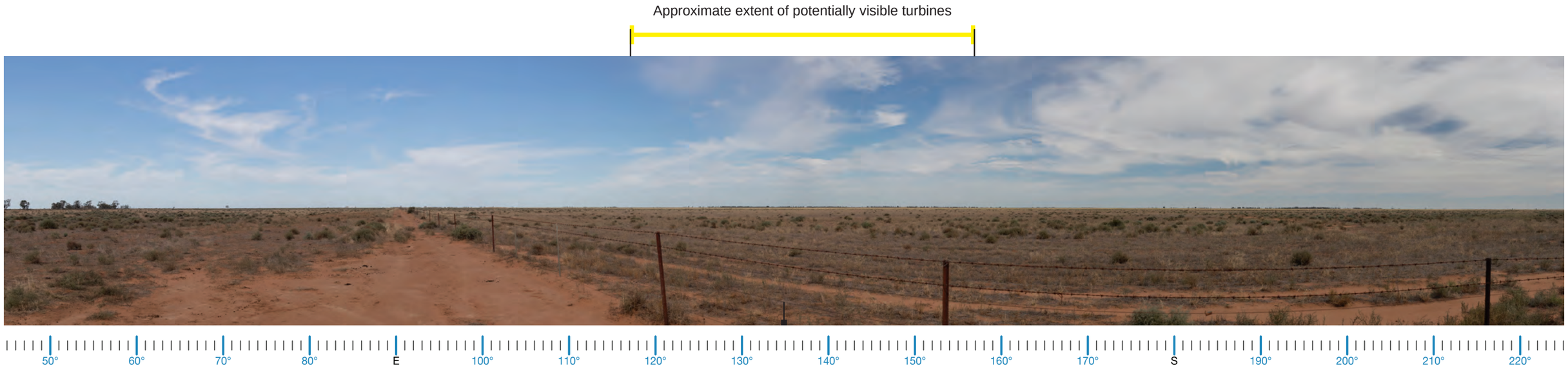
Aerial Image VP10 (Aerial Image Source: Six Maps)

VIEWPOINT VP10

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Elginbah’, Jerilderie Road, Hay South	87 m
Coordinates:	Viewing Direction:
34°41’10.25”S 145° 4’51.25”E	East
Distance to nearest WTG:	Visibility Distance Zone:
7.03 km	**Near Foreground (NF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
One (1) 60º Sector with turbines within 8000 m.	

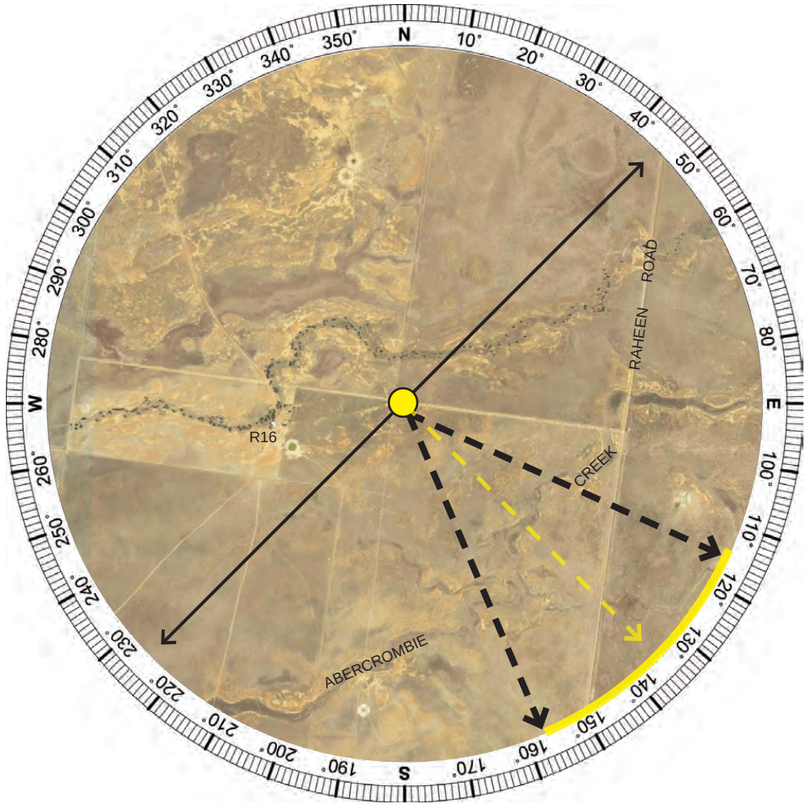
Existing Landscape Character Description:
This viewpoint is located near the gate and mailbox of ‘Elginbah’, i.e., dwelling R11. Surrounding lands are used as grazing pastures and comprise of saltbush and native grasses. Isolated stands of trees can be seen in the far background and this defines the generally treeless character of these plains. Vegetation associated with dwelling R11 is visible in the far middleground. Views are open and expansive due to the lack of obtrusive elements. Aerial imagery indicates that dwelling R11 is surrounded by canopy cover and this will help screen most views of the Project from the dwelling.
Potential Visual Impact:
Views of the Project are likely to be available in the eastern/southeastern direction due to lack of obtrusive elements. Views from dwelling R11, however, are likely to be partially fragmented by existing vegetation.

VP11 Eastern boundary of ‘Glenmore’, off Raheen Road, Hay South



LEGEND

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



Aerial Image VP11 (Aerial Image Source: Six Maps)

VIEWPOINT VP11

Viewpoint Summary:	
Location:	Elevation:
Eastern boundary of ‘Glenmore’, off Raheen Road, Hay South	113 m
Coordinates:	Viewing Direction:
34°42’20.22”S 145° 0’47.91”E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
5.92 km	**Near Middleground (NM)**
Land Use:	Viewer Sensitivity Level:
Agricultural	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
One (1) 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:

This viewpoint is located at the eastern boundary of ‘Glenmore’, i.e., dwelling R16. Surrounding land comprises of flat land parcels used for grazing and cropping. Vegetation is characterised by tracts of saltbush and grasses. The surrounds are generally treeless with occasional tracts land presenting trees that are mostly associated with dwellings. Views are, therefore, open and expansive. Predominant viewing direction is southeast. Aerial imagery indicates that the dwelling is surrounded by sparse vegetation, and therefore, there will be views of the Project from the dwelling.

Potential Visual Impact:

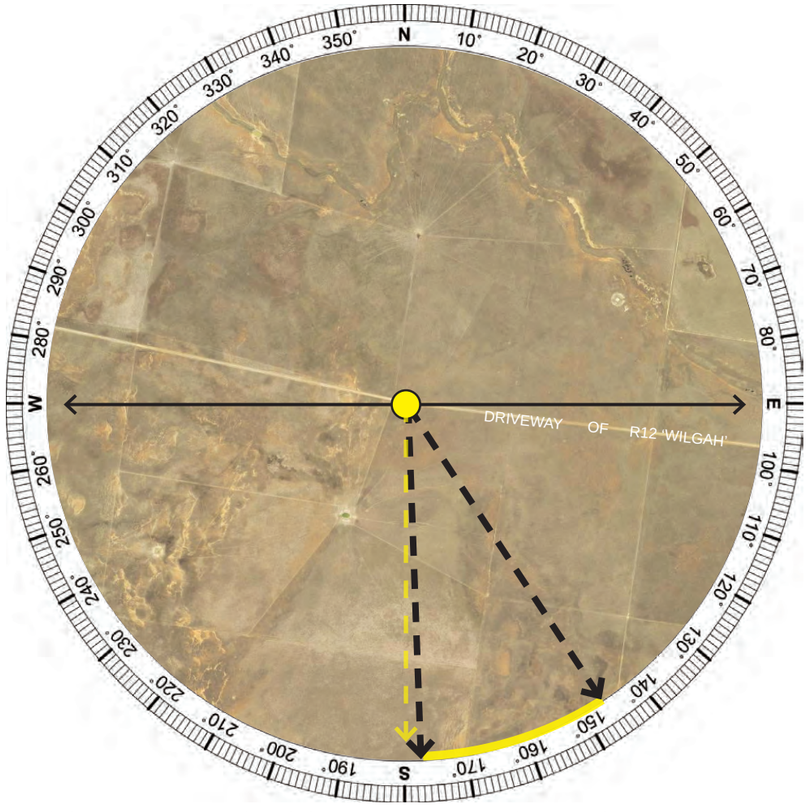
Open and flat farmlands with intermittent stands of trees and bushes define the character extensively. Majority of the Project will be visible generally in the southeast due to the availability of open, clear views. Views from dwelling R16 are also likely to be open and available.

VP12 Driveway of ‘Wilgah’ at 1047 - 1049 Glencoe Road, Hay South

Approximate extent of potentially visible turbines

LEGEND

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



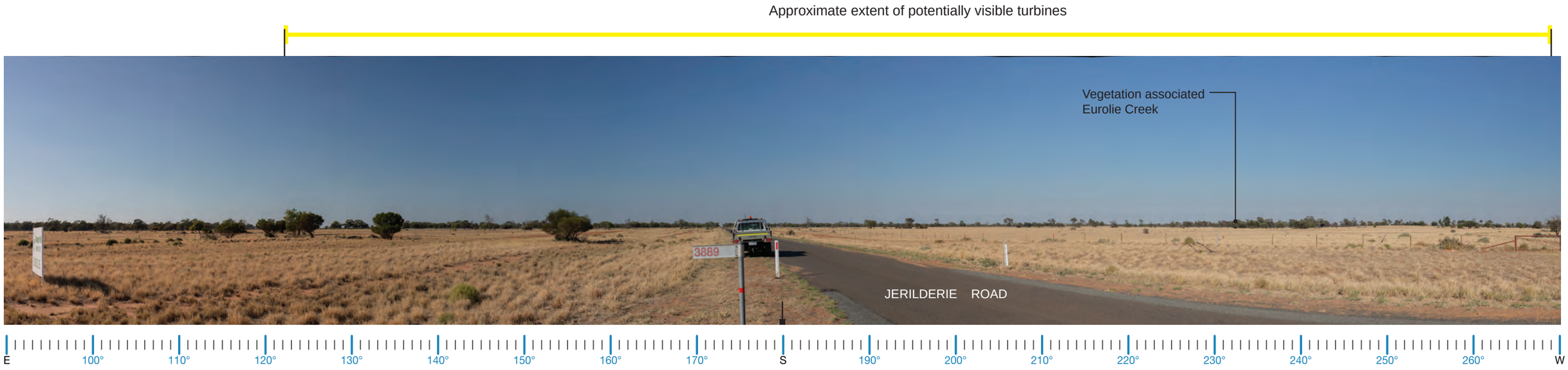
Aerial Image VP12 (Aerial Image Source: Six Maps)

VIEWPOINT VP12

Viewpoint Summary:	
Location:	Elevation:
Driveway of ‘Wilgah’ at 1047 - 1049 Glencoe Road, Hay South	211 m
Coordinates:	Viewing Direction:
34°36’12.85”S 145° 2’33.33”E	South
Distance to nearest WTG:	Visibility Distance Zone:
15.86 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:
The viewpoint was taken from the road used to access ‘Wilgah’, i.e., dwelling R12. It also represents views from dwelling R19 ‘Glecoe’. Surrounding terrain is generally flat and is predominantly used for sheep, cattle, emu and kangaroo grazing. Stands of lignum and nitre goosefoot are visible on paddocks that are dominated by native grasses and low-growing saltbush communities. Views are, therefore, open, expansive and unhindered. Dwelling R12 and R19 are surrounded by vegetation which will help fragment their views towards the Project.
Potential Visual Impact:
Lack of canopy cover and limited intervening elements will allow clear views of the Project from this location.

VP13 Mailbox of ‘Eurolie’, Jerilderie Road, Hay South



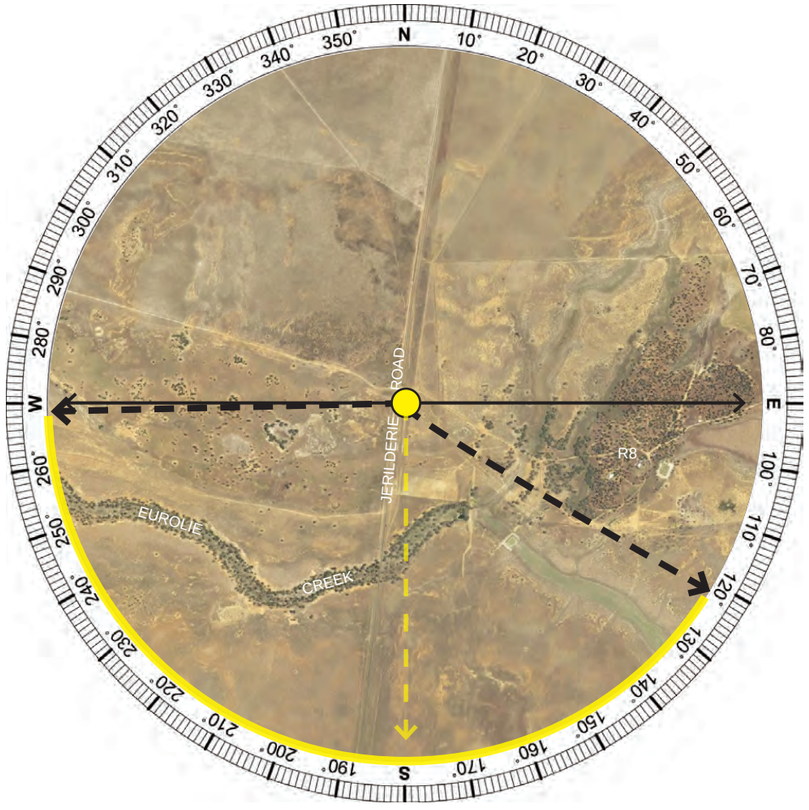
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



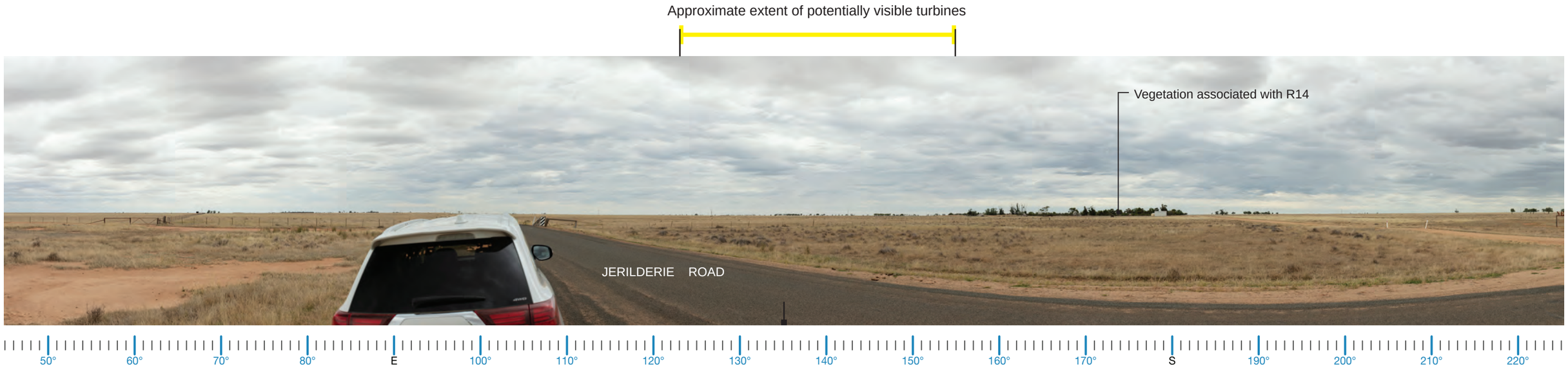
Aerial Image VP13 (Aerial Image Source: Six Maps)

VIEWPOINT VP13

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Eurolie’, Jerilderie Road, Hay South	98 m
Coordinates:	Viewing Direction:
34°45’17.15”S 145° 7’44.13”E	East
Distance to nearest WTG:	Visibility Distance Zone:
1.45 km	**Far Foreground (FF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
Three (3) 60º Sectors with turbines within 8000 m.	

Existing Landscape Character Description:
This photograph was taken at the mailbox of ‘Eurolie’, i.e., dwelling R8, off Jerilderie Road. It also represents views from dwelling R9. Both are involved dwellings. Land is characterised by the grassy and saltbush plains that are used for grazing. The terrain is predominantly flat with very minor undulations that hold seasonal water. Occasional stands of lignum, larger saltbush varieties and nitre goosefoot are visible in the foreground and the middleground. The background shows a row of dense vegetation which is associated with Eurolie Creek. These, however, don’t screen views towards the west. Views are generally open and unhindered.
Potential Visual Impact:
Views of the Project are likely to available in the eastern and western directions. It is likely that views from ‘Eurolie’ may be partially screened by existing vegetation as visible in the aerial imagery.

VP14 Mailbox of ‘Nelleona’, Jerilderie Road, Hay South



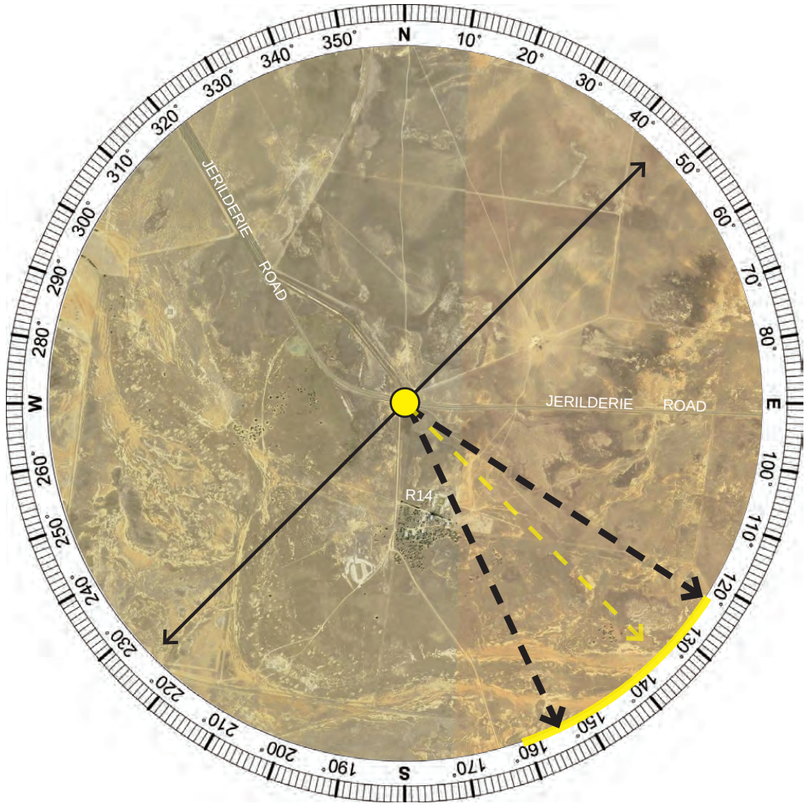
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP14 (Aerial Image Source: Six Maps)

VIEWPOINT VP14

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Nelleona’, Jerilderie Road, Hay South	115 m
Coordinates:	Viewing Direction:
34°40’23.43”S 144°59’29.23”E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
9.99 km	**Far Middleground (FM)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:

The viewpoint represents views from Jerilderie Road and dwelling R14. Surrounding terrain is generally flat and is characterised by native grasses and forbs. Lack of canopy cover allows clear, open views in the landscape. The land is used extensively for grazing and some areas are used for cropping. The viewpoint showcases the predominant character of the Project Area which is defined by extensive tracts of saltbush and grassy plains.

Potential Visual Impact:

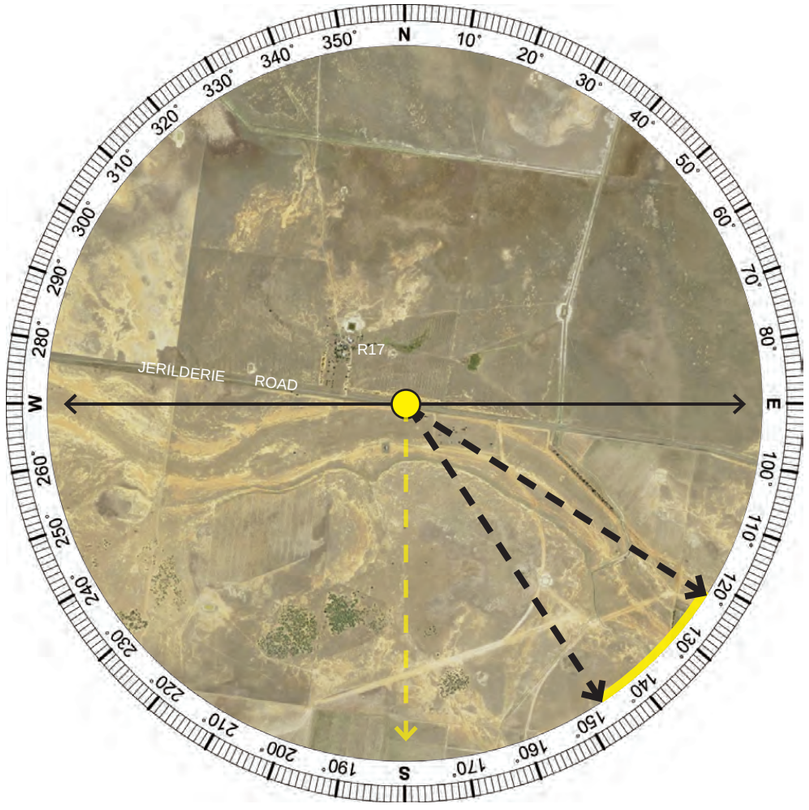
Views towards the Project will be available in the middleground. Majority of the Project is likely to be visible at this location due to lack of intervening elements. Views from dwelling R14, however, are likely to be partially screened by existing vegetation.

VP15 Mailbox of ‘Cedar Grove’, Jerilderie Road, Hay South

Approximate extent of potentially visible turbines

LEGEND

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



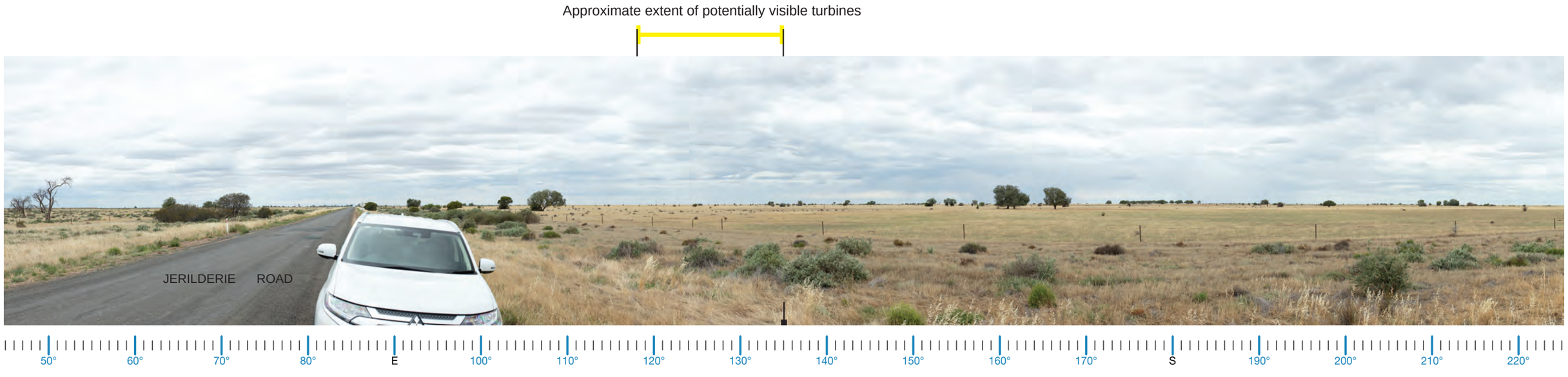
Aerial Image VP15 (Aerial Image Source: Six Maps)

VIEWPOINT VP15

Viewpoint Summary:	
Location:	Elevation:
Mailbox of ‘Cedar Grove’, Jerilderie Road, Hay South	110 m
Coordinates:	Viewing Direction:
34°39’4.51”S 144°56’40.64”E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
14.62 km	**Near Background (NB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:
This photograph was taken from Jerilderie Road to represent views from dwelling R17 and other surrounding scattered dwellings such as R13 located along Jerilderie Road. Landscape character is generally defined by large parcels of native grazing pastures with grasses, saltbush and isolated stands of trees. Vegetation associated with dwelling R17’s driveway is visible along the horizon in the east. The terrain is flat and views are generally open and clear due to lack of obstructive elements.
Potential Visual Impact:
Views of the Project are likely to available in the southeast. Views from dwelling R17 and R13, however, are likely to be partially fragmented by existing vegetation and plantations.

VP16 Jerilderie Road, Hay South



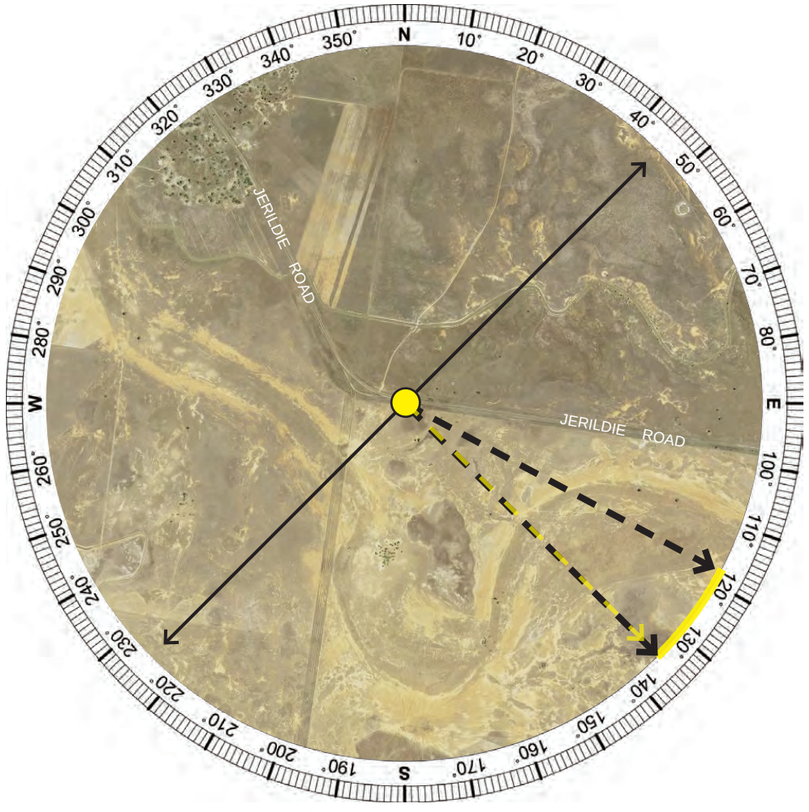
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



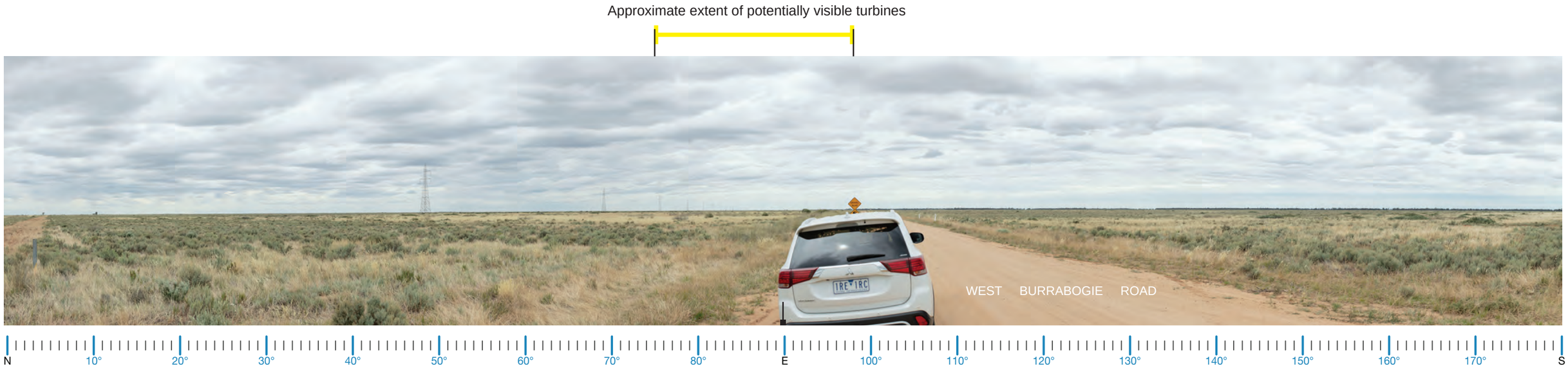
Aerial Image VP16 (Aerial Image Source: Six Maps)

VIEWPOINT VP16

Viewpoint Summary:	
Location:	Elevation:
Jerilderie Road, Hay South	103 m
Coordinates:	Viewing Direction:
34°38'43.03"S 144°53'29.22"E	Southeast
Distance to nearest WTG:	Visibility Distance Zone:
18.73 km	**Far Foreground (FF)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU04: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:
The viewpoint is located on Jerilderie Road. Surrounding terrain is flat and is predominantly used for sheep and cattle grazing. Scattered tree cover is visible in the middleground and vegetation is generally defined by saltbush communities, grasses and forbs. Lack of visually obtrusive elements allows clear, open views in the southeast where the Project is likely to be visible. Views are open, expansive and showcase the predominant character of the farmlands that make up this region.
Potential Visual Impact:
Views towards the Project are open due to the lack of tree cover in the foreground. It is likely that majority of the Project will be visible at this viewpoint.

VP17 Intersection of West Burrabogie Road and Cobb Highway, Booroorban



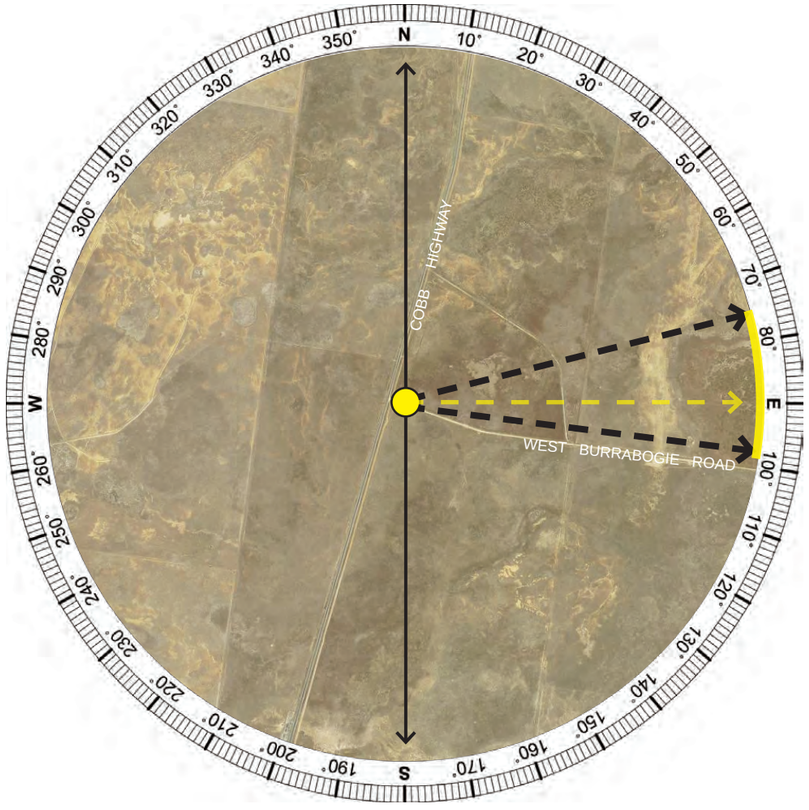
LEGEND

Viewing direction and centre of panorama

Direction of potentially visible turbines

Extent of panorama

Extent of potentially visible turbines



Aerial Image VP17 (Aerial Image Source: Six Maps)

VIEWPOINT VP17

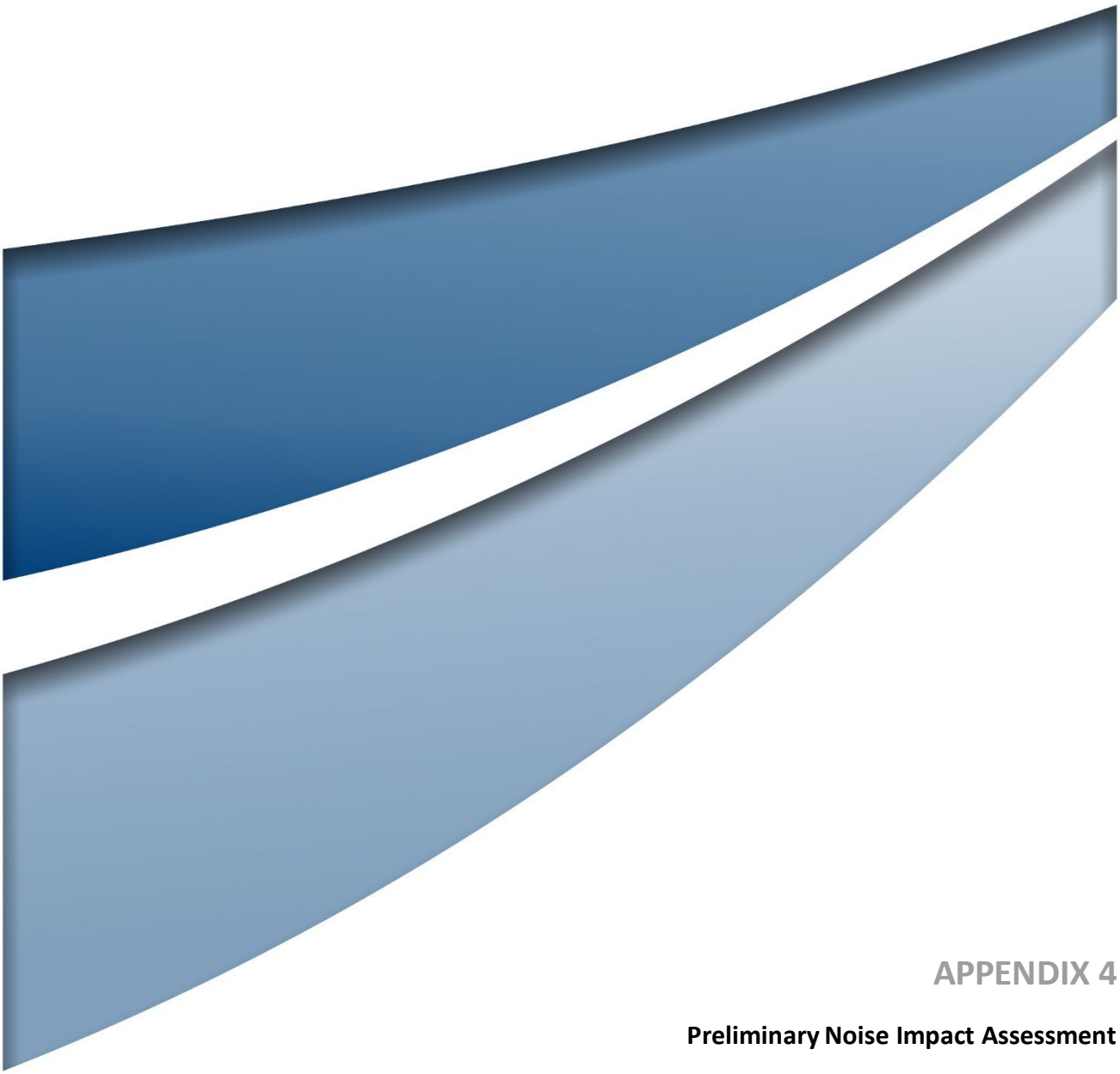
Viewpoint Summary:	
Location:	Elevation:
Intersection of West Burrabogie Road and Cobb Highway, Booroorban	90 m
Coordinates:	Viewing Direction:
34°48'27.17"S 144°46'31.53"E	East
Distance to nearest WTG:	Visibility Distance Zone:
25.33 km	**Far Background (FB)**
Land Use:	Viewer Sensitivity Level:
Low Use Road	**Low**
LCU:	Scenic Quality Rating:
LCU05: Saltbush and Grassy Plains	**Low**
Multiple Wind Turbine Tool:	
No 60º Sector with turbines within 8000 m.	

Existing Landscape Character Description:

The viewpoint is located at the intersection of West Burrabogie Road and Cobb Highway. West Burrabogie Road leads to dwelling R7. Surrounding terrain is flat and is predominantly used for livestock grazing. Vegetation character is generally defined by saltbush communities, grasses and forbs amidst treeless, flat land parcels. Lack of visually obtrusive elements allows clear, open views in the east when viewed from this location. Views of the Project, however, will be distant and not likely to be clear.

Potential Visual Impact:

Views towards the Project are open due to the lack of tree cover in the foreground. It is likely that views from this location will be distant.



APPENDIX 4

Preliminary Noise Impact Assessment

MARSHALL DAY Acoustics

BULLAWAH WIND FARM
PRELIMINARY NOISE ASSESSMENT

Rp 001 20211154 | 31 August 2022

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EXECUTIVE SUMMARY

The proposed Bullawah Wind Farm (the Project) by BayWa r.e. Projects Australia Pty Ltd (the proponent) comprises the construction, operation and decommissioning of a wind farm located 28 km southeast of Hay in the Riverina Region of south-western New South Wales (NSW). The Project area is on grazing land that lies within the Local Government Areas of Hay, Murrumbidgee and Edward River. The Project is inside the NSW Government's South-West Renewable Energy Zone (REZ).

The Project will have an installed capacity of up to 1,000 MW of renewable energy. A large-scale battery energy storage system (BESS) proposed on site will allow for the capture and storage of dispatchable energy. The power generated from the one hundred and seventy (170) wind turbines, each with a maximum blade-tip height of 300 m above ground level, or released from battery storage, will feed into the electricity grid via the proposed Project EnergyConnect transmission line.

A preliminary assessment of operational noise for the proposed Project has been carried out in accordance with the NSW Department of Planning and Environment's *Wind Energy: Noise Assessment Bulletin - For State significant wind energy development*, dated December 2016 (the NSW Noise Assessment Bulletin).

The preliminary noise assessment has been carried out based on the current project design comprising one hundred and seventy (170) multi-megawatt wind turbines within the wind farm site. Noise modelling was carried out based on a candidate turbine model, as nominated by the proponent, with a generation capacity of 6.8 MW and representative of the size and type of turbine being considered for the Project.

The results of the modelling demonstrate that, despite the precautionary approach, the Project can be designed and operated to comply with the operational noise requirements of the NSW Noise Assessment Bulletin. Once the Secretary's Environmental Assessment Requirements (SEARs) are released for this project, further detailed assessment will be undertaken to support a subsequent State Significant Development Application (SSDA), to be lodged with the NSW Department of Planning and Environment (DPE), to demonstrate how compliance would be achieved for the specific noise matters defined by the SEARs.

This would include background noise monitoring at key receivers around the Project, revised operational wind turbine noise modelling assessment and other noise considerations including special noise characteristics, construction and ancillary infrastructure.

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1.0 INTRODUCTION

The proposed Bullawah Wind Farm (the Project) by BayWa r.e. Projects Australia Pty Ltd (the proponent) comprises the construction, operation and decommissioning of a wind farm located 28 km southeast of Hay in the Riverina Region of south-western New South Wales (NSW). The Project area is on grazing land that lies within the Local Government Areas of Hay, Murrumbidgee and Edward River. The Project is inside the NSW Government's South-West Renewable Energy Zone (REZ).

The Project will have an installed capacity of up to 1,000 MW of renewable energy and include a large-scale battery energy storage system (BESS) which will allow for the capture and storage of dispatchable energy. The power generated from the one hundred and seven (170) wind turbines, each with a maximum blade-tip height of 300 m above ground level, or released from battery storage, will feed into the electricity grid via the proposed Project EnergyConnect transmission line.

This report presents the results of a preliminary noise assessment prepared for submission with a Scoping Report and a Secretary's Environmental Assessment Requirements (SEARs) request.

The preliminary noise assessment has been prepared in accordance with the NSW Department of Planning and Environment's *Wind Energy: Noise Assessment Bulletin - For State significant wind energy development*, dated December 2016 (the NSW Noise Assessment Bulletin) and is based on:

- The minimum (base) operational noise limit determined in accordance the NSW Noise Assessment Bulletin;
- Preliminary noise modelling for the Project based on the current Project design comprising one hundred and seventy (170) multi-megawatt wind turbines and a candidate turbine model representative of the size and type of turbine being considered for the Project; and
- A comparison of the predicted noise levels with the base noise limit.

At this stage, Marshall Day Acoustics Pty Ltd (MDA) has not been advised of operational or approved wind farms within 10 km of the proposed subject site. Therefore, potential cumulative noise considerations have not been assessed for the Project at this stage. Given the broader development of renewable energy within the South-West REZ, cumulative impacts will need to be considered in more detail during later stages of the planning and approvals process

Other noise considerations relating to the Project would be assessed during the State Significant Development Application (SSDA) stage of the Project. This would include the noise of construction and ancillary infrastructure associated with the Project, along with any other specific noise matters defined by the SEARs for the Project when issued.

Acoustic terminology used in this report is presented in Appendix A.

2.0 PROJECT DESCRIPTION

2.1 Overview

The proposed Project is located 28 km southeast of Hay in NSW in the Riverina Region of south-western NSW within the Murrumbidgee, Hay and Edward River LGAs. The Project site is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km southwest of the project area) and Griffith (88 km northeast of the project area). Smaller townships of Darlington Point, Jerilderie and Coleambally are nearer to the Project site.

The Project site is proposed in an area mostly east of the Jerilderie, North Boundary and Willurah roads junction, either side of the Balranald to Darlington Point transmission line, and south of the Oolambeyan National Park.

The Project, if approved, will have an installed capacity of up to 1,000 MW. A BESS on site will also allow the capture and storage of energy generated, with additional infrastructure developed to connect to the proposed Project EnergyConnect transmission line.

The Project is in early stages of development. Plans for the proposed development comprise:

- Approximately 170 (3 blade) wind turbines, with a maximum blade-tip height of 300 m above ground;
- Power infrastructure providing connection to Project EnergyConnect i.e., on-site substations/switchyards to connect the proposed wind turbines to the South-West REZ transmission line, that runs through the Project Area;
- Internal electrical reticulation network i.e., electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines;
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings;
- A single grid-scale BESS of approximately 500 MW comprising up to four-hour batteries;
- Temporary and permanent meteorological monitoring masts;
- Temporary construction facilities including:
  - Construction compound/s and site office buildings and storage areas;
  - On-site concrete batching plants for use during the construction phase;
  - Laydown areas used for wind turbine installation and storage of wind turbine components;
  - Targeted road network upgrades to facilitate delivery of wind turbine components to the Project Area as required; and
  - Provision for a temporary accommodation camp on site (if required).

The current project design comprises a total of one hundred and seventy (170) wind turbines. The coordinates of the wind turbines are presented in tabular and graphical format in Appendix B.

A total of fifteen (15) noise sensitive receivers are located within 12 km distance from a proposed turbine location. This includes six (6) receivers involved with the Project. The remainder of the receivers are referred to as non-involved receivers.

Typically, MDA would assess noise to receivers within up to 5 km. This is a nominal distance commonly referenced on account of being significantly greater than the separation distance required to achieve compliance with the lowest possible noise limit prescribed in the NSW Noise Assessment Bulletin. Due to the low number of receivers within 5 km of the Project, this extent has been increased to 12 km to provide greater context to the modelling results.

The coordinates of the receivers are tabulated in Appendix C.

A site layout plan illustrating the turbine layout and receivers is provided in Appendix D.

2.2 Candidate wind turbine model

The turbine model to be assessed in detail as part of the SSDA will be determined from ongoing Project design development. Further, if the Project were ultimately approved, the final wind turbine model would only be selected after a tender process to procure the supply of turbines. The final selection would be made on account of a range of design requirements including achieving compliance with relevant noise limits at surrounding noise sensitive receivers.

Accordingly, to assess the proposed development at this stage in the Project, it is necessary to consider a representative candidate turbine model for the size and type of turbines being considered. The purpose of using a candidate turbine in this assessment is to inform a preliminary assessment of operational noise, accounting for the base noise limit and noise emission levels that are typical of the size of turbines being considered for the development. While a specific turbine manufacturer's data has been relied on for the assessment, the turbine make and model has not been specified at this stage for commercial reasons.

The candidate turbine is a variable speed wind turbine, with the speed of rotation and the amount of power generated by the turbines being regulated by control systems which vary the pitch of the turbine blades (the angular orientation of the blade relative to its axis).

Details of the candidate wind turbine models are provided in Table 1.

Table 1: Candidate wind turbine model details

Item	Specification
Rated power	6.8 MW
Rotor diameter	162 m
Modelled hub height	200 m
Modelled tip height	281 m
Operating mode	Standard
Serrated trailing edge	No

A maximum tip height of 300 m and a maximum hub height of 200 m is proposed for the Project. The tip height constitutes the hub height and blade length (half the rotor diameter) of a subject wind turbine. No commercially available wind turbine models are known that are specified to operate with the sought specifications and as a result, manufacturer's noise data for this operating configuration is not available.

In order to provide the most robust technical approximation of the sought operating configuration, manufacturer's noise data associated with a wind turbine model of known rotor diameter has been used, with the hub height of the wind turbine aligned with the maximum proposed hub height of 200 m. This results in a modelled tip height of 281 m. Further adjustments to apply manufacturer's noise data with a modelled wind turbine noise source having a rotor diameter other than that associated with the manufacturer's noise data would not be technically appropriate.

A candidate wind turbine model (or models) with specifications consistent with the Project design will be used in the Environmental Impact Statement (EIS), to reflect the candidate wind turbine models under consideration at the time. Accordingly, the noise assessment undertaken for the EIS would reflect those candidate wind turbine models.

3.0 OPERATIONAL WIND FARM NOISE CRITERIA

3.1 Non-involved receivers

The NSW Noise Assessment Bulletin provides guidance on how noise impacts are to be assessed for large-scale wind energy development projects that are State Significant Development (SSD).

The NSW Noise Assessment Bulletin states that the South Australian EPA publication *Wind farms environmental noise guidelines* dated July 2009 (the SA EPA Guideline) is to be used as the relevant assessment standard, subject to a set of variations that apply to the assessment of NSW projects. The variations are defined for:

- noise limits;
- special noise characteristics; and
- noise monitoring.

In relation to noise limits, the variation defined in the NSW Noise Assessment Bulletin sets the base criterion at a value of 35 dB L_{Aeq} for all projects, in lieu of the 35 to 40 dB L_{Aeq} base criterion range defined in the SA EPA Guideline. The criteria in the NSW Noise Assessment Bulletin are subsequently defined as follows:

> *The predicted equivalent noise level ($L_{Aeq,10\ minute}$)*, adjusted for tonality and low frequency noise in accordance with these guidelines, should not exceed 35 dB(A) or the background noise ($L_{A90(10\ minute)}$) by more than 5 dB(A), whichever is the greater, at all relevant receivers for wind speed from cut-in to rated power of the wind turbine generator and each integer wind speed in between.*
>
> ** Determined in accordance with SA 2009, Section 4.*

Variations are also defined in the NSW Noise Assessment Bulletin for the assessment of special noise characteristics. These procedures will be referenced in subsequent detailed assessment phases for the Project.

The NSW Noise Assessment Bulletin notes the following in relation to the types of receivers where the noise limits apply:

> *The criteria in this Bulletin have been developed to address potential noise impacts on the amenity of residents and other relevant receivers in the vicinity of a proposed wind energy project. Wind energy proponents commonly negotiate agreements with private land owners where applicable noise limits may not be achievable at relevant receiver locations. A negotiated agreement will be considered as part of the assessment of a wind energy project, as will the requirements of SA 2009 and this Bulletin. The proponent's EIS should clearly identify the expected noise levels at all receiver locations including host properties to ensure that affected persons are appropriately informed regarding the development proposal.*

3.2 Involved receivers

The assessment criteria detailed in the previous section apply to all noise sensitive receivers that are not involved with the proposed project (e.g. by way of land ownership or a negotiated agreement). However, in accordance with the requirements of the NSW Noise Assessment Bulletin, predicted noise levels are also presented for participating receivers, comprising host properties and receivers where a noise agreement is in place.

Notwithstanding the above, a reference level of 45 dB L_{Aeq} is presented as a base criterion for participating receivers in order to provide context to the predicted noise levels for these locations. This is consistent with the SA EPA Guideline which recommends a level of 45 dB for *financial stakeholders*. Comparisons between the predicted noise levels and the 45 dB reference level are provided for informative purposes only. Noise levels at these locations will ultimately need to be managed in accordance with the commercial agreements established between the proponent and the landowners.

4.0 ASSESSMENT METHOD

Operational wind farm noise levels are predicted using:

- Noise emission data for the wind turbines;
- A 3D digital model of the site and the surrounding environment; and
- International standards used for the calculation of environmental sound propagation.

At this preliminary stage of assessment, the primary consideration is potential A-weighted noise levels associated with operation of the Project.

The method selected to predict A-weighted noise levels is International Standard ISO 9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2). The prediction method is consistent with the guidance provided by the SA EPA Guideline and has been shown to provide a reliable method of predicting the typical upper A-weighted levels of the noise expected to occur in practice from wind farm developments.

The ISO 9613-2 method is used in conjunction with a set of input choices and procedural modifications that are specific to wind farm noise assessment, based on international research and guidance.

The noise prediction method is summarised in Table 2 with further discussion of the method and the calculation choices is provided in Appendix E.

Table 2: Downwind prediction methodology

Detail	Description
Software	Proprietary noise modelling software SoundPLAN version 8.2
Method	International Standard ISO 9613-2:1996 *Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO 9613-2). Adjustments to the ISO 9613-2 method are applied on the basis of the guidance contained in the UK Institute of Acoustics publication *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* (the UK Institute of Acoustics guidance). The adjustments are applied within the SoundPLAN noise modelling software and relate to the influence of terrain screening and ground effects on sound propagation. Specific details of adjustments are noted below and are discussed in Appendix E.
Source characterisation	Each wind turbine is modelled as a point source of sound. The total sound of the wind farm is then calculated based on simultaneous operation of all wind turbines and summing the contribution of each. Calculations of turbine to receiver distances and average sound propagation heights are made based on the point source being located at the position of the hub of the turbine. Calculations of terrain related screening are made based on the point source being located at the maximum tip height of each turbine. Discussion of the modelled tip height and wind turbine noise data is provided in Section 2.2 and Section 5.1. Discussion of terrain screening effects is provided below.
Terrain data	Elevation contours in 5 m resolution provided by the proponent

Detail	Description
Terrain effects	Adjustments for the effect of terrain are determined and applied based on the UK Institute of Acoustics guidance and research outlined in Appendix E. • Valley effects: +3 dB is applied to the calculated noise level of a wind turbine when a significant valley exists between the wind turbine and calculation point. A significant valley is determined to exist when the actual mean sound propagation height between the turbine and calculation point is 50 % greater than would occur if the ground were flat. • Terrain screening effects: only calculated if the terrain blocks line of sight between the maximum tip height of the turbine and the calculation point. The value of the screening effect is limited to a maximum value of 2 dB. The project is in a typically flat area characterised by limited variations in ground elevation between the turbines and surrounding receivers. These terrain characteristics did generally result in limited application of adjustments to the predicted noise levels for some turbine/receiver combinations. For reference purposes, the ground elevations at the turbine and receiver locations are tabled in Appendix B and Appendix C respectively. The topography of the site is depicted in the elevation map provided in Appendix F.
Ground conditions	Ground factor of G = 0.5 based on the UK Institute of Acoustics guidance and research outlined in Appendix E. The ground around the site corresponds to acoustically soft conditions (G = 1) according to ISO 9613-2. The adopted value of G = 0.5 assumes that 50 % of the ground cover is acoustically hard (G = 0) to account for variations in ground porosity and provide a cautious representation of ground effects.
Atmospheric conditions	Temperature 10 °C and relative humidity 80 % These represent conditions which result in relatively low levels of atmospheric sound absorption and are chosen based on the UK Institute of Acoustics guidance and the SA EPA Guideline. The calculations are based on sound speed profiles[1] which increase the propagation of sound from each turbine to each receiver, whether as a result of thermal inversions or wind directed toward each calculation point. The primary consideration for wind farm noise assessment is wind speed and direction. The noise level at each calculation point is assessed based on being simultaneously downwind of every wind turbine at the site. Other wind directions in which part or the entire wind farm is upwind of the receiver will result in lower noise levels. In some cases, it is not physically possible for a receiver to be simultaneously downwind of each turbine and the approach is therefore precautionary in these instances.
Receiver heights	1.5 m above ground level This is a deviation from UK Institute of Acoustics guidance. However, the modelling also does not include the 2 dB subtraction recommended by the UK Institute of Acoustics guidance. This approach has been shown to be valid for predicting noise level of wind farms expected to be measured using the L_{A90} parameter (as per the NSW Noise Assessment Bulletin).

[1] The sound speed profile defines the rate of change in the speed of sound with increasing height above ground

5.0 WIND TURBINE NOISE ASSESSMENT

5.1 Wind turbine noise emissions

The noise emissions of wind turbines are described in terms of the sound power level for different wind speeds at the hub height. The sound *power* level is a measure of the total sound energy produced by each turbine and is distinct from the sound *pressure* level which depends on a range of factors such as the distance from the turbine.

Sound power level data for the candidate turbine model has been sourced from the manufacturer's specification document provided by the proponent at the time of reporting. The sound power data provided in the manufacturer's documentation has been adjusted by the addition of +1.0 dB at each wind speed to provide a margin for typical values of test uncertainty, in line with recommendations from the UK Institute of Acoustics guidance.

The sound power levels referenced in this assessment, including the +1.0 dB adjustment, are illustrated in Figure 1. The overall level represents the total noise emission of the turbine, including the secondary contribution of ancillary plant associated with the turbine (e.g., cooling fans and internal transformer).

The sound power levels in Figure 1 are considered typical of the range of noise emissions associated with comparable multi-megawatt wind turbines. The data is therefore considered appropriate to reference in this preliminary assessment as a representation of the apparent sound power levels of the turbine when tested and rated in accordance with International Electrotechnical Commission publication IEC 61400-11:2012 *Wind turbines - Part 11: Acoustic noise measurement techniques* (IEC 61400-11).

The sound frequency characteristics of the turbine was sourced from the manufacturer's specification document provided by the proponent at the time of reporting. The reference spectrum used as the basis for this assessment is illustrated Figure 2 and corresponds to the highest overall sound power level illustrated in Figure 1.

Figure 1: Turbine assessment sound power levels (including +1 dB for test uncertainty), dB L_{WA}

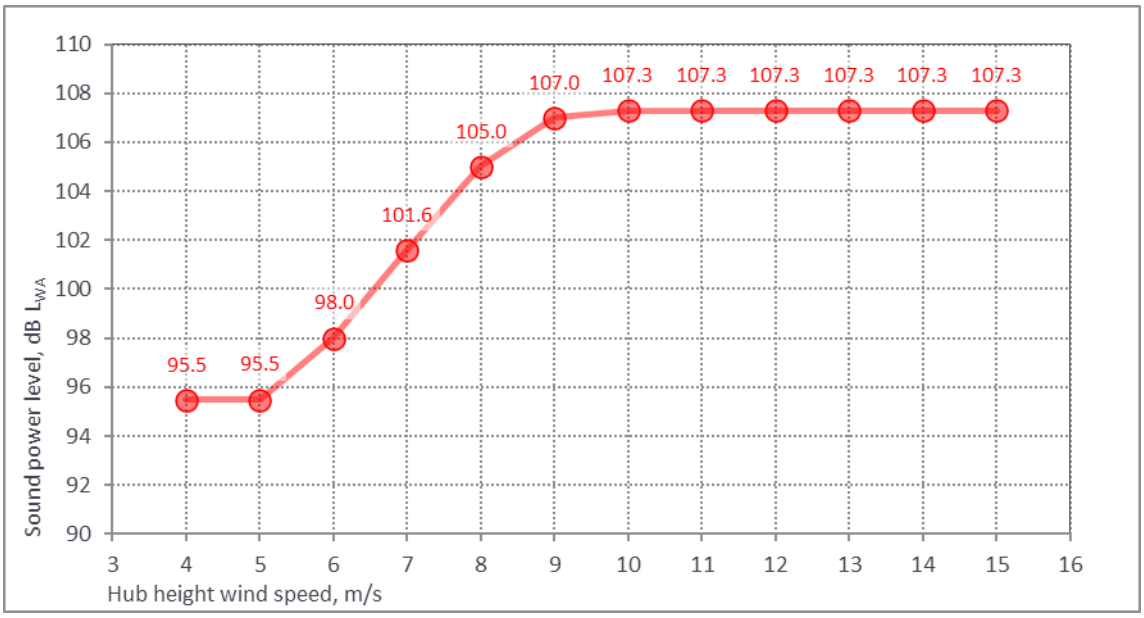
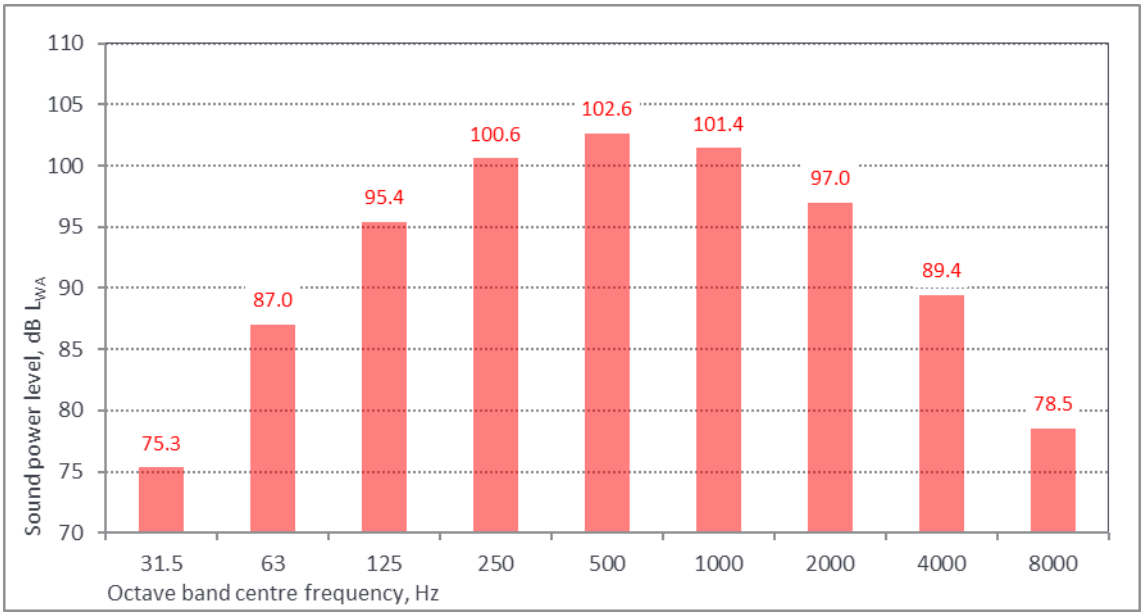


Figure 2: Turbine assessment sound power level spectrum (including +1 dB for test uncertainty), dB L_{WA}



The manufacturer specification for the candidate turbine model does not provide information about tonality.

The occurrence of tonality in the noise of contemporary multi-megawatt turbine designs is generally limited. This is supported by evidence of operational wind farms in Australia which indicates that the occurrence of tonality at receivers is atypical. On this basis, adjustments for tonality have not been applied to the predicted noise levels presented in this preliminary assessment. Notwithstanding this, the subject of tonality would be addressed in subsequent assessment stages for the Project. As part of this, further information will need to be obtained from the manufacturer concerning tonality.

The other special noise characteristic which is assessable in accordance with the NSW Noise Assessment Bulletin is low frequency noise. While there is a prescribed criterion for the application of low frequency noise penalty adjustments in the NSW Noise Assessment Bulletin (based on C-weighted noise levels), there is no established or verified engineering prediction method of C weighted noise levels associated with the operation of wind turbines.

For the purposes of this report, a risk assessment approach has been adopted using a simplified prediction method to estimate the C-weighted noise levels. Details of the study have been provided in Appendix H.

5.2 Preliminary predicted noise levels

This section of the report presents the preliminary predicted A-weighted noise levels of the Project at surrounding receivers, and an assessment of compliance with the base noise limit.

Sound levels in environmental assessment work are typically reported to the nearest integer to reflect the practical use of measurement and prediction data. However, in the case of wind farm layout design, significant layout modifications may only give rise to fractional changes in the predicted noise level. This is a result of the relatively large number of sources influencing the total predicted noise level, as well as the typical separating distances between the turbine locations and surrounding assessment positions. It is therefore necessary to consider the predicted noise levels at a finer resolution than can be perceived or measured in practice. It is for this reason that the levels presented in this section are reported to one decimal place.

Predicted noise levels for all receivers within 12 km of a wind turbine are listed in Table 3 for non-involved receivers. The minimum noise limit applicable to the wind farm at non-involved receivers is 35 dB L_{Aeq}.

The predicted noise levels are for conditions when the candidate wind turbine's noise emissions have reached their highest level (corresponding to 15 m/s) and the wind is directed from the wind farm to each receiver. The predicted noise levels presented include the +1.0 dB allowance to account for turbine sound power level measurement uncertainty, as described in Section 5.1.

Table 3: Highest predicted noise level at non-involved receivers within 12 km of a wind turbine

Receiver	dB L_{Aeq}	Distance to the nearest turbine, m	Below the base criterion
R4	32.7	1,562	Yes
R5	28.2	2,511	Yes
R7	22.3	7,495	Yes
R11	20.3	8,596	Yes
R13	15.4	11,926	Yes
R14	17.6	9,410	Yes
R15	19.7	8,827	Yes
R16	20.9	6,321	Yes
R20	22.6	5,554	Yes

Predicted noise levels for each integer wind speed are tabulated in Appendix G for all receivers within 12 km of a wind turbine.

It can be seen from Table 3 that the predicted noise levels from the proposed Project are below the NSW Noise Assessment Bulletin base criterion of 35 dB L_{Aeq} at all of the assessed non-involved receivers.

The above findings support that the Project can be designed and operated to comply with the operational noise requirements of the NSW Noise Assessment Bulletin.

Predicted noise levels at involved receivers are provided in Table 4, for information.

Table 4: Predicted noise level at all involved receivers

Receiver	dB L_{Aeq}	Distance to the nearest turbine, m	Below the 45 dB reference level
R1	43.0	619	Yes
R2	40.7	951	Yes
R3	37.6	1,604	Yes
R8	34.5	1,606	Yes
R9	27.7	3,511	Yes
R10	22.4	8,200	Yes

It can be seen from Table 4 that the predicted noise levels from the proposed Project are below the 45 dB L_{Aeq} reference level for all involved receivers.

The location of the total predicted 30 dB, 35 dB, 40 dB, and 45 dB L_{Aeq} noise contours is illustrated in Figure 3 with a zoomed view shown in Figure 4.

5.3 Low-frequency noise

The risk assessment provided in Appendix H indicates calculated low frequency noise levels below the applicable thresholds described in Section H2 for both involved and non-involved receivers. It is noted that the margin between the predicted levels and the most stringent threshold is of a comparable magnitude to the uncertainty associated with C-weighted predictions.

On the basis of the above, adjustments for special noise characteristics referred to in the NSW Noise Assessment Bulletin have not been applied to the predicted noise levels for non-involved receivers presented in this assessment. However, assessment of these special noise characteristics would need to be carried out as part of the post-construction compliance assessment.

Figure 3: Highest predicted noise levels (corresponding to hub height wind speeds of 15 m/s or greater)

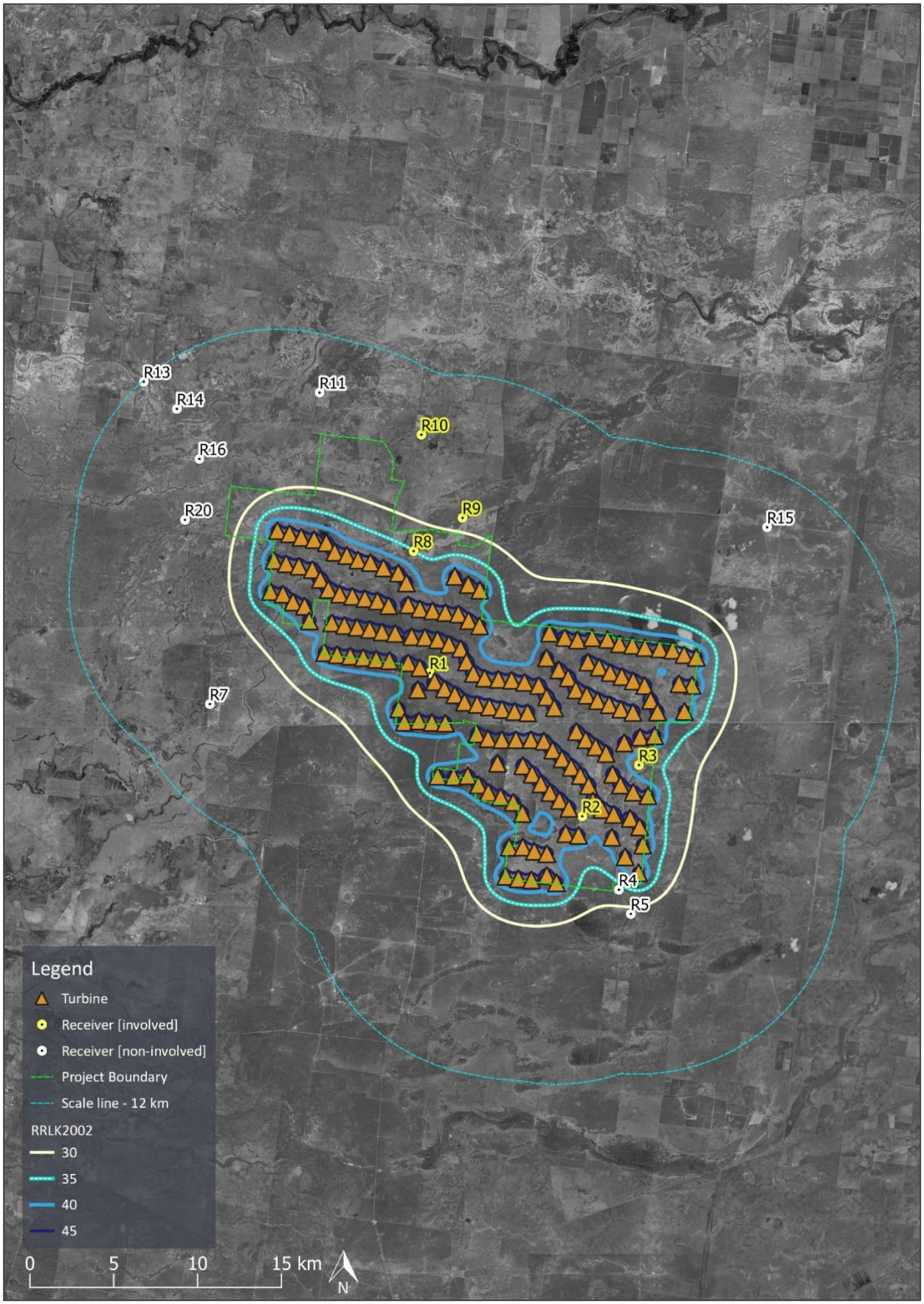
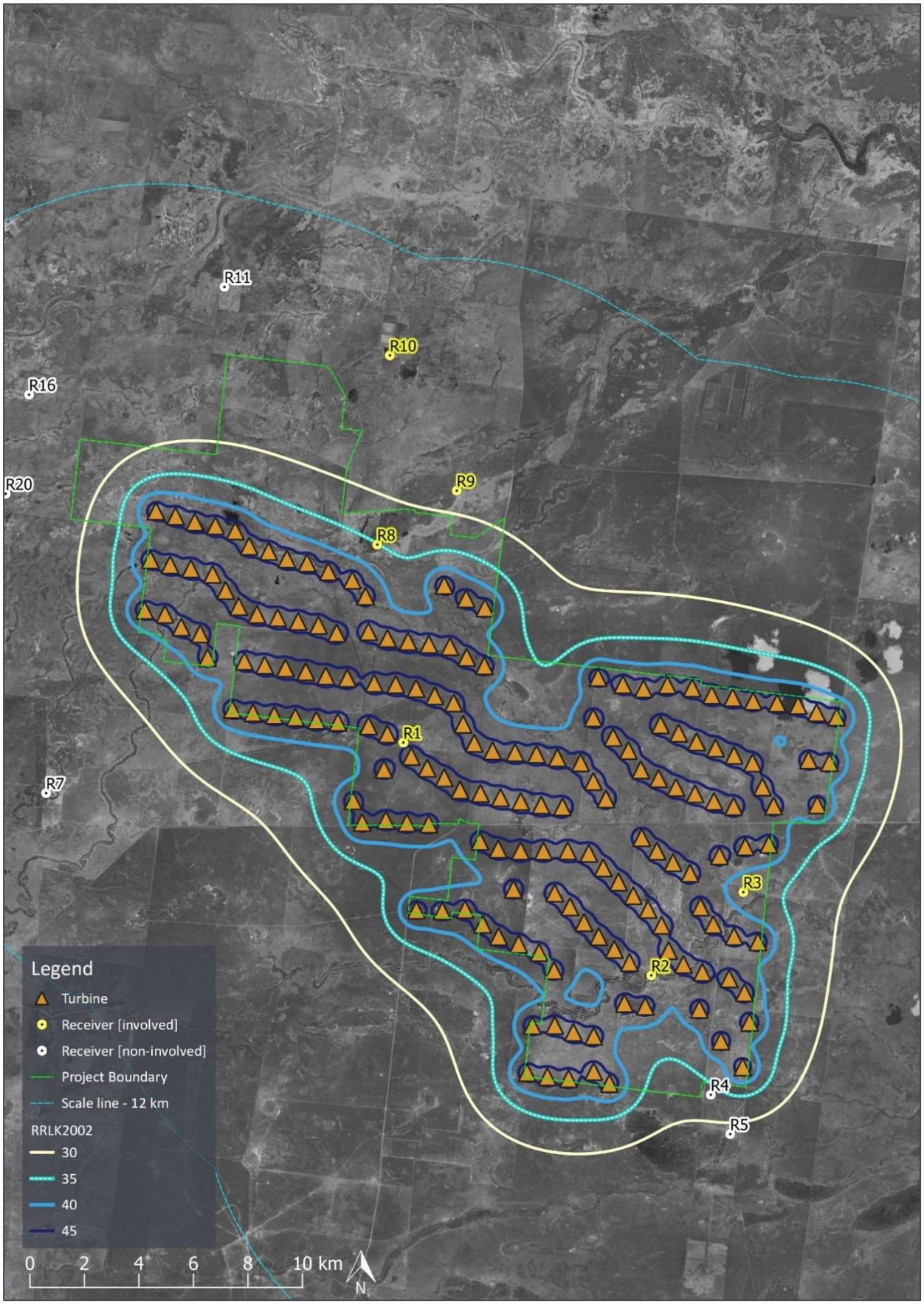


Figure 4: Highest predicted noise levels (corresponding to hub height wind speeds of 15 m/s or greater) - Zoomed



6.0 DETAILED ASSESSMENT PHASE

A detailed assessment of a wind farm development in NSW involves addressing several environmental noise considerations detailed in the Project specific SEARs. Whilst Project specific SEARs are yet to be issued, typical requirements include assessment of:

- operational wind turbine noise;
- ancillary infrastructure noise;
- construction noise;
- construction traffic noise; and
- construction vibration.

Environmental noise considerations relating to construction and ancillary infrastructure would be addressed at the SSDA phase of the assessment, once the Project specific SEARs have been released.

Further detailed assessment work may involve background noise monitoring at key receivers to determine the applicable criteria in accordance with the NSW Noise Assessment Bulletin. The results of any background noise monitoring would be documented in the noise assessment report prepared to accompany the SSDA for the Project.

The NSW Noise Assessment Bulletin specifies additional criteria relating to *special characteristics*, defined as tonality and low frequency. While tonality cannot be readily predicted, in relation to low frequency noise, the bulletin states that:

> *Noise assessments for proposed wind energy projects shall assess the potential for non-associated residential receiver locations to experience low frequency noise levels exceeding 60 dB(C).*

Low frequency noise characteristics are highly specific to the turbine being considered, and its assessment can involve detailed modelling using alternative procedures to those used for A-weighted noise levels. In accordance with the NSW Noise Assessment Bulletin, this modelling data is to be provided as part of an application to develop a wind farm. Accordingly, this modelling is to be undertaken and reported at the SSDA phase of the assessment.

7.0 SUMMARY

A preliminary assessment of operational noise for the proposed Project has been carried out in accordance with the NSW Noise Assessment Bulletin.

The preliminary noise assessment has been prepared based on the current project design comprising one hundred and seventy (170) multi-megawatt turbines within the wind farm site.

Noise modelling was carried out based on a candidate turbine model, as nominated by the proponent, with a generation capacity of 6.8 MW and representative of the size and type of turbine being considered for the Project. While turbine manufacturer's data has been relied on for the assessment, the turbine make and model has not been specified at this stage for commercial reasons.

The results of the modelling demonstrate that, despite the precautionary approach, the Project can be designed and operated to comply with the operational noise requirements of the NSW Noise Assessment Bulletin. Once the SEARs are released for this Project, further detailed assessment will be undertaken to support a subsequent SSDA, to be lodged with DPE. This would include background noise monitoring at key receivers around the Project, revised operational wind turbine noise modelling assessment and other noise considerations including special noise characteristics, construction and ancillary infrastructure.

APPENDIX A GLOSSARY OF TERMINOLOGY

The basic quantities used within this document to describe noise adopt the conventions outlined in ISO 1996-1:2016 *Acoustics - Description measurement and assessment of environmental noise – Basic quantities and assessment procedures*.

Accordingly, all frequency weighted sound pressure levels are expressed as decibels (dB) in this report.

For example, sound pressure levels measured using an "A" frequency weighting are expressed as L_A dB. Alternative ways of expressing A-weighted decibels such as dBA or dB(A) are therefore not used within this report.

Term	Definition	Abbreviation
A-weighting	A method of adjusting sound levels to reflect the human ear's varied sensitivity to different frequencies of sound.	See discussion above this table.
C- weighting	A method of adjusting sound levels to account for non-linear frequency response of the human ear at high noise levels (typically greater than 100 decibels).	-
A-weighted 90th centile	The A-weighted pressure level that is exceeded for 90 % of a defined measurement period. It is used to describe the underlying background sound level in the absence of a source of sound that is being investigated, as well as the sound level of steady, or semi steady, sound sources.	L_{A90}
A-weighted equivalent level	The A-weighted equivalent continuous pressure level.	L_{Aeq}
C-weighted equivalent level	The C-weighted equivalent continuous pressure level.	L_{Ceq}
Decibel	The unit of sound level.	dB
Hertz	The unit for describing the frequency of a sound in terms of the number of cycles per second.	Hz
Low frequency	A sound with perceptible content in the audible frequency range typically below 200 Hz	-
Octave Band	A range of frequencies. Octave bands are referred to by their logarithmic centre frequencies, these being 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz for the audible range of sound.	-
Sound power level	A measure of the total sound energy emitted by a source, expressed in decibels.	L_W
Sound pressure level	A measure of the level of sound expressed in decibels.	L_p
Special characteristics	A term used by the NSW Noise Assessment Bulletin to define sound characteristics that increase the likelihood of adverse reaction to the sound. The characteristics are tonality and low frequency.	-
Tonality	A characteristic to describe sounds which are composed of distinct and narrow groups of audible sound frequencies (e.g. whistling or humming sounds).	-

APPENDIX B TURBINE COORDINATES

The following table sets out the coordinates of the current proposed turbine layout supplied by the proponent.

Table 5: Turbine coordinates – GDA2020 MGA zone 55

Turbine	Easting, m	Northing, m	Terrain elevation, m
1	321,994.20	6,153,384.07	95
2	322,714.78	6,153,202.13	96
3	323,417.62	6,152,984.46	96
4	324,175.05	6,152,851.42	96
5	324,905.81	6,152,661.46	95
6	321,791.48	6,151,605.47	95
7	322,512.31	6,151,415.32	95
8	323,273.76	6,151,273.62	95
9	321,576.75	6,149,752.28	95
10	322,324.06	6,149,601.12	95
11	325,410.92	6,152,099.61	95
12	326,127.76	6,151,910.22	95
13	326,797.88	6,151,631.39	95
14	327,539.60	6,151,485.74	95
15	328,317.93	6,151,165.64	95
16	324,072.50	6,151,069.94	95
17	324,550.85	6,150,476.71	95
18	325,031.75	6,149,886.12	95
19	322,921.87	6,149,131.14	95
20	323,613.89	6,148,885.40	95
21	323,889.66	6,148,009.31	95
22	325,703.32	6,149,598.37	95
23	326,460.91	6,149,474.24	95
24	327,212.61	6,149,341.54	95
25	327,956.98	6,149,202.21	96
26	328,625.88	6,148,916.72	98
27	325,239.01	6,147,882.42	95
28	325,982.94	6,147,740.52	95
29	326,745.62	6,147,626.64	96
30	327,491.24	6,147,494.38	97

Turbine	Easting, m	Northing, m	Terrain elevation, m
31	328,228.49	6,147,345.07	98
32	329,015.34	6,147,261.15	99
33	324,797.21	6,146,115.14	95
34	325,549.81	6,145,992.26	95
35	326,335.62	6,145,905.24	96
36	327,108.23	6,145,823.49	96
37	327,880.85	6,145,715.38	97
38	328,669.29	6,145,638.91	98
42	332,570.18	6,150,663.66	97
43	333,374.87	6,150,171.65	98
44	334,064.13	6,149,837.12	98
45	329,198.51	6,150,853.78	96
46	329,683.37	6,150,265.27	97
47	329,790.84	6,148,966.11	99
48	330,488.90	6,148,717.55	99
49	331,246.28	6,148,603.32	99
50	332,009.32	6,148,503.37	98
51	332,781.42	6,148,416.12	98
52	333,394.88	6,148,024.77	99
53	334,045.47	6,147,712.90	100
54	330,002.39	6,147,071.65	100
55	330,791.81	6,147,029.00	100
56	331,539.80	6,146,879.70	100
57	332,222.08	6,146,612.99	100
58	332,917.09	6,146,349.07	100
59	333,265.48	6,145,568.46	100
60	333,673.82	6,144,872.51	100
61	334,344.08	6,144,594.07	100
62	335,171.67	6,144,532.34	100
63	335,957.78	6,144,475.43	100
64	336,725.56	6,144,343.28	100
65	337,573.23	6,144,159.84	100
66	329,792.81	6,145,507.72	100

Turbine	Easting, m	Northing, m	Terrain elevation, m
67	330,484.85	6,145,213.83	100
68	331,364.08	6,144,388.30	100
69	331,946.00	6,143,958.95	100
70	332,573.17	6,143,606.46	100
71	333,149.91	6,143,160.26	100
72	333,900.41	6,143,032.75	100
73	334,636.33	6,142,879.73	100
74	335,379.54	6,142,735.83	100
75	336,130.04	6,142,604.67	100
76	336,909.68	6,142,537.27	100
77	338,042.69	6,143,471.84	100
78	338,506.98	6,142,829.85	100
79	330,358.14	6,143,912.69	97
80	329,225.90	6,142,763.30	95
81	329,560.34	6,141,964.91	95
82	330,430.21	6,142,051.16	96
83	331,203.03	6,141,955.98	97
84	332,004.37	6,141,911.80	99
85	338,217.22	6,147,285.72	100
86	339,127.23	6,147,024.11	100
87	338,040.42	6,145,806.35	100
88	338,769.06	6,145,087.95	100
89	339,884.74	6,146,869.11	100
90	340,760.55	6,147,007.94	100
91	341,669.65	6,146,901.08	100
92	342,386.82	6,146,637.50	100
93	343,158.14	6,146,549.42	100
94	343,908.06	6,146,418.56	100
95	344,787.26	6,146,343.37	100
96	345,559.05	6,146,261.41	100
97	346,237.65	6,145,996.40	100
98	346,970.44	6,145,832.69	101
99	346,710.30	6,144,164.74	102

Turbine	Easting, m	Northing, m	Terrain elevation, m
100	345,937.45	6,144,257.98	100
101	339,330.32	6,144,606.30	100
102	340,505.81	6,145,549.88	100
103	341,173.13	6,145,245.37	100
104	341,831.89	6,144,924.80	100
105	342,528.49	6,144,694.85	100
106	343,208.04	6,144,428.54	100
107	343,885.79	6,144,153.08	100
108	344,248.08	6,143,268.13	100
109	344,659.10	6,142,571.77	100
110	346,259.85	6,142,611.16	101
111	339,786.67	6,143,897.79	100
112	340,434.55	6,143,580.33	100
113	341,075.95	6,143,249.91	100
114	341,775.65	6,143,016.67	100
115	342,468.88	6,142,744.56	100
116	343,193.22	6,142,555.23	100
117	333,884.01	6,141,276.73	100
118	334,551.60	6,140,993.38	100
119	335,372.56	6,140,926.58	100
120	336,215.08	6,140,924.54	100
121	337,103.38	6,140,927.82	100
122	337,878.45	6,140,836.76	100
123	338,405.54	6,140,304.31	100
124	339,818.29	6,141,412.37	100
125	340,376.47	6,140,919.97	100
126	340,967.38	6,140,496.85	100
127	341,589.62	6,140,107.74	102
128	342,672.26	6,140,740.94	100
129	343,620.06	6,141,080.04	100
130	344,483.74	6,141,163.31	100
131	331,546.48	6,138,757.42	97
132	332,501.23	6,138,721.64	100

Turbine	Easting, m	Northing, m	Terrain elevation, m
133	333,337.68	6,138,778.16	100
134	335,112.38	6,139,517.69	100
135	338,966.21	6,139,785.26	100
136	339,510.09	6,139,282.17	100
137	341,977.10	6,138,868.25	102
138	342,445.76	6,138,225.52	101
139	336,626.43	6,139,376.51	100
140	337,185.73	6,138,875.47	100
141	337,698.43	6,138,298.69	100
142	338,240.25	6,137,780.17	100
143	338,811.21	6,137,314.08	100
144	339,370.51	6,136,830.52	100
145	340,050.58	6,138,781.21	100
146	340,547.40	6,138,195.67	100
147	340,804.87	6,137,270.50	100
148	341,349.70	6,136,761.23	100
149	342,044.99	6,136,475.68	100
150	341,932.63	6,135,117.20	100
151	333,980.67	6,138,237.00	100
152	334,565.94	6,137,781.96	100
153	335,301.54	6,137,508.12	100
154	336,053.04	6,137,198.53	100
155	336,601.51	6,136,534.06	100
156	343,207.83	6,137,794.12	100
157	344,085.31	6,137,585.20	101
158	343,026.88	6,136,237.05	100
159	343,587.34	6,135,725.25	101
160	339,184.81	6,135,333.18	100
161	339,948.86	6,135,226.56	100
162	335,806.90	6,134,517.70	100
163	336,624.86	6,134,524.68	100
164	337,310.79	6,134,271.05	100
165	338,056.81	6,134,130.89	100

Turbine	Easting, m	Northing, m	Terrain elevation, m
166	335,613.33	6,132,791.12	100
167	336,359.09	6,132,645.06	100
168	337,136.24	6,132,572.65	100
169	338,056.64	6,132,834.14	100
170	338,632.80	6,132,394.57	100
171	342,724.54	6,133,947.14	100
172	343,777.55	6,134,637.99	101
174	343,522.72	6,132,998.84	101

APPENDIX C RECEIVER LOCATIONS

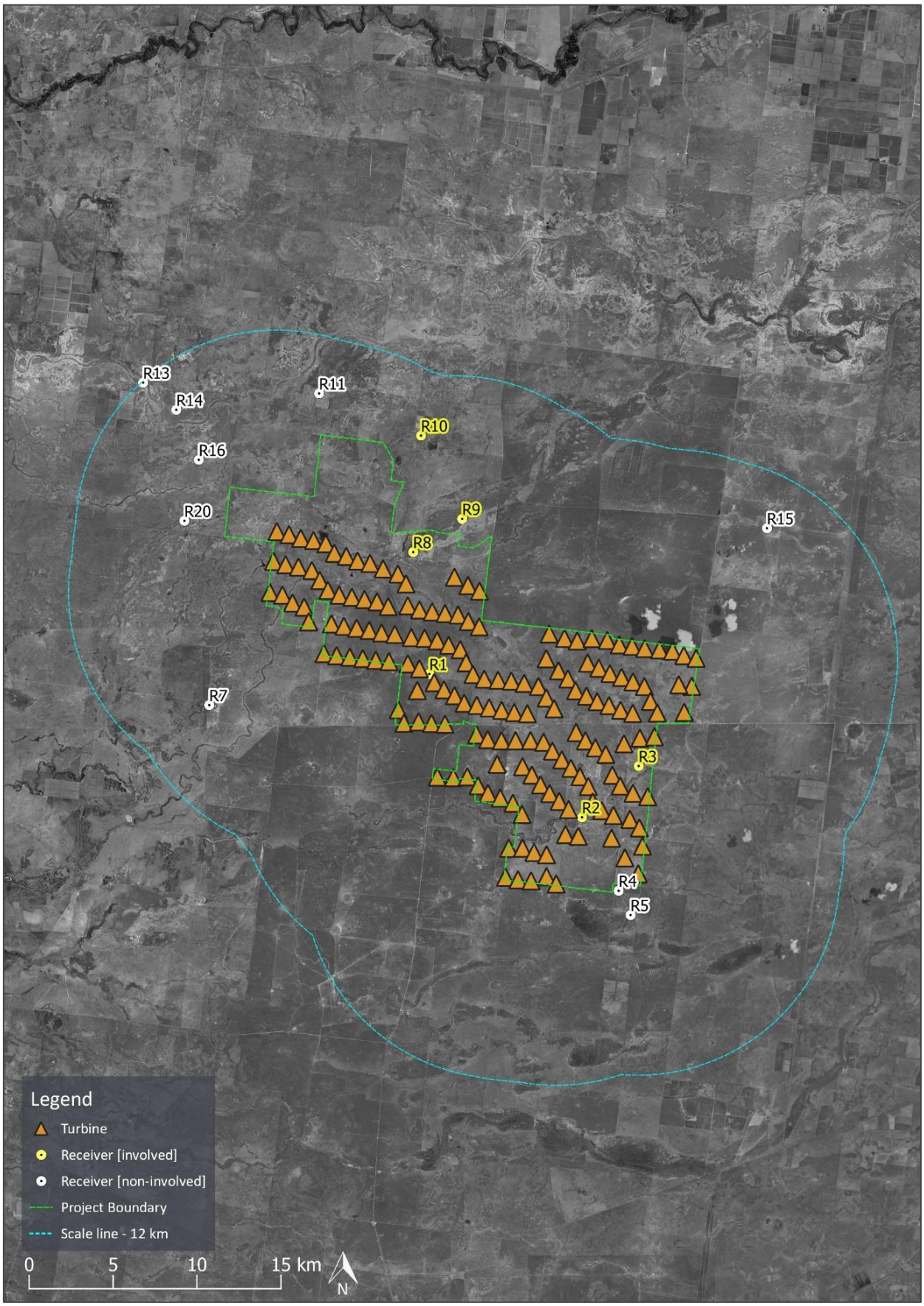
The following table sets out the fifteen (15) noise sensitive receivers located within 12 km of a proposed wind turbine and considered in the preliminary noise assessment, together with their respective distance to the nearest turbine. Data has been provided by the proponent.

Table 6: Receiver locations – GDA2020 MGA zone 55

Receiver ID	Easting, m	Northing, m	Terrain elevation, m	Distance to the nearest turbine, m
Involved receivers				
R1	331,075	6,144,898	100	619
R2	340,172	6,136,357	100	951
R3	343,549	6,139,413	100	1,604
R8	330,116	6,152,157	100	1,606
R9	333,033	6,154,138	100	3,511
R10	330,578	6,159,099	100	8,200
Non-involved receivers				
R4	342,355	6,131,980	100	1,562
R5	343,067	6,130,538	100	2,511
R7	317,963	6,143,043	95	7,495
R11	324,506	6,161,607	99	8,596
R13	314,024	6,162,254	95	11,926
R14	315,998	6,160,634	95	9,410
R15	351,193	6,153,582	105	8,827
R16	317,339	6,157,656	95	6,321
R20	316,480	6,154,022	95	5,554

APPENDIX D SITE LAYOUT PLAN

Figure 5: Proposed turbine locations and noise sensitive receivers



APPENDIX E NOISE PREDICTION MODEL

Environmental noise levels associated with wind farms are predicted using engineering methods.

The international standard ISO 9613-2 *Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO 9613-2) has been chosen as the most appropriate method to calculate the level of broadband A-weighted wind farm noise expected to occur at surrounding receptor locations. This method is the most robust and widely used international method for the prediction of wind farm noise.

The use of this standard is supported by international research publications, measurement studies conducted by Marshall Day Acoustics and direct reference to the standard in the South Australian EPA publication *Wind farms environmental noise guidelines*, NZS 6808:2010 *Acoustics – Wind farm noise* and AS 4959:2010 *Acoustics – Measurement, prediction and assessment of noise from wind turbine generators.*

The standard specifies an engineering method for calculating noise at a known distance from a variety of sources under meteorological conditions favourable to sound propagation. The standard defines favourable conditions as downwind propagation where the source blows from the source to the receiver within an angle of ±45 degrees from a line connecting the source to the receiver, at wind speeds between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground. Equivalently, the method accounts for average propagation under a well-developed moderate ground based thermal inversion. In this respect, it is noted that at the wind speeds relevant to noise emissions from wind turbines, atmospheric conditions do not favour the development of thermal inversions throughout the propagation path from the source to the receiver.

To calculate far-field noise levels according to the ISO 9613-2, the noise emissions of each turbine are firstly characterised in the form of octave band frequency levels. A series of octave band attenuation factors are then calculated for a range of effects including:

- Geometric divergence;
- Air absorption;
- Reflecting obstacles;
- Screening;
- Vegetation; and
- Ground reflections.

The octave band attenuation factors are then applied to the noise emission data to determine the corresponding octave band and total calculated noise level at receivers.

Calculating the attenuation factors for each effect requires a relevant description of the environment into which the sound propagation such as the physical dimensions of the environment, atmospheric conditions and the characteristics of the ground between the source and the receiver.

Wind farm noise propagation has been the subject of considerable research in recent years. These studies have provided support for the reliability of engineering methods such as ISO 9613-2 when a certain set of input parameters are chosen in combination. Specifically, the studies to date tend to support that the assignment of a ground absorption factor of G = 0.5 for the source, middle and receiver ground regions between a wind farm and a calculation point tends to provide a reliable representation of the upper noise levels expected in practice, when modelled in combination with other key assumptions; specifically all turbines operating at identical wind speeds, emitting sound levels equal to the test measured levels plus a margin for uncertainty (or guaranteed values), at a temperature of 10 ^{o}C and relative humidity of 70 % to 80 %, with specific adjustments for screening and ground effects as a result of the ground terrain profile.

In support of the use of ISO 9613-2 and the choice of G = 0.5 as an appropriate ground characterisation, the following references are noted:

- A factor of G = 0.5 is frequently applied in Australia for general environmental noise modelling purposes as a way of accounting for the potential mix of ground porosity which may occur in regions of dry/compacted soils or in regions where persistent damp conditions may be relevant
- In 1998, a comprehensive study (commonly cited as the Joule Report), part funded by the European Commission found that the ISO 9613-2 model provided a robust representation of upper noise levels which may occur in practice, and provided a closer agreement between predicted and measured noise levels than alternative standards such as CONCAWE and ENM. Specifically, the report indicated the ISO 9613 method generally tends to marginally over predict noise levels expected in practice.
- The UK Institute of Acoustics journal dated March/April 2009 published a joint agreement between practitioners in the field of wind farm noise assessment (the UK IOA 2009 joint agreement), including consultants routinely employed on behalf of both developers and community opposition groups, and indicated the ISO 9613-2 method as the appropriate standard and specifically designated G = 0.5 as the appropriate ground characterisation. This agreement was subsequently reflected in the recommendations detailed in the UK Institute of Acoustics publication *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* (UK Institute of Acoustics guidance). It is noted that these publications refer to predictions made at receiver heights of 4 m. Predictions in Australia are generally based on a lower prediction height of 1.5 m which tends to result in higher ground attenuation for a given ground factor, however conversely, predictions in Australia do not generally incorporate a -2 dB factor (as applied in the UK) to represent the relationship between L_{Aeq} and L_{A90} noise levels. The result is that these differences tend to balance out to a comparable approach and thus supports the use of G = 0.5 in the context of Australian prediction methodologies.

A range of measurement and prediction studies[2, 3, 4] for wind farms in which Marshall Day Acoustics' staff have been involved in have provided further support for the use of ISO 9613-2 and G = 0.5 as an appropriate representation of typical upper noise levels expected to occur in practice.

The findings of these studies demonstrate the suitability of the ISO 9613 method to predict the propagation of wind turbine noise for:

- the types of noise source heights associated with a modern wind farm, extending the scope of application of the method beyond the 30 m maximum source heights considered in the original ISO 9613-2;
- the types of environments in which wind farms are typically developed, and the range of atmospheric conditions and wind speeds typically observed around wind farm sites. Importantly, this supports the extended scope of application to wind speeds in excess of 5 m/s.

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[2] Bullmore, Adcock, Jiggins & Cand – *Wind Farm Noise Predictions: The Risks of Conservatism*; Presented at the Second International Meeting on Wind Turbine Noise in Lyon, France September 2007.

[3] Bullmore, Adcock, Jiggins & Cand – *Wind Farm Noise Predictions and Comparisons with Measurements*; Presented at the Third International Meeting on Wind Turbine Noise in Aalborg, Denmark June 2009.

[4] Delaire, Griffin, & Walsh – *Comparison of predicted wind farm noise emission and measured post-construction noise levels at the Portland Wind Energy Project in Victoria, Australia*; Presented at the Fourth International Meeting on Wind Turbine Noise in Rome, April 2011.

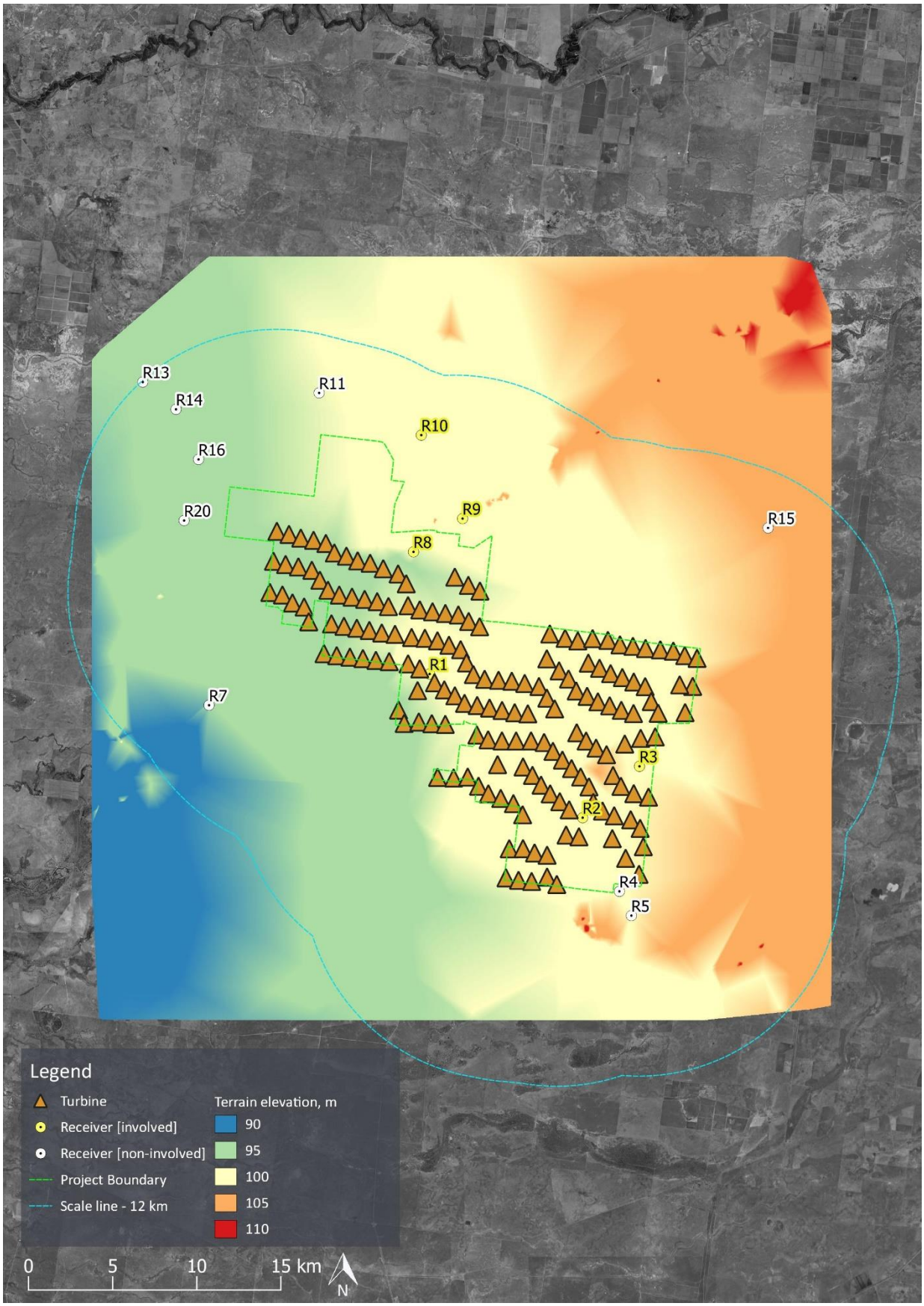
In addition to the choice of ground factor referred to above, adjustments to the ISO 9613-2 standard for screening and valleys effects are applied based on recommendations of the Joule Report, UK IOA 2009 joint agreement and the UK IOA Good Practice Guide. The following adjustments are applied to the calculations:

- screening effects as a result of terrain are limited to 2 dB
- screening effects are assessed based on each turbine being represented by a single noise source located at the maximum tip height of the turbine rotor
- an adjustment of 3 dB is added to the predicted noise contribution of a turbine if the terrain between the turbine and receiver in question is characterised by a significant valley. A significant valley is defined as a situation where the mean sound propagation height is at least 50 % greater than it would be otherwise over flat ground.

The adjustments detailed above are implemented in the wind turbine calculation procedure of the SoundPLAN 8.2 software used to conduct the noise modelling. The software uses these definitions in conjunction with the digital terrain model of the site to evaluate the path between each turbine and receiver pairing and then subsequently applies the adjustments to each turbine's predicted noise contribution where appropriate.

APPENDIX F SITE TOPOGRAPHY

Figure 6: Terrain elevation map for the Project and surrounding area



APPENDIX G TABULATED PREDICTED NOISE LEVEL DATA

Table 7: Predicted Noise Levels, dB L_{Aeq} (includes +1 dB allowance for measurement uncertainty) for receivers within 12 km of a wind turbine

Receiver	Hub-height wind speed (m/s)					
	5	6	7	8	9	≥10
Involved receivers						
R1	31.2	33.7	37.3	40.7	42.7	43.0
R2	28.9	31.4	35.0	38.4	40.4	40.7
R3	25.8	28.3	31.9	35.3	37.3	37.6
R8	22.7	25.2	28.8	32.2	34.2	34.5
R9	15.9	18.4	22.0	25.4	27.4	27.7
R10	10.6	13.1	16.7	20.1	22.1	22.4
Non-involved receivers						
R4	20.9	23.4	27.0	30.4	32.4	32.7
R5	16.4	18.9	22.5	25.9	27.9	28.2
R7	10.5	13.0	16.6	20.0	22.0	22.3
R11	8.5	11.0	14.6	18.0	20.0	20.3
R13	3.6	6.1	9.7	13.1	15.1	15.4
R14	5.8	8.3	11.9	15.3	17.3	17.6
R15	7.9	10.4	14.0	17.4	19.4	19.7
R16	9.1	11.6	15.2	18.6	20.6	20.9
R20	10.8	13.3	16.9	20.3	22.3	22.6

APPENDIX H C-WEIGHTING ASSESSMENT RESULTS

H1 Introduction

Presented below are details of the risk assessment carried out for the purpose of gauging whether penalties for low frequency, as detailed in the NSW Noise Assessment Bulletin, are applicable.

H2 Assessment requirement

The following excerpt concerning C-weighted wind turbine noise have been reproduced from NSW Noise Assessment Bulletin.

> ***Low Frequency Noise***
>
> *The presence of excessive low frequency noise (a special noise characteristic) [ie noise from the wind farm that is repeatedly greater than 65 dBC during day time or 60 dBC during the night-time at any relevant receiver] will incur a 5 dB(A) penalty, to be added to the measured noise level for the wind farm, unless a detailed internal low frequency noise assessment demonstrates compliance with the proposed criteria for the assessment of low frequency noise disturbance (UK Department for Environment, Food and Rural Affairs (DEFRA, 2005) for a steady noise source.*

H3 Prediction method

As stated in Section 2.4, there are no commonly used, practical methods to accurately predict the wind turbine low frequency noise levels at receptor locations.

In this case, the C-weighted noise levels at receptor locations have been estimated using a simplified approach which constitutes the same noise modelling methods as described above for A-weighted levels, but with the following modifications:

- The range of band frequencies has been expanded to include bands down to the 12.5 Hz frequency band
- The ground absorption parameter has been set to G = 0 (hard ground) to account for the increased influence of ground reflections at low frequencies.

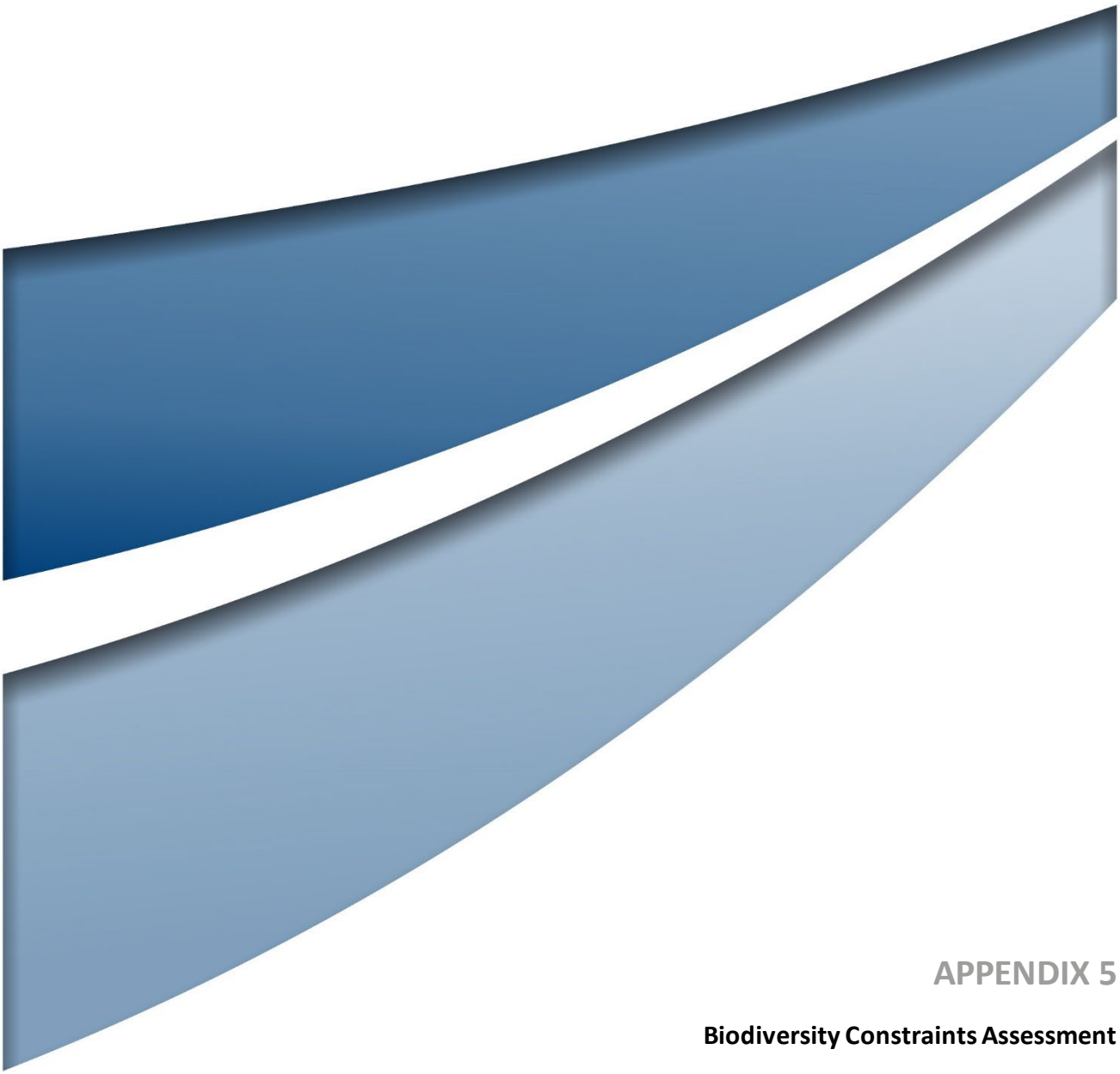
C-weighted noise levels have been predicted for the worst-case wind speed in terms of C-weighted levels being 15 m/s.

H4 Results

Table 8 presents the results of the preliminary C-weighted noise predictions for identified receivers within 12 km of a wind turbine.

Table 8: Predicted C-weighted noise levels

Receiver ID	dB L_{Ceq}
Involved receivers	
R1	61.5
R2	59.9
R3	58.1
R8	55.9
R9	52.1
R10	48.5
Non-involved receivers	
R4	53.3
R5	50.9
R7	48.2
R11	46.7
R13	42.9
R14	44.6
R15	46.6
R16	46.7
R20	47.6



APPENDIX 5

Biodiversity Constraints Assessment

umwelt
Environmental & Social Consultants

BayWa r.e.

BULLAWAH WIND FARM

Biodiversity Constraints Assessment

FINAL

September 2022

BULLAWAH WIND FARM

Biodiversity Constraints Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
BayWa r.e. Projects Australia Pty Limited

Project Director: Nathan Baker
Project Manager: Lauren Evans
Technical Director: Rachel Musgrave
Technical Manager: Larissa Abbott
Report No. 22110/R05
Date: September 2022

Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
01	Rachel Musgrave	15 June 2022	Nathan Baker	15 June 2022
02	Lauren Evans	23 September 2022	Nathan Baker	23 September 2022

Abbreviations

Abbreviation	Definition
AEMO	Australian Energy Market Operator
AGL	above ground level
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BayWa r.e.	BayWa r.e. Projects Australia Pty Ltd
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
BVMTT	Biodiversity Values Map Threshold Tool
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DoEWHA	Department of the Environment, Water, Heritage and the Arts
DoSEWPC	Department of Sustainability, Environment, Water, Population and Communities
DPE	NSW Department of Planning and Environment (current)
DPIE	NSW Department of Planning, Industry and Environment (superseded)
EAH	Environment Agency Head
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning & Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
FTE	full time equivalent
GDE	groundwater dependent ecosystem
GHG	greenhouse gas emissions
GW	gigawatt
IBRA	Interim Biogeographic Regionalisation for Australia
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LGA	Local Government Area
LLS Act	*Local Land Services Act 2013*
LLS Regulation	Local Land Services Regulation 2014
MNES	Matters of National Environmental Significance
MW	megawatts
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
NVMP	Native Vegetation (Multi Attribute)
NVR	Native Vegetation Regulatory

Abbreviation	Definition
PAH	Planning Agency Head
PCT	Plant Community Type
PMST	Protected Matters Search Tool
RES	Renewable Energy Systems
REZ	Renewable Energy Zone
SAII	Serious And Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SVTM	State Vegetation Type Map
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
TSC Act	*Threatened Species Conservation Act 1995*
Umwelt	Umwelt (Australia) Pty Limited

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Appendices

Appendix A Protected Matters Search Tool (PMST)

1.0 Introduction

1.1 Background

BayWa r.e. Projects Australia Pty Ltd (BayWa r.e.) propose to develop the Bullawah Wind Farm (the Project) to provide a reliable and affordable source of energy for the people of New South Wales (NSW) and contribute to reducing greenhouse gas (GHG) emissions associated with energy generation.

The Project is located approximately 28 km south east of Hay and in the Riverina region of south western NSW, within the Hay Shire, Murrumbidgee and Edward River Local Government Areas (LGA). It will include the installation, operation, maintenance and decommissioning of up to 170 wind turbines, Battery Energy Storage System (BESS) facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The current BayWa r.e. development design incorporates approximately 170 wind turbines, with a maximum blade-tip height of 300 m above ground level, and an installed capacity of up to 1,000 megawatts (MW) (1 gigawatt (GW)).

Umwelt (Australia) Pty Limited (Umwelt) was engaged by BayWa r.e. to prepare a Scoping Report for planning and environmental aspects of the Project, and in support of the proponent's request for the Secretary's Environmental Assessment Requirements (SEARs).

1.2 Purpose and Objectives

This biodiversity constraints assessment report has been prepared to document the outcomes of preliminary desk and field based investigations conducted for the Project. It aims to support the Scoping Report prepared by Umwelt, and more broadly the proponent's request for SEARs.

It presents vegetation and other biodiversity mapping established via searches of existing and publicly available resources and databases, and other environmental information accessible at the time the investigations were completed. These third party data, results or interpretations have been independently verified by Umwelt to the extent possible within the current scope and our analysis has been informed by 12 days (FTE) of preliminary site survey effort i.e. site visit conducted by two Umwelt ecologists over seven days from 3-9 May 2022.

It presents recommended next steps formed on the basis of anticipated requirements for a Project of this type and scale, and the investigations conducted to date. The assessment of constraints documented herein is preliminary only and any guidance is limited to potential impacts, any anticipated biodiversity assessment requirements and compliance obligations.

This report is not designed to achieve the legislative and statutory requirements of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Environmental Planning and Assessment Act 1979* (EP&A Act), *Biodiversity Conservation Act 2016* (BC Act) and other relevant legislation (refer **Section 1.4** of this report), however these requirements would be achieved in the future with the implementation of recommendations documented herein, and confirmation of these requirements following receipt of the SEARs.

1.2.1 Contributing Authors

This report was prepared by the following contributing authors:

- Gemma Hopkins – Environmental Consultant
- Joel Callaghan - Ecologist
- Lachlan Laurie – Senior Ecologist
- Larissa Abbott – Senior Ecologist
- Rachel Musgrave – Principal Ecologist
- Nathan Baker – Principal Environmental Consultant.

1.3 Project Overview

The Project is located approximately 28 km south east of Hay and in the Riverina region of south western NSW, within the Hay Shire, Murrumbidgee and Edward River LGAs. The Project Area is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km south west of the Project Area, population 7,862) and Griffith (88 km north east of the Project Area, population 27,300). Smaller townships of Darlington Point, Jerilderie and Coleambally are nearer to the Project.

While the exact Project boundaries are still being refined, the Project will take in an area mostly east of the Jerilderie, North Boundary and Willurah roads junction, either side of the Balranald to Darlington Point transmission line, and south of the Oolambeyan National Park. The Cobb Highway is situated ~20 km west of the Project Boundary (western most extent) and Conargo Road is ~8.5 km east of the Project Boundary (eastern most extent), while Jerilderie Road traverses the Project Area (north to south direction), until the intersection of North Boundary Road and Willurah Road. North Boundary Road crosses the middle section of Project Area (east to west direction), whilst Willurah Road is adjacent to the western side of the southern extent of the Project Boundary, running parallel in a north to south direction. The Sturt Highway (which goes through Hay) is directly north of the Project Boundary at a distance of >20 km.

The Project Area is zoned as RU1 Primary Production within the Hay Local Environment Plan (LEP) 2011, the Murrumbidgee LEP 2013 and Conargo LEP 2013. The majority of land that surrounds the Project is also zoned RU1 Primary Production, however the Oolambeyan National Park (directly north and adjacent to the Project Boundary) is zoned as E1 National Parks and Nature Reserves.

The indicative Project Boundary encompasses an area of approximately 33,000 hectares. The topography of the Project Area (all land within and including the Project Boundary) is relatively flat and homogenous ranging from between 90 and 100 m above sea level (ASL). The Project Area is dissected by a number of larger waterways namely Abercrombie and Eurolie Creek in the north and Coleambally Outfall Drain in the south. The Project is located ~420 km from the Port of Melbourne (closest port to Project) and ~850 km from the Port of Newcastle (farthest port from the Project). Transportation access to the Project would be provided via the existing public road network and BayWa r.e. is currently considering multiple port, transportation and access route options. Preferred options are to be selected following feasibility and logistics studies, and during the detailed design stages of the development.

1.3.1 South-West Renewable Energy Zone (REZ)

The NSW Government's 'Electricity Strategy' and 'Electricity Infrastructure Roadmap' set out a plan to deliver the state's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast and Illawarra regions. This builds on the 'NSW Transmission Infrastructure Strategy' and supports the implementation of the Australian Energy Market Operator's (AEMO's) 'Integrated System Plan'.

The South-West REZ was chosen due to an abundance of high-quality solar resources, proximity to Project EnergyConnect, relative land-use compatibility, and a strong pipeline of proposed projects. EnergyCo NSW is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping the proposed Project is within the boundaries of the REZ. **Figure 1.1** shows the current proposed REZ.

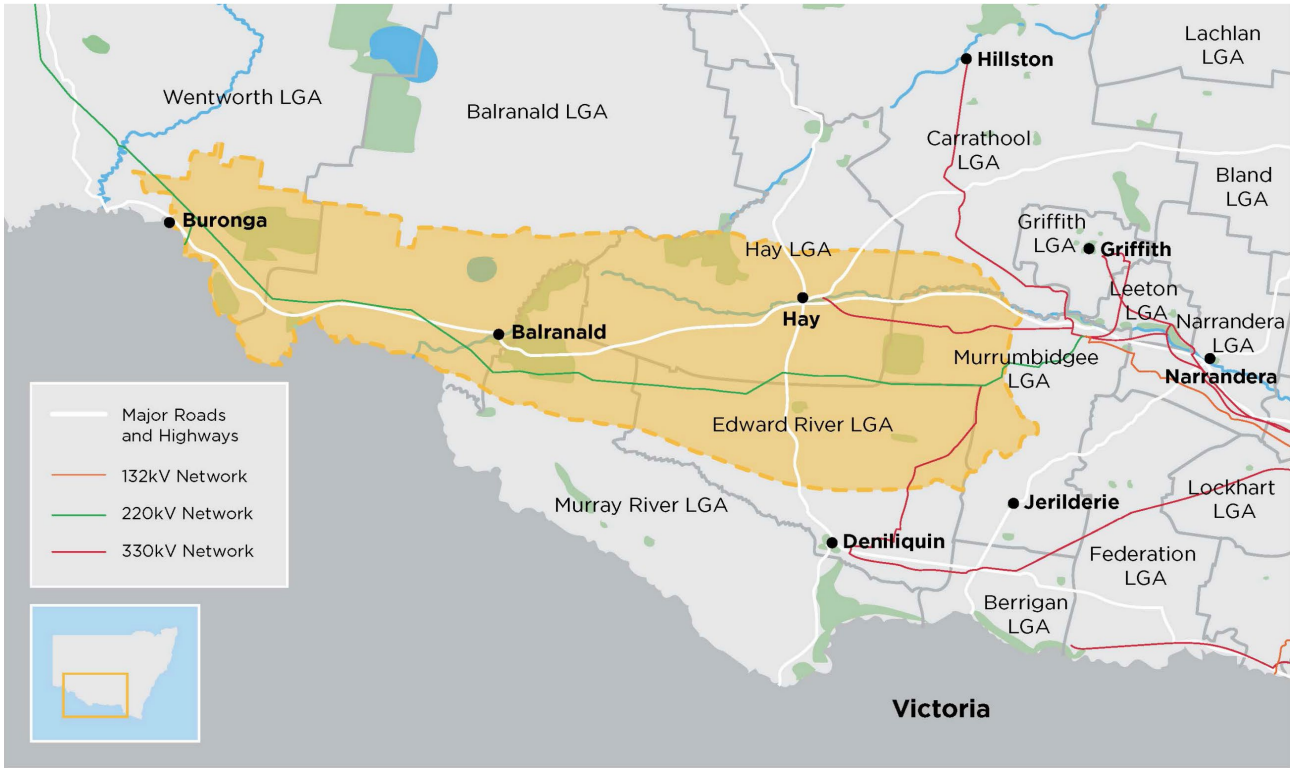


Figure 1.1 South-West Renewable Energy Zone

The Project Boundary is entirely within the South-West REZ. There are various other renewable projects currently operational in the REZ, including Darlington Point Solar Farm, Coleambally Solar Farm and Lang's Crossing Solar Farm. In addition, Hay Solar Farm has been approved, with various other projects in the planning phase including the Burrawong Wind Farm and Coleambally Battery Energy Storage System (BESS).

1.3.2 Indicative Project Design

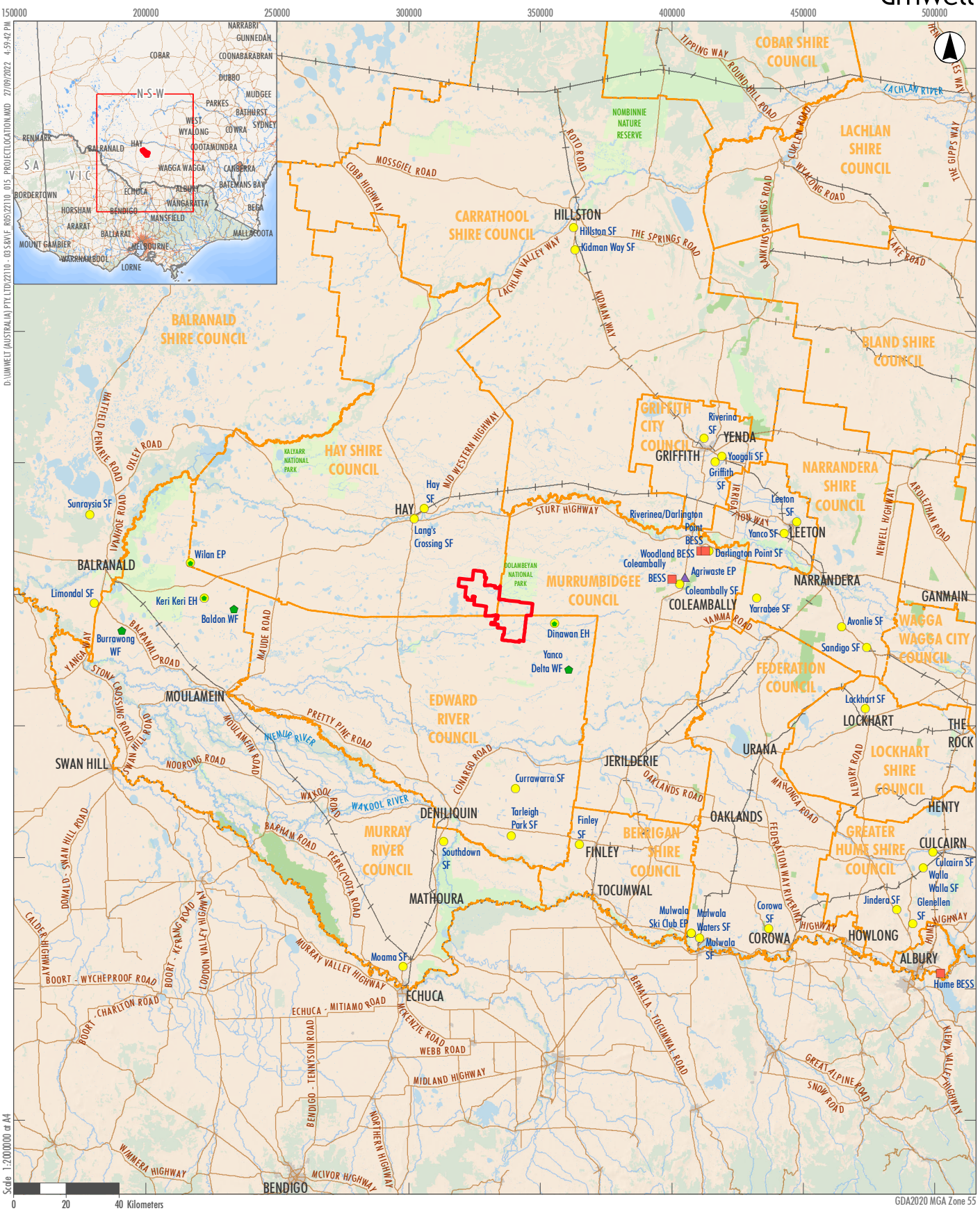
The Project will include the installation, operation, maintenance and decommissioning of up to 170 wind turbines, BESS facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The current BayWa r.e. development design incorporates up to 170 wind turbines (with a maximum blade-tip height of 300 m above ground level (AGL)) with an installed capacity of up to 1,000 MW (1 GW).

The key components of the Project include:

- ~170 (3 blade) wind turbines, with a maximum blade-tip height of 300 metres (m) above ground.
- Power infrastructure providing connection to Project EnergyConnect i.e. on-site substations/switchyards to connect the proposed wind turbines to the South-West REZ transmission line, that runs through the Project Area.
- Internal electrical reticulation network i.e. electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings.
- A single grid-scale BESS (~500 MW, up to four-hour battery).
- Temporary and permanent meteorological monitoring masts.
- Temporary construction facilities including:
    - construction compound/s and site office buildings and storage areas
    - on-site concrete batching plants for use during the construction phase
    - laydown areas used for wind turbine installation and storage of wind turbine components.
- Targeted road network upgrades to facilitate delivery of wind turbine components to the Project Area as required.
- Provision for a temporary accommodation camp on site (if required).

The South-West REZ is relatively undeveloped, but there is substantial commercial interest in the area, such that there are several other renewable energy developments in the vicinity of the Project, most at the early stages of the planning and approvals pathway. Other new and nearby renewable energy projects include, but are not limited to, the Dinawan Energy Hub (~10 km east of the Project, being developed by Spark Renewables), the Yanco-Delta Wind Farm (~16 km south-east of the Project, being developed by Virya Energy), and then Baldon Wind Farm, Keri Keri Renewable Energy Hub, Wilan Energy Park and Burrawong Wind Farm (each >50 km from the Project) as well as The Plains Renewable Energy Park (south of Hay, precise location yet to be announced). Other new renewable energy projects in the South-West REZ are anticipated.

The Project's regional context, indicative layout, land-use zoning and other relevant features are identified in **Figure 1.2** to **Figure 1.4**.



Legend

- Project Boundary
- Local Government Areas
- Major Roads
- Railway
- Hydro Areas
- Watercourses
- State Forest
- NPWS Estate

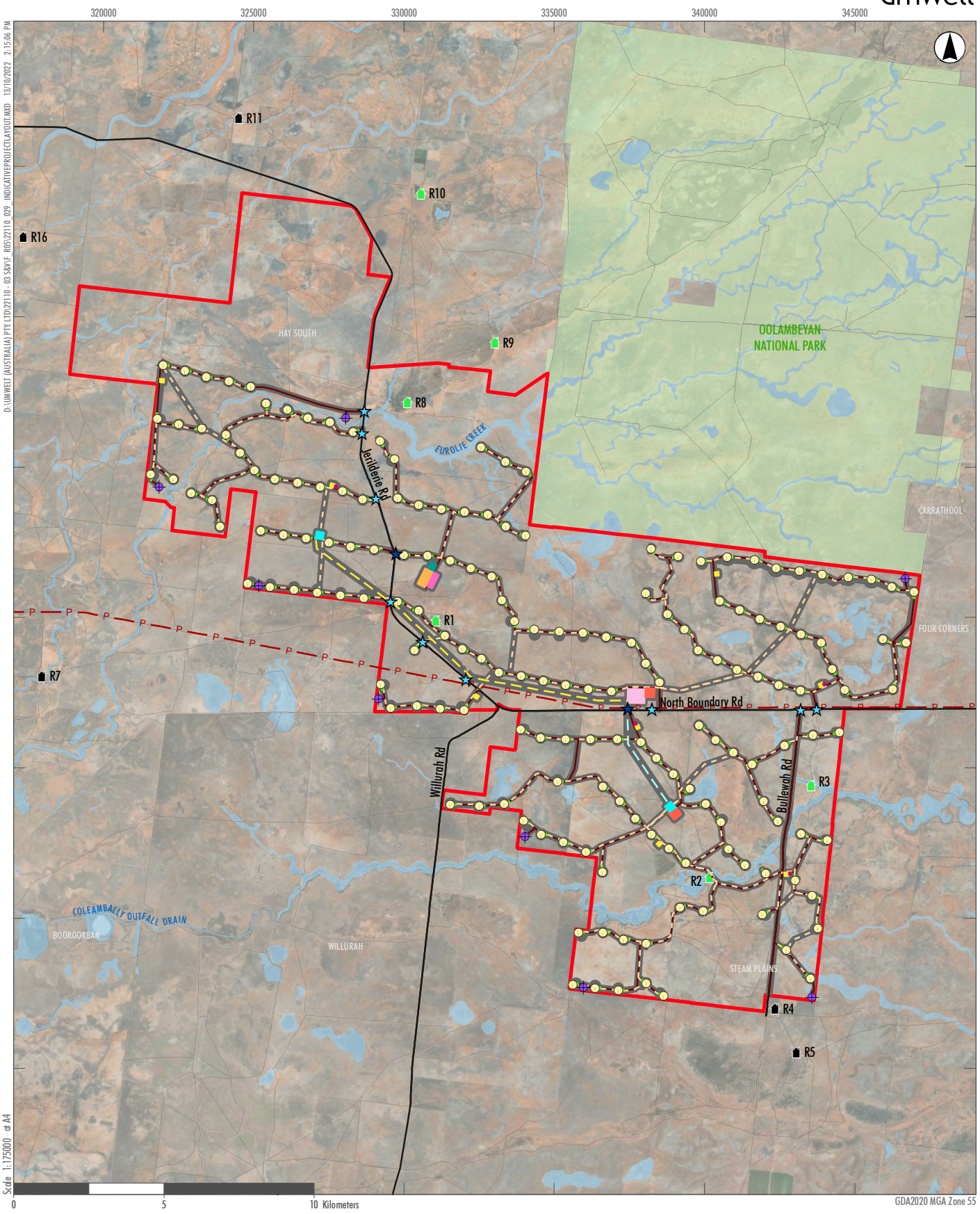
South-West REZ Renewable Projects

- Battery Energy Storage System (BESS)
- Bioenergy
- Renewable Energy Hub (EH)/Energy Park (EP)
- Solar Farm (SF)
- Wind Farm (WF)

FIGURE 1.2

Regional Context

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Indicative Development Area
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Main Site Entry
- Secondary Site Entry
- Existing 220kV Electricity Transmission Line
- Public Roads
- NPWS Estate

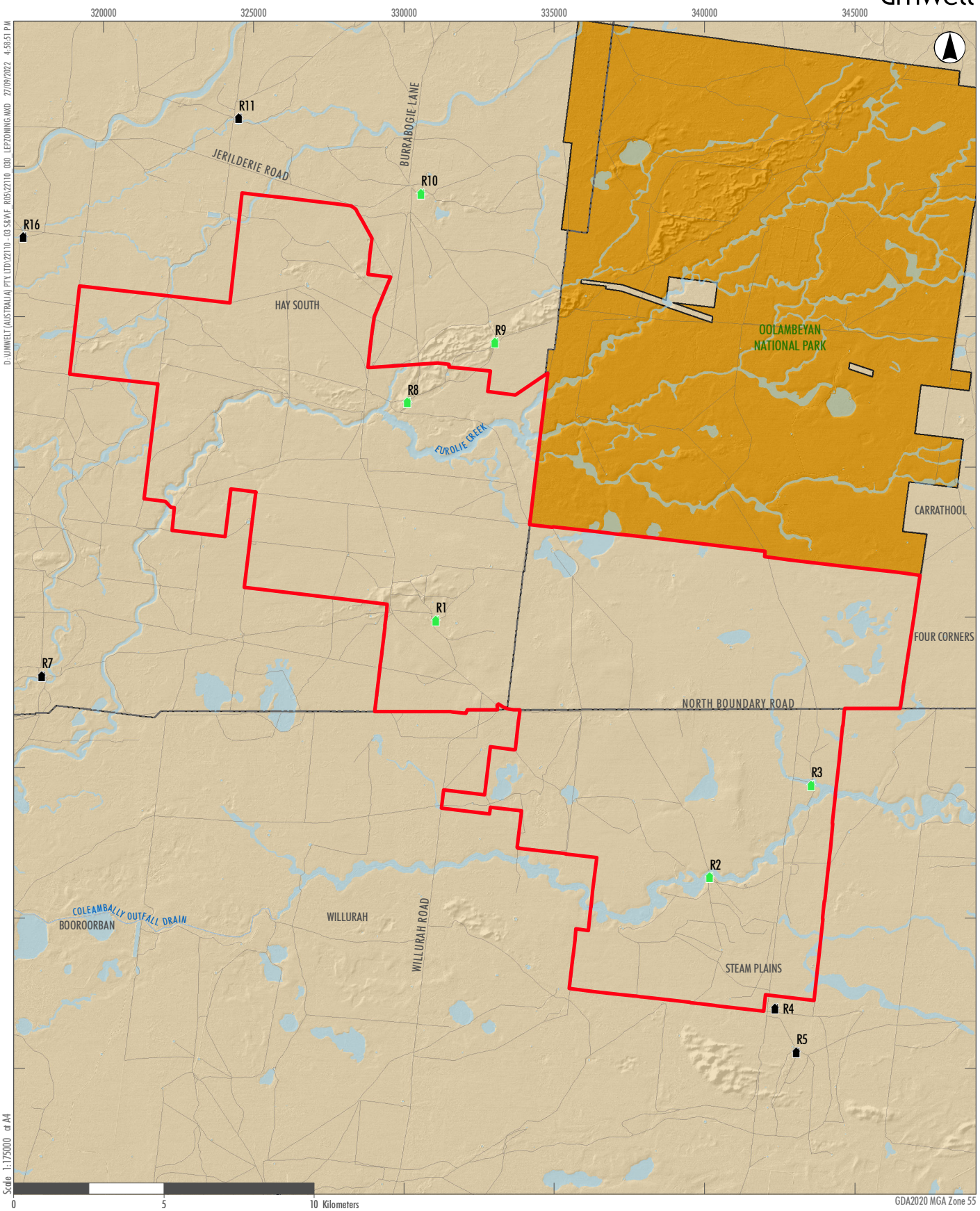
Project Infrastructure

- Internal 330kV Transmission Line (Central to South)
- Internal 330kV Transmission Line (North to Central)
- Cable Route
- Access Tracks
- Permanent Meteorological Masts
- Collector Substation
- Conceptual Temporary Accommodation Camp
- Hardstands
- Main Substation including BESS
- Operation and Maintenance Building
- Main Temporary Construction Compound
- Main Temporary Laydown
- Temporary Construction Compound
- Temporary Satelitte Laydown

FIGURE 1.3

Preliminary Layout

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Road
- Watercourse

Local Environment Plan - Land Zoning

Hay (2011), Murrumbidgee (2013), Conargo (2013)

- E1 National Parks and Nature Reserves
- RU1 Primary Production

FIGURE 1.4

Land Use Zoning

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

1.4 Statutory Considerations

Commonwealth and State Legislation relevant to this biodiversity constraints assessment report is described in **Table 1.1.**

Table 1.1 Legislation relevant to the project

Relevant legislation	Governing Agency	Summary
Commonwealth legislation		
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's primary piece of environmental legislation and is administered by the Australian Government – DCCEEW. It is designed to protect national environmental assets, known as matters of national environmental significance (MNES), which include threatened species of flora and fauna, endangered ecological communities, and migratory species, as well as other protected matters. It defines the categories of threat for threatened flora and fauna, identifies key threatening processes and provides for the preparation of recovery plans for threatened flora, fauna, and communities. Actions that may adversely affect MNES may be deemed to be a controlled action under the EPBC Act. The significance of the proposed action on MNES can be determined through self-assessment using *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (Department of the Environment, Water, Heritage and the Arts, 2013). A referral is required for proposed actions that may affect nationally listed threatened species, threatened ecological communities, and migratory species. In accordance with the Bilateral Agreement reached between the NSW and Commonwealth Governments, an Environmental Impact Statement (EIS) under the NSW *Environmental Planning & Assessment Act 1979* (EP&A Act, see below) for State Significant Development (SSD) can also be used for an EIS under the EPBC Act. This is possible for a "controlled action" and if directed by the Commonwealth Minister.
State legislation		
Environmental Planning and Assessment Act 1979 (EP&A Act)	Department of Planning and Environment (DPE)	The *Environmental Planning & Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats of biodiversity values as listed in the *Biodiversity Conservation Act 2016* (BC Act) and NSW *Fisheries Management Act 1994* (FM Act). The EIS anticipated to be prepared for the Project will meet the necessary environmental assessment requirements under the relevant provisions of the EP&A Act.

Relevant legislation	Governing Agency	Summary
Biodiversity Conservation Act 2016 (BC Act)	DPE – Biodiversity and Conservation Division (BCD)	The BC Act and its supporting regulations commenced on 25 August 2017. The BC Act repealed the *Threatened Species Conservation Act 1995* (TSC Act) along with other natural resource management legislation, while retaining the TSC Act species list. The BC Act sets out the environmental impact assessment framework for threatened species, threatened ecological communities and Areas of Outstanding Biodiversity Value (formerly critical habitat) for Major Projects, Part 5 activities, and local development. Sections 7.9 of the BC Act requires that an application of development under Part 4 of the EP&A Act for SSD must be accompanied by a Biodiversity Development Assessment Report (BDAR) prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM) (DPIE, 2020), unless Planning Agency Head (PAH) and the Environment Agency Head (EAH) determine that the proposed development is not likely to have any significant impact on biodiversity values. The potential impacts associated with the Project are such that the PAH and EAH will likely consider them significant, and a BDAR be required.
National Parks and Wildlife Act 1974 (NPW Act)	DPE	The *National Parks and Wildlife Act 1974* (NPW Act) provides for the protection of Aboriginal sites and designated conservation areas as well as the flora and fauna within conservation areas. There are no conservation areas declared under the NPW Act that are within Project Area, however the Oolambeyan National Park is adjacent to Project Boundary in the northern section of the wind farm. The objective of the NPW Act is to consolidate and amend the law relating to the establishment, preservation and management of national parks, historic sites, certain other areas, and the protection of certain fauna, native plants and Aboriginal objects.
Fisheries Management Act 1994 (FM Act)	Department of Primary Industries (DPI)	The objectives of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. More detailed objectives relevant to the Project include: • to conserve fish stocks and key fish habitats • to conserve threatened species, populations and ecological communities of fish and marine vegetation • to promote ecologically sustainable development, including the conservation of biological diversity.

Relevant legislation	Governing Agency	Summary
Local Land Services Act 2013 (LLS Act)	Local Land Services (LLS)	The *Local Land Services Act 2013* (LLS Act), supported by the Local Land Services Regulation 2014 (LLS Regulation), established 11 regional Local Land Services organisations to provide biosecurity, natural resources management and agricultural advisory services. Under Part 5A of the LLS Act and the supporting regulation, a Native Vegetation Regulatory (NVR) map showing the extent of categorised land in NSW is to be published by the EAH. The NVR map underpins the legislative framework for native vegetation clearing in rural areas by categorising land in NSW. However, the map applies only to the following zones (if they are not in an excluded LGA): Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU5 Primary Production Small Lots and Zone RU6 Transition. Currently, various map categories have been released under staged transitional arrangements. The online NVR map viewer currently displays a) Excluded Land, b) Category 2 – Vulnerable Land and c) Category 2 – Sensitive Land. Category 1 – Exempt Land and Category 2 – Regulated Land maps have not yet been released. During the transition period landholders must determine if their land is Category 1 or Category 2 under the LLS Act.
Biosecurity Act 2015	DPI	The *Biosecurity Act 2015* replaced the *Noxious Weeds Act 1993* on 1 July 2017. The Biosecurity Act is a wide-ranging legislation that outlines the requirements of government, councils, private landholders, and public authorities in the management of biosecurity matters. Priority weeds are regulated under the Biosecurity Act with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Some priority weeds have additional management obligations which may apply generally, or under specific circumstances. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as is reasonably practicable.
State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP 2021)	DPE	The Koala SEPP 2021 was created under the EP&A Act and commenced on 17 March 2021. The Koala SEPP 2021 reinstates the policy framework of SEPP Koala Habitat Protection 2019 for most land zone types. For all RU1 (Primary Production), RU2 (Rural Landscape) or RU3 (Forestry) zoned land outside of the Sydney Metropolitan Area and Central Coast, SEPP Koala Habitat Protection 2020 continues to apply, though it does not establish any specific obligations or considerations for SSD. The Koala SEPP 2021 aims to: • Help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process. • Provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

2.0 Methodology

2.1 Desktop Assessment

A review of relevant public databases and literature was undertaken to identify threatened and migratory species, endangered populations, threatened ecological communities (TECs) and their habitats that have previously been recorded within the locality (a 30 km radius around the Project Area). Threatened species, migratory species, endangered populations and TECs (listed under BC Act and EPBC Act) that have the potential to occur within the locality were also considered based on the type of habitat present and the NSW bioregion within which the Project Area occurs.

Databases and literature reviewed as part of this ecological assessment include:

- a search of the DPE BioNet Atlas based on a 30 km radius around the Project Area
- a search of the DCEEW Protected Matters Search Tool (PMST) based on a 30 km radius around the Project Area
- BioNet Threatened Biodiversity Data Collection (TBDC)
- BioNet Vegetation Classification
- the Biodiversity Values Map Threshold Tool (BVMTT)
- DPE's Important Habitat Mapping
- a search of the National Flying-fox monitoring viewer accessed by the DCCEEW Interactive Flying-fox Web Viewer.
- eSpade 2.1 spatial viewer system (eSpade 2022).

2.2 Vegetation Mapping

Two sets of regional vegetation mapping were considered to inform the assessment of the vegetation communities present within the Project Area:

- NSW State Vegetation Type Map (SVTM) – Riverina v1.1.0, VIS_ID 4469 (DPE 2019)
- NVMP Hay Vegetation Map. VIS_ID 4153 (DPE 2015).

While useful in identifying broad vegetation formations and classes potentially occurring on site, NVMP Hay Vegetation Map (VIS_ID 4153) (DPE 2015) does not classify vegetation to Plant Community Type (PCT). The NSW State Vegetation Type Map (SVTM) – Riverina v1.1.0 (VIS_ID 4469) (DPE 2019) does classify vegetation to PCT and was therefore adopted as baseline mapping.

2.3 Site Visit

The site visit was conducted by two Umwelt ecologists over seven days from 3-9 May 2022, resulting in a total of 12 days (FTE) of preliminary site survey effort. Each of the survey days were approximately ten hours in duration, resulting in approximately 120 hours of survey effort.

The ecologists inspected the Project Area to verify the baseline vegetation mapping and record observations of any TECs and any threatened and migratory species habitat. Incidentally observed threatened species and general ecological features – such as waterbodies – were also recorded.

Rapid data assessments were undertaken across the development site to:

- Record the flora species occurring and to capture the structural variation in vegetation communities.
- Record the variation in species diversity across.
- define changes in abiotic conditions (the occurrence of creek lines and past disturbances).

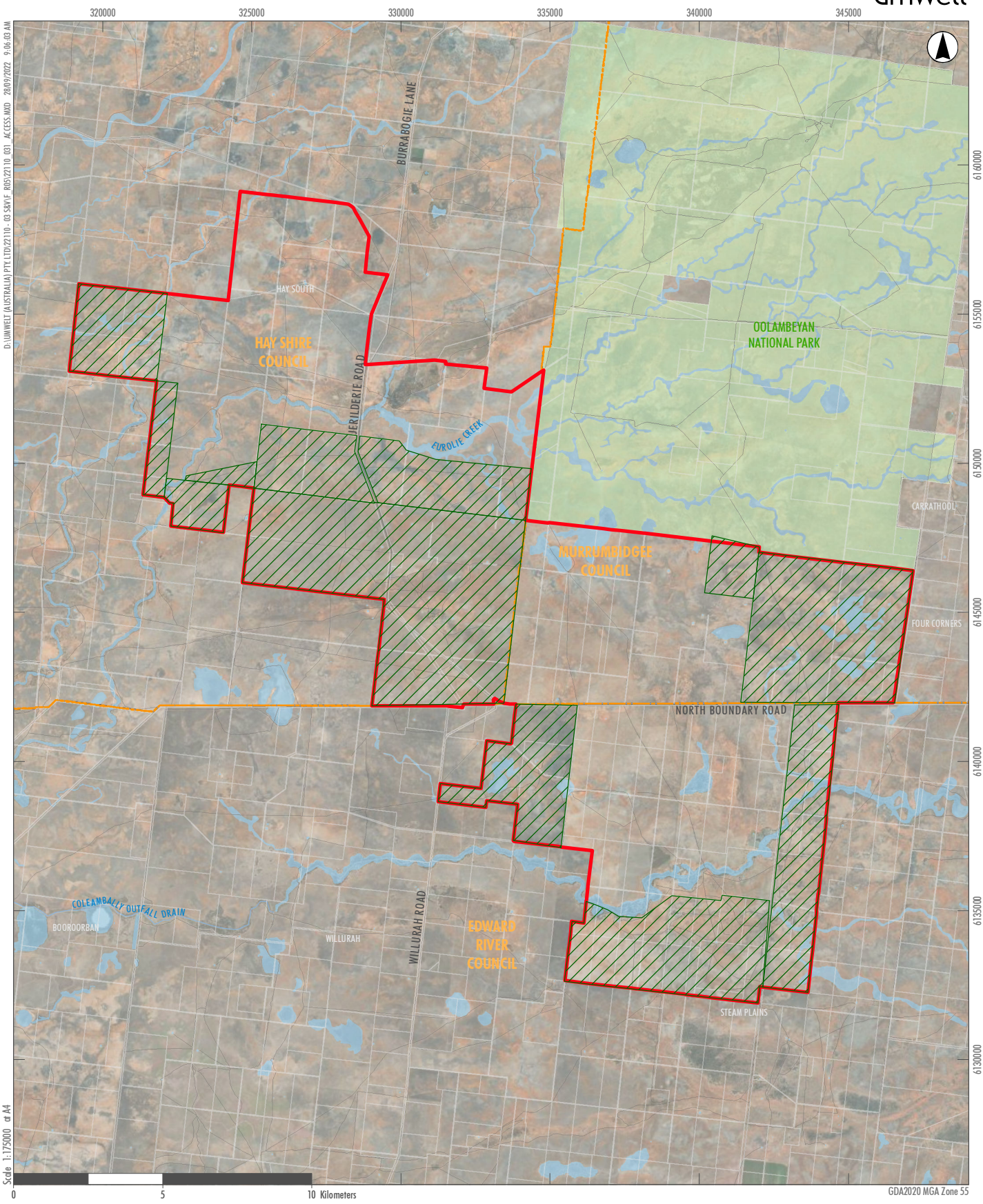
The presence of fauna habitat within the Project Area was also noted. Specific attention was paid to the potential occurrence of semi-permanent waterbodies, creek lines, rocky outcrops and presence of hollow bearing trees.

2.3.1 Limitations and Constraints

During the site survey portions of the Project Area were inaccessible due to some paddocks containing lambing ewes. Paddocks containing lambing ewes were concentrated in the north of the Project Area on both sides of Jerilderie Road, and in the east of the Project Area on both sides of North Boundary Road.

Existing desktop information has been used to assess the biodiversity values occurring in these paddocks.

Access across the Project Area during the site visit is shown in **Figure 2.1.**



Legend

- Project Boundary
- Land Access
- Local Government Areas
- NPWS Estate

FIGURE 2.1

Project Area Access

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

3.0 Existing Environment

3.1 Landscape Context

The landscape context which describes attributes that are potentially relevant to the biodiversity occurring in the Project Area is outlined in **Table 3.1** and shown on **Figure 3.1** below.

Table 3.1 Landscape features of the Project Area

Landscape features	Landscape context
IBRA region	Riverina IBRA Region
IBRA subregion	Murrumbidgee IBRA Sub-region
NSW (Mitchell) Landscapes	• Murrumbidgee Channels and Floodplains • Murrumbidgee Depression Plains • Murrumbidgee Lakes, Swamps and Lunettes • Murrumbidgee Scalded Plains • Murrumbidgee Source-bordering Dunes
Land tenure, parks and reserves	• Oolambeyan National Park • Private freehold • Crown land • Public roads and infrastructure
Rivers, stream and estuaries	Coleambally Creek, Eurolie Creek, Nyangay Creek and Abercrombie Creek are the three named waterways occurring in the Project Area. Smaller unnamed creeks and estuaries also occur/cross the Project Area.
Wetlands (within, adjacent to and downstream)	The Commonwealth Government's PMST does not identify any wetlands of international importance within 200 km of the Project Area. The Murrumbidgee catchment includes several floodplains and wetlands, including the mid-Murrumbidgee River Wetlands. The Mid Murrumbidgee Wetlands are of national importance, located along the Murrumbidgee River between Narrandera and Carrathool, approximately 25 km north of the Project Area.
Areas of geological significance or soil hazard features	The Murrumbidgee IBRA Sub-region is characterised by an alluvial fan with distributary channels and floodplains, undulating plains with depressions. Source-bordering dunes are common. No areas of acid sulfate soil risk occur within the Project Area.
Connectivity	There are patches of Black Box Woodland and Callitris Mixed Woodland that traverse the Project Area. Several of these patches follow the contours of Eurolie Creek and Coleambally Creek and may provide connectivity between fragmented terrestrial habitat.

3.2 Biodiversity Values Map

The Biodiversity Values (BV) map identifies land with high biodiversity value that is especially sensitive to impacts from development and clearing. Land types included on the BV include:

- coastal wetlands and littoral rainforest mapped under the State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP)
- core koala habitat identified in a plan of management under State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44)
- declared Ramsar wetlands defined by the EPBC Act
- land containing threatened species or threatened ecological communities identified as potential serious and irreversible impacts (SAII) under section 6.5 of the BC Act
- biodiverse riparian land
- high conservation value grasslands or groundcover
- old growth forest identified in mapping developed under the National Forests Policy Statement but excluding areas not meeting the criteria published jointly by the Minister of the Environment and the Minister for Primary Industries
- rainforest identified in mapping developed under the National Forests Policy Statement but excluding areas not meeting the criteria published jointly by the Minister for Energy and Environment and the Minister for Primary Industries
- declared areas of outstanding biodiversity value
- council nominated areas with connectivity or threatened species habitat that the Minister for Energy and Environment considers will conserve biodiversity at bioregional or state scale
- any other land that in the opinion of the Environment Agency Head is of sufficient biodiversity value to be included.

Areas within the Project Boundary identified on the BV Map are shown in **Figure 3.2** include biodiverse riparian land, and threatened species or communities with the potential for serious and irreversible impact.

3.3 Important Habitat Mapping

For a small number of threatened species as detailed within the TBDC, Section 5.1.3 of the Biodiversity Assessment Method (BAM) allows for important habitat maps. Important habitat maps identify areas that are considered essential to support critical life stages of the species, for example breeding areas or locations important for foraging or over-wintering for migratory species. Currently, important habitat maps are provided for the following species:

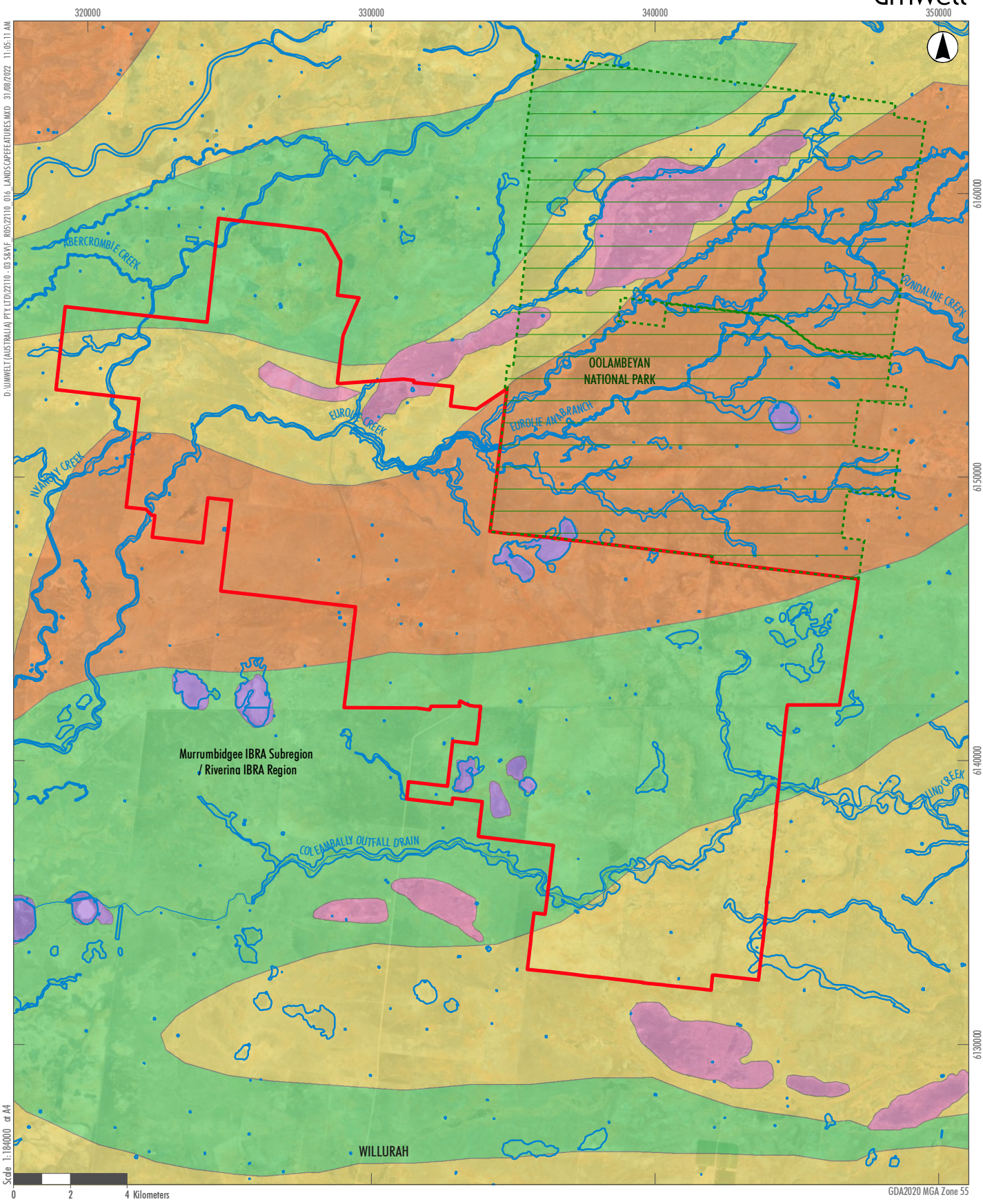
- Swift Parrot (*Lathamus discolor*)
- Plains-wanderer (*Pedionomus torquatus*)

- Regent Honeyeater (*Anthochaera phrygia*)
- Migratory Shorebirds.

Important habitat mapping for the Swift Parrot (*Lathamus discolor*), Regent Honeyeater (*Anthochaera phrygia*) and Migratory Shorebirds are not present within the Project Area. Important habitat mapping for the Plains-wanderer (*Pedionomus torquatus*) is present within the Project Area as shown in **Figure 3.3** below.

Impacts to mapped important habitat for Plains-wanderer may be considered Serious and Irreversible (SAII), which is a central component of the NSW Biodiversity Offsets Scheme. It is fundamentally about protecting threatened species and threatened ecological communities that are most at risk of extinction from potential development impacts or activities. The BC Act and the LLS Act impose various obligations on decision-makers in relation to impacts on biodiversity values that are at risk of a SAII. These obligations generally require a decision-maker to determine whether or not any of the residual impacts of a proposed development, activity, biodiversity certification or vegetation clearing on biodiversity values (that is, the impacts that would remain after any proposed avoid or mitigate measures have been taken) are serious and irreversible. To assist a decision-maker with this task, the BC Act (and the Biodiversity Regulation 2017 (BC Regulation)) provides a framework to make this determination. The framework consists of a series of principles defined in the BC Regulation and supporting guidance, provided for under section 6.5 of the BC Act, to interpret these principles.

Umwelt acknowledge the importance of SAII and recommend the matter is progressed during future stages of the approvals pathway, and in accordance with all relevant legislation. Further information, in the context of this biodiversity constraints assessment, is however provided in **Section 3.5**, **Section 3.6** and **Section 5.0** of this report.



Legend

- Project Boundary
- Water Body
- Drainage Line
- National Parks (NPWS Estate)

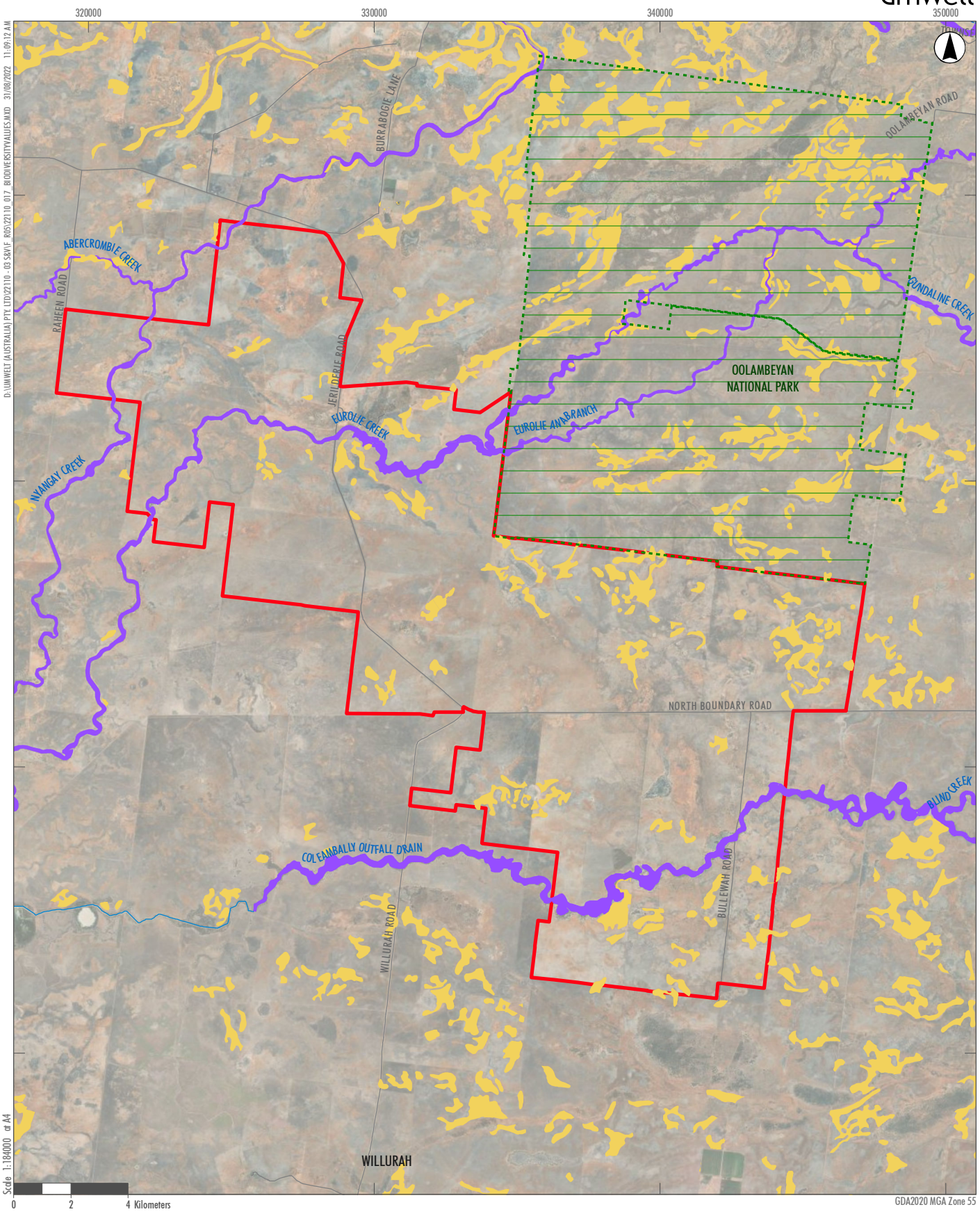
NSW (Mitchell) Landscape

- Murrumbidgee Channels and Floodplains
- Murrumbidgee Depression Plains
- Murrumbidgee Lakes, Swamps and Lunettes
- Murrumbidgee Scalded Plains
- Murrumbidgee Source-bordering Dunes

FIGURE 3.1

Landscape features within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019)



Legend

- Project Boundary
- Road
- Drainage Line
- National Parks (NPWS Estate)

Biodiversity Values

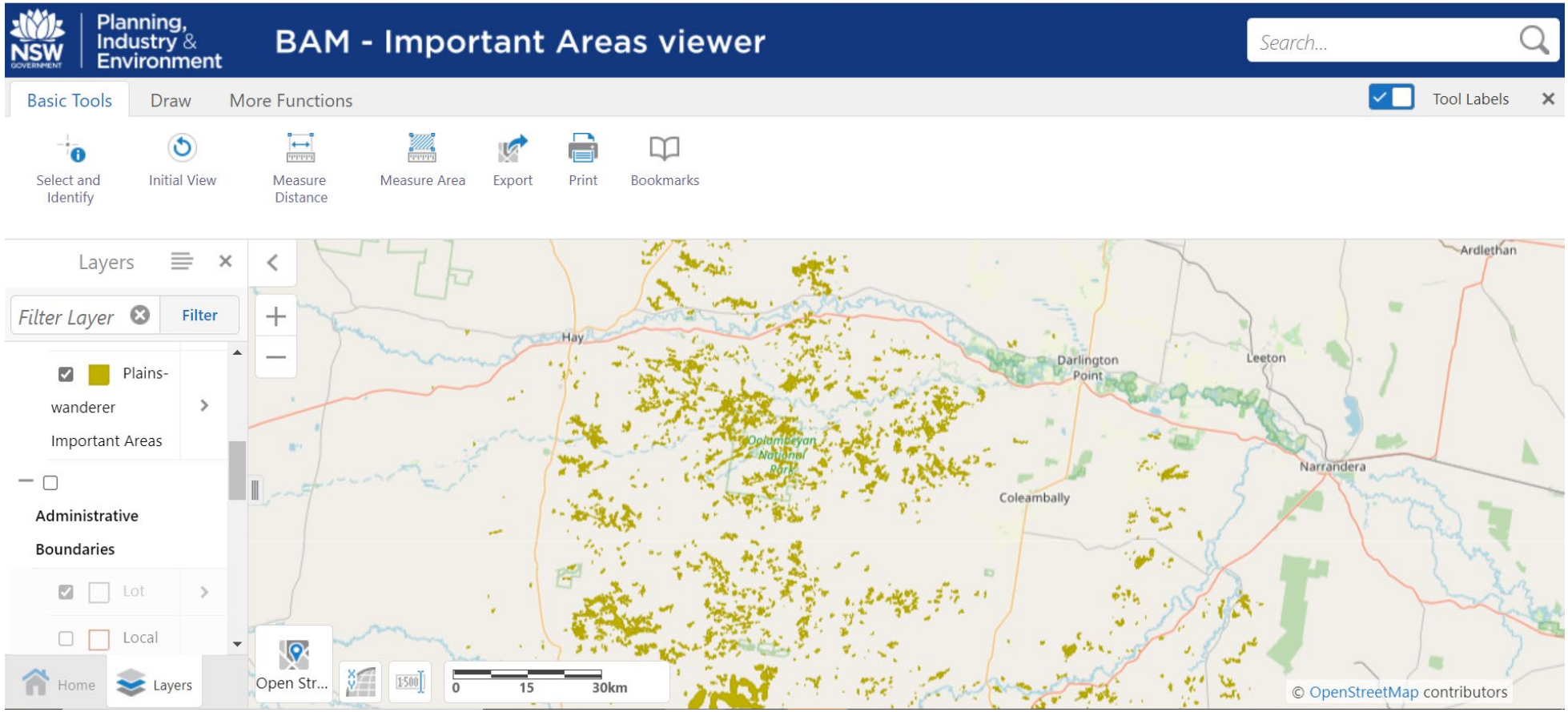
- Biodiverse riparian land
- Threatened species or communities with potential for serious and irreversible impacts

FIGURE 3.2

Biodiversity Values mapped within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019), © State Government of NSW and Department of Planning and Environment 2018

Figure 3.3 Important Habitat Mapping



3.4 Potential Vegetation Communities

3.4.1 Plant Community Types

The baseline vegetation mapping (NSW State Vegetation Type Map (SVTM) – Riverina v1.1.0) identified 20 Plant Community Types (PCTs) within the Project Area, refer to **Table 3.2**.

The site visit confirmed the likely occurrence of these PCTs however their distribution across the Project Area differed to that depicted in the baseline mapping (refer **Figure 3.4** of this report).

The most significant difference between the baseline vegetation mapping and what was observed on site was the distribution of PCT: 28 - White Cypress Pine open woodland of sand plains: prior streams and dunes mainly of the semi-arid (warm) climate zone. The site visit identified that the distribution of this PCT was less extensive than the distribution depicted in the baseline mapping.

It should be noted that this mapping is preliminary and would require further surveys as part of any biodiversity assessment carried out as part of an Environmental Impact Assessment (EIA), in this case the EIS prepared as part of the SSD planning approvals process.

Table 3.2 Plant Community Types and potential threatened ecological community associations

Plant Community Type		BC Act	EPBC Act	Area (Ha) within Project Area
-	Non-native vegetation	-	-	861.70
1	PCT: 7 - River Red Gum - Warrego Grass - herbaceous riparian tall open forest wetland mainly in the Riverina Bioregion	-	-	4.50
2	PCT: 9 - River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion	-	-	0.60
3	PCT 10: River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	319.78
4	PCT: 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	9.20

Plant Community Type		BC Act	EPBC Act	Area (Ha) within Project Area
5	PCT 13: Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	233.70
6	PCT: 15 - Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	3.47
7	PCT 17: Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	-	-	1,726.22
8	PCT: 24 - Canegrass swamp tall grassland wetland of drainage depressions: lakes and pans of the inland plains	-	-	137.89
9	PCT: 26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Weeping Myall Woodlands	473.58
10	PCT: 28 - White Cypress Pine open woodland of sand plains: prior streams and dunes mainly of the semi-arid (warm) climate zone	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion	-	3,307.40
11	PCT: 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	-	Natural Grasslands of the Murray Valley Plains	6,562.32
12	PCT: 45 - Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	-	Natural Grasslands of the Murray Valley Plains	39.92

Plant Community Type		BC Act	EPBC Act	Area (Ha) within Project Area
13	PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	-	Natural Grasslands of the Murray Valley Plains	10,545.13
14	PCT: 70 - White Cypress Pine woodland on sandy loams in central NSW wheatbelt	-	-	1,030.08
15	PCT: 153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	Acacia loderi shrublands	-	1.68
16	PCT 160: Nitre Goosefoot shrubland wetland on clays of the inland floodplains	-	-	174.35
17	PCT 164: Cotton Bush open shrubland of the semi-arid (warm) zone	-	-	7,161.24
18	PCT 165: Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone	-	-	329.55
19	PCT: 182 - Cumbungi rushland wetland of shallow semi-permanent water bodies and inland watercourses	-	-	0.34
20	PCT 216: Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion	-	-	69.21

3.4.2 Threatened Ecological Communities

Prior to the site visit, the desktop assessment identified nine (9) TECs with a moderate or higher likelihood of occurring within a 30 km radius of the Project Area. After the site visit, four were determined as having a high likelihood of occurrence within the Project Area.

The nine (9) TECs identified in the desktop assessment as potentially occurring within the Project Area are detailed in **Table 3.3** and further information regarding each of the four (4) TEC determined as having high likelihood of occurrence is provided in **Section 3.4.2.1** below.

Note, detailed vegetation surveys and analysis across the Project Area have not been carried out to date. As such, the presence of other TECs occurring within the Project Area cannot be discounted.

Table 3.3 Threatened ecological communities potentially occurring in the Project Area

Threatened Ecological Community	BC Act listing	EPBC Act listing	Entity with the potential for Serious and Irreversible Impact (SAII)	Likelihood of occurrence
Acacia loderi shrublands	Endangered	Not listed	No	Moderate
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Endangered	Not listed	No	Moderate
Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions	Endangered	Not listed	Yes	Moderate
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Not listed	Endangered	No	Moderate
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Not listed	Endangered	No	Moderate
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Endangered	Not listed	No	Moderate
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered	Not listed	No	High
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion	Endangered	Not listed	No	High
Weeping Myall Woodlands	Not listed	Endangered	No	High
Natural Grasslands of the Murray Valley Plains	Not listed	Critically endangered	No	High

3.4.2.1 TECs with High Likelihood of Occurrence

Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (BC Act)

Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Myall Woodland) typically occurs as a low open woodland or open shrubland. The canopy assemblage is dominated by Weeping Myall (*Acacia pendula*) while the shrub layer supports a diverse assemblage of chenopods and other woody shrubs. The groundcover is often dominated by grasses (*Rytidosperma* spp., *Austrostipa* spp., *Eragrostis* spp.) and forbs species adapted to lower rainfall. Depending on the disturbance history, the canopy and/or shrub layer may be reduced or even entirely removed (DPE 2022) within Myall Woodland TEC.

Within the Project Area, PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion may conform to Myall Woodland as listed under the BC Act. The largest occurrence of PCT 26, and potentially Myall Woodland, occurs in the south east of the Project Area with

smaller remnant stands being recorded sporadically in other visited paddocks. In the north of the Project Area a second large occurrence has been identified in the baseline mapping however this could not be confirmed during the site visit because access to that section of the Project Area was unavailable.

Weeping Myall Woodlands (EPBC Act)

The description of the EPBC Act listed Weeping Myall Woodlands provided in the *Commonwealth Listing Advice on Weeping Myall Woodlands* (DoEWHA 2009) is similar to the BC Act listed Myall Woodlands, however, requires vegetation to meet specific condition and size requirements to meet the definition of the TEC under the EPBC Act. PCT 26 within the Project Area may also conform to Weeping Myall Woodlands as listed under the EPBC Act.

Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion (BC Act)

Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion (Sandhill Pine Woodland) is an open woodland community dominated by *Callitris glaucophylla*. Depending on the disturbance history, occurrences of *C. glaucophylla* may be as isolated individuals or even absent (see **Photo 3.1** below). The abundance of other flora species is dependent on the area's fire frequency and grazing regime (DPE 2017).

In the Riverina Bioregion, the distribution of Sandhill Pine Woodland is associated with historical streams and waterways which have created aeolian source-bordering dunes. These dunes are typically scattered throughout extensive alluvial clay plains (DPE 2017). In the Project Area, PCT 19: Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains may conform to Sandhill Pine Woodland as listed under the BC Act.

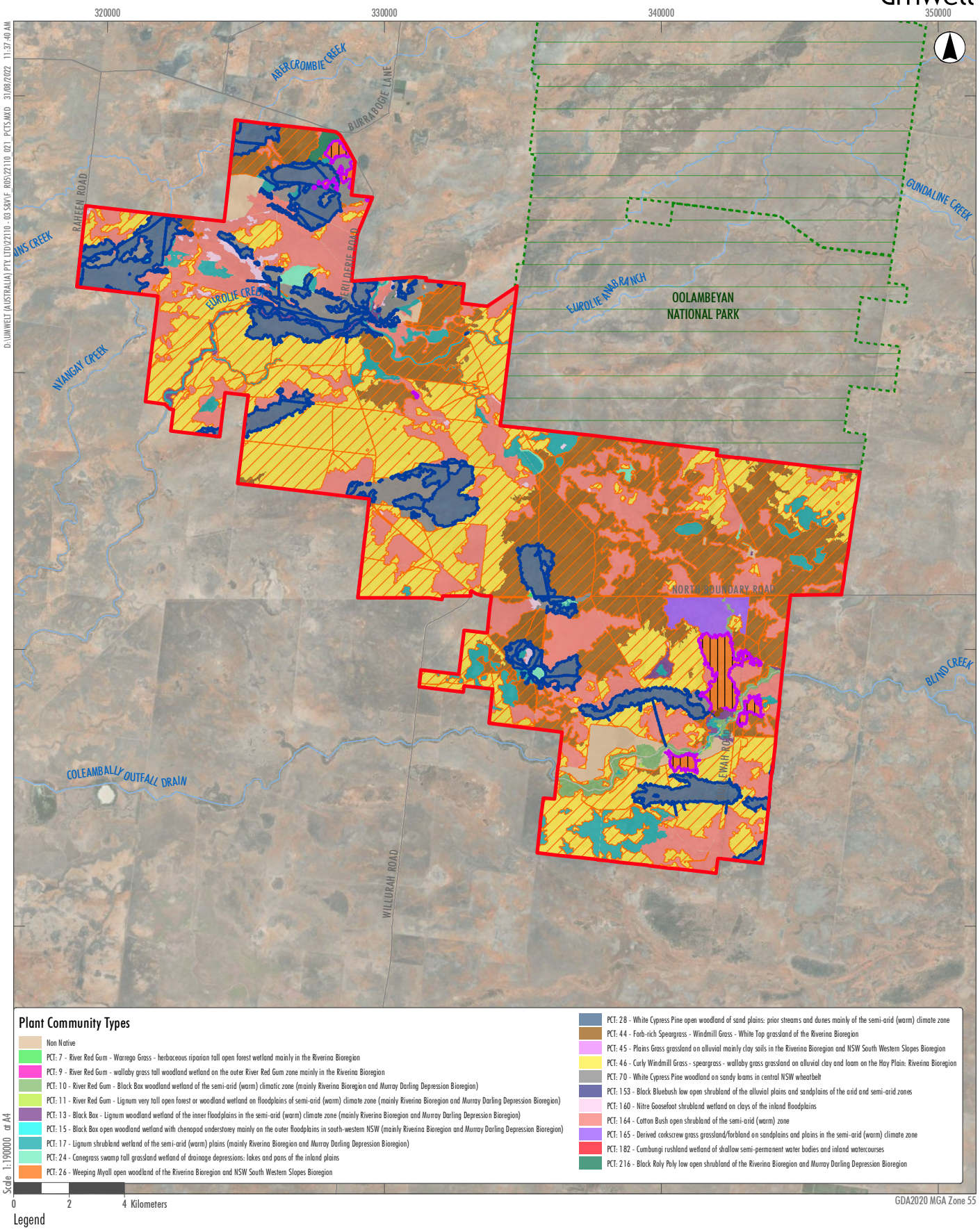
Photo 3.1 Single *Callitris glaucophylla* which may indicate the presence of Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion

Natural Grasslands of the Murray Valley Plains (EPBC Act)

Natural Grasslands of the Murray Valley Plains is a natural temperate grassland community with semi-arid characteristics created by less frequent rainfall. This TEC occurs as a grassland or forbland in which trees and shrubs are either sparse or absent. Common grass taxa include *Rytidosperma* spp., *Austrostipa* spp., *Chloris* spp. and *Enteropogon ramosus*. Frequently recorded forb species include *Arthropodium* spp., *Bulbine* spp., *Sida* spp., *Swainsona* spp and *Calotis* spp. (DoSEWPC 2012).

According to the *Approved Conservation Advice for Natural Grasslands of the Murray Valley Plains* (DoSEWPC 2012), this TEC can be distinguished from other derived grasslands by the 'presence of indicator plant species that are typical of natural grasslands but uncommon in other grassy communities'.

The BioNet Vegetation Classification System identifies PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion, as a component of Natural Grasslands of the Murray Valley Plains. Further field-based assessment will be required to confirm this association and to delineate other occurrences of the TEC within the Project Area.



Legend

- Project Boundary
- Road
- Watercourse
- National Parks (NPWS Estate)

BC Act

- Acacia loderi shrublands
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregion

EPBC Act

- Natural Grasslands of the Murray Valley Plains
- Weeping Myall Woodlands

FIGURE 3.4

Plant Community Types and Threatened Ecological Communities within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019),

3.4.3 Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) rely on the presence of groundwater to function and sustain the resident assemblage of species, populations, and ecological communities. The level of groundwater dependence of vegetation communities in the Project Area has been identified using the GDE Atlas (BoM 2017) and the Risk assessment guidelines for GDE (Serov et al. 2012).

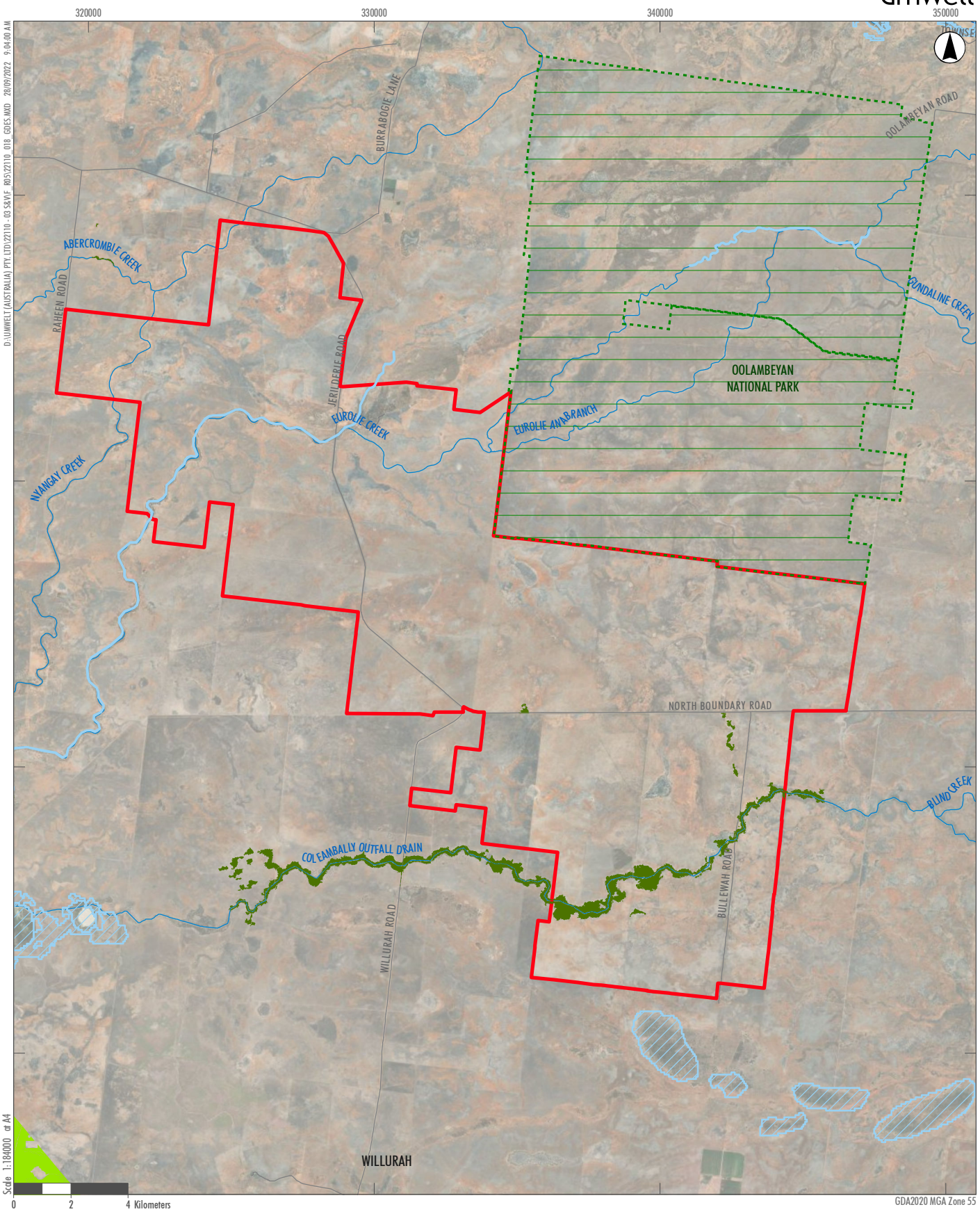
The GDE Atlas delineates and provides information about the following three types of GDEs (BoM 2017):

- Aquatic ecosystems that rely on the surface expression of groundwater – this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands, and springs. Marine and estuarine ecosystems can also be groundwater dependent, but they are not mapped in the GDEs Atlas.
- Terrestrial ecosystems that rely on the subsurface presence of groundwater – this includes all vegetation ecosystems.
- Subterranean ecosystems – this includes cave and aquifer ecosystems.

Within the aquatic and terrestrial ecosystem type, an area of vegetation can be classified as either a high potential, moderate potential or low potential GDE. According to the GDEs Atlas, the Project Area is mapped as containing both aquatic and terrestrial GDEs, refer **Table 3.4** and **Figure 3.5** below.

Table 3.4 Groundwater dependent ecosystems mapped in the Project Area

GDE type	Potential GDE	Landscape feature
Aquatic	Low potential – national assessment	Eurolie Creek
Terrestrial	High potential – regional studies	Vegetation surrounding Coleambally Outfall Drain River Red Gum – Black Box Woodland wetland of the semi-arid (warm) climatic zone



Legend

- Project Boundary
- Road
- Drainage Line
- National Parks (NPWS Estate)

Aquatic GDE

- Low potential GDE - from national assessment

Terrestrial GDE

- High potential GDE - from regional studies
- Low potential GDE - from regional studies

FIGURE 3.5

Groundwater Dependent Ecosystems within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019), © Commonwealth of Australia (Bureau of Meteorology) 2017.

3.5 Threatened Flora

The NSW BioNet Wildlife Atlas search and Commonwealth PMST search identified records for 11 threatened flora species within a 30 km radius of the Project Area. Of these, ten threatened flora species are assessed as having a moderate or higher likelihood of occurrence in the Project Area (refer **Table 3.5**). Threatened flora species recorded within the locality of the Project Area are shown in **Figure 3.6** below**.**

Table 3.5 Threatened flora potentially occurring in the Project Area

Common name (*Scientific name*)	BC Act	EPBC Act	Entity with the potential for SAII	Likelihood of occurrence
Mossgiel Daisy (*Brachyscome papillosa*)	Vulnerable	Vulnerable	No	High (previous records in Oolambeyan NP)
Calotis moorei	Endangered	Endangered	Yes	Moderate
Winged Peppercress (*Lepidium monoplocoides*)	Endangered	Endangered	No	High (previous records in South West Woodlands NR)
Chariot Wheels (*Maireana cheelii*)	Vulnerable	Vulnerable	No	High (previous records along Cobb Hwy)
Turnip Copperburr (*Sclerolaena napiformis*)	Endangered	Endangered	No	Moderate
Spike-Rush (*Eleocharis obicis*)	Vulnerable	Vulnerable	No	Moderate
Slender Darling Pea (*Swainsona murrayana*)	Vulnerable	Vulnerable	No	High
Red Darling Pea (*Swainsona plagiotropis*)	Vulnerable	Vulnerable	No	Moderate
Austral Pillwort (*Pilularia novae-hollandiae*)	Endangered	-	Yes	High (previous records in Oolambeyan NP)
Austrostipa wakoolica	Endangered	Endangered	No	Moderate

3.6 Threatened Fauna

The NSW BioNet Wildlife Atlas search and Commonwealth PMST search identified records for 27 threatened flora species within a 30 km radius of the Project Area. Of these, one threatened amphibian species and 16 threatened bird species are assessed as having a moderate or higher likelihood of occurrence in the Project Area (refer **Table 3.6** below).

Threatened fauna species recorded within the locality of the Project Area are shown in **Figure 3.7**. No threatened invertebrates, reptiles, mammals or fish were assessed as having a moderate or higher likelihood of occurring in the Project Area.

Table 3.6 Threatened fauna species potentially occurring in the Project Area

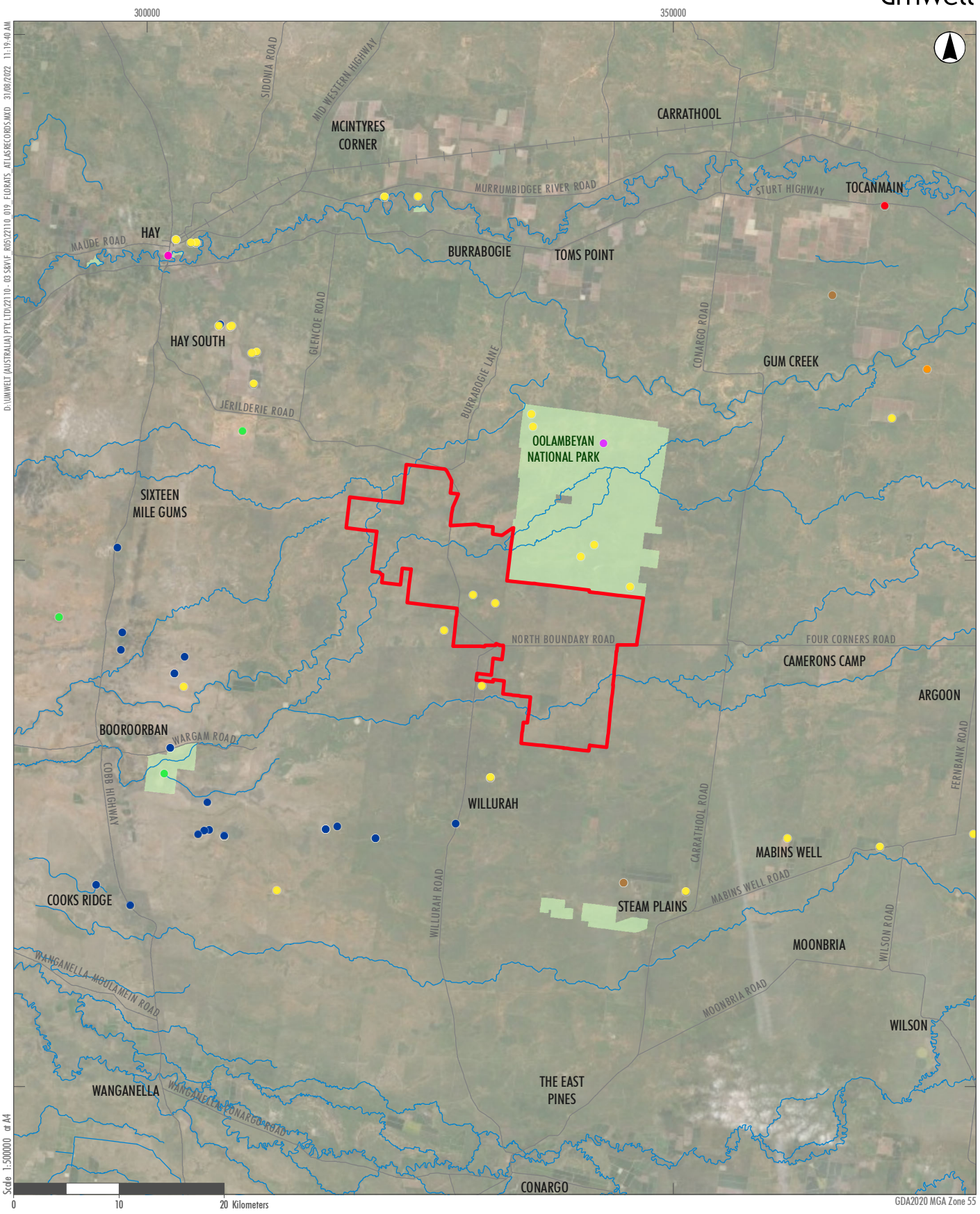
Common name (*Scientific name*)	BC Act	EPBC Act	Entity with the potential for SAII	Likelihood of occurrence
Amphibians				
Southern Bell Frog (*Litoria raniformis*)	Endangered	Vulnerable	No	Moderate
Birds				
Flame Robin (*Petroica phoenicea*)	Vulnerable	Not listed	No	Recorded (Umwelt)
White-fronted chat (*Epthianura albifrons*)	Vulnerable	Not listed	No	Recorded (Umwelt)
Black falcon (*Falco subniger*)	Vulnerable	Not listed	No	Recorded (Umwelt)
Grey-crowned babbler (*Pomatostomus temporalis temporalis*)	Vulnerable	Not listed	No	Recorded (Umwelt)
Spotted harrier (*Circus assimilis*)	Vulnerable	Not listed	No	Recorded (Umwelt)
Plains wanderer (*Pedionomus torquatus*)	Endangered	Critically endangered	Yes	Recorded (Umwelt)
White-throated Needletail (*Hirundapus caudacutus*)	Not listed	Vulnerable	No	Moderate
Australasian Bittern (*Botaurus poiciloptilus*)	Endangered	Endangered	No	Moderate
Australian Painted Snipe (*Rostratula australis*)	Endangered	Endangered	No	Moderate
Superb Parrot (*Polytelis swainsonii*)	Vulnerable	Vulnerable	No	High
Painted Honeyeater (*Grantiella picta*)	Vulnerable	Vulnerable	No	High
Freckled Duck (*Stictonetta naevosa*)	Vulnerable	Not listed	No	Moderate
Little Eagle (*Hieraaetus morphnoides*)	Vulnerable	Not listed	No	High (previous records from Oolambeyan NP)
Australian Bustard (*Ardeotis australis*)	Endangered	Not listed	No	Moderate
Diamond Firetail (*Stagonopleura guttata*)	Vulnerable	Not listed	No	High (previous records from Oolambeyan NP and Cobb Hwy)
Grey Falcon (*Falco hypoleucos*)	Endangered	Vulnerable	No	High (previous records from Oolambeyan NP and Cobb Hwy)

3.7 Migratory species

The Commonwealth PMST search identified records for 10 threatened migratory species within a 30 km radius of the Project Area. Of these, three are considered to have a moderate to higher likelihood of occurring within the Project Area as described in **Table 3.7.**

Table 3.7 Migratory species potentially occurring in the Project Area

Common name (*Scientific name*)	BC Act	EPBC Act	Likelihood of occurrence
Migratory (marine)			
Fork-tailed Swift (*Apus pacificus*)	Not listed	Migratory	Moderate
Migratory (wetland)			
Sharp-tailed Sandpiper (*Calidris acuminata*)	Not listed	Migratory	Moderate
Latham's Snipe (*Gallinago hardwickii*)	Not listed	Migratory	Moderate



Legend

- Project Boundary
- Road
- Railway Line
- Drainage Line
- National Parks (NPWS Estate)

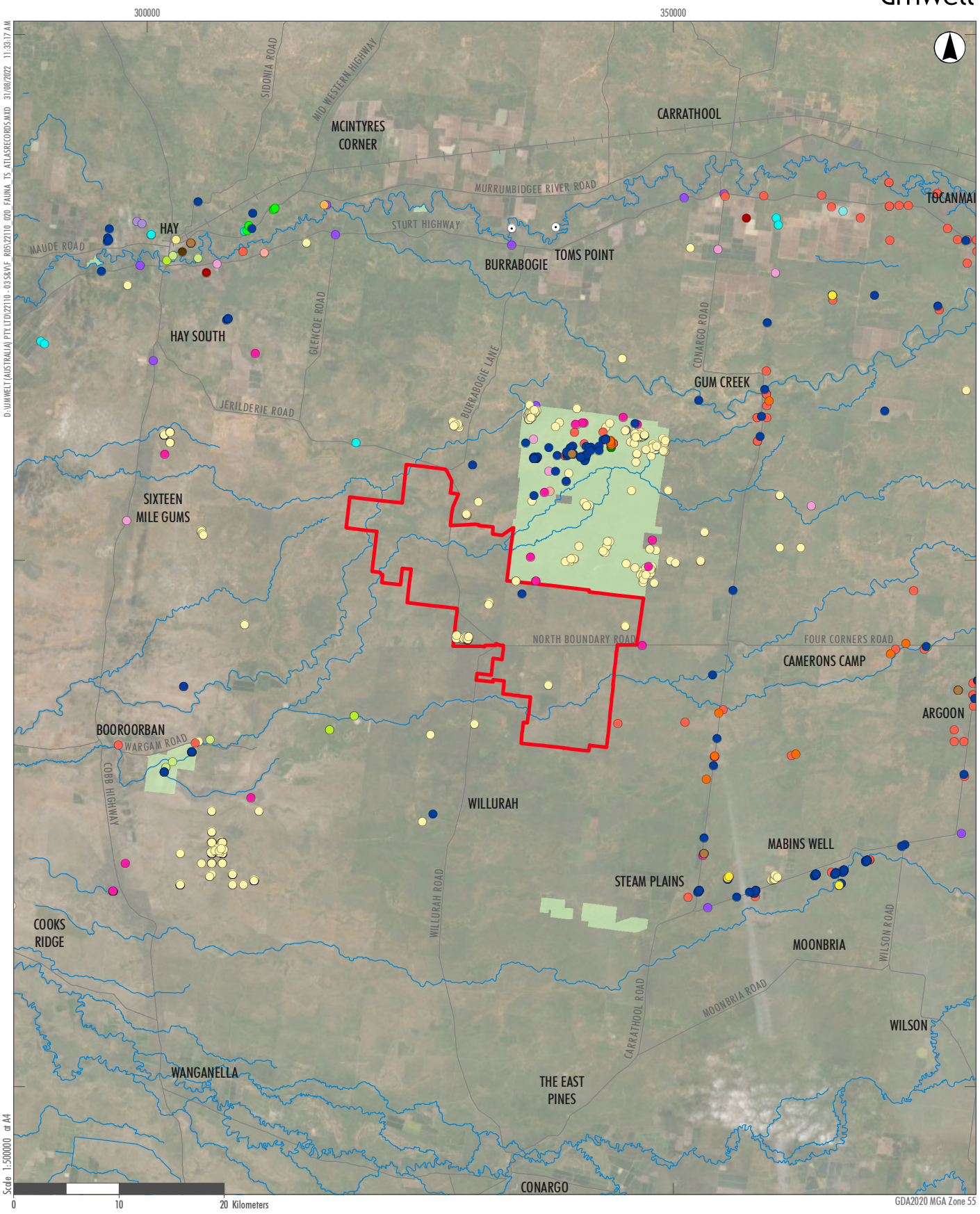
NSW Bionet Atlas Threatened Flora records

- *Brachyscome papillosa*
- *Convolvulus tedmoorei*
- *Eucalyptus leucoxylon subsp. pruinosa*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*
- *Swainsona murrayana*
- *Swainsona sericea*

FIGURE 3.6

Threatened flora records within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019), NSW Bionet Atlas records (2022).



Legend

- Project Boundary
- Road
- Railway Line
- Drainage Line
- National Parks (NPWS Estate)

NSW Bionet Atlas Threatened Fauna records

- Australian Bustard
- Bilby
- Black Falcon
- Blue-billed Duck
- Brolga
- Brown Treecreeper (eastern subspecies)
- Bush Stone-curlew
- Diamond Firetail
- Dusky Woodswallow
- Flame Robin
- Freckled Duck
- Gilbert's Whistler
- Grey-crowned Babbler (eastern subspecies)
- Little Eagle
- Magpie Goose
- Painted Honeyeater
- Plains-wanderer
- Southern Bell Frog
- Southern Myotis
- Spotted Harrier
- Spotted-tailed Quoll
- Superb Parrot
- Varied Sittella
- White-fronted Chat

FIGURE 3.7

Threatened fauna records within Project Area

Image Source: ESRI Basmap (2021) Data source: NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019), Forestry Corporation of NSW (2019), NSW Bionet Atlas records (2022).

3.8 Matters of National Environmental Significance

The EPBC Act provides protection of the environment from actions proposed to 'have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land'. MNES under the Act include the following:

- World Heritage Properties.
- National Heritage Places.
- Ramsar Wetlands.
- Threatened species or ecological communities listed in the EPBC Act.
- Migratory species listed in the EPBC Act.
- Commonwealth marine environment.
- Nuclear actions.
- Great Barrier Reef Marine Park.
- A water resource, in relation to coal seam gas development and large coal mining development.

A search of the Commonwealth PMST was undertaken on 16 June 2022. The search included a 30 km buffer from the indicative Project Area as at June 2022. The search results are summarised below in **Table 3.8** and a record of the PMST report is provided in **Appendix A.**

It is noted that the Project Area was subsequently reduced as part of the avoidance and minimisation strategy outlined in Section 3.9 of the Project's Scoping Report. As such, **Table 3.8** and **Appendix A** provide a precautionary summary of MNES of potential relevance to the Project.

Table 3.8 Matters of National Environmental Significance (MNES)

MNES	Relevance to Development
World Heritage Properties	0
National heritage properties	0
Wetlands of international importance	4 (tributaries only located within buffer area)
Threatened ecological communities	5
Threatened species	27
Migratory species	10
State and territory reserves	4
Commonwealth marine area	0
Commonwealth Land	6
The Great Barrier Reef Marine Park	0

The PMST identified the following threatened ecological communities which may occur within 30 km of the Project Area:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Grasslands of the Murray Valley Plains
- Weeping Myall Woodlands
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

The PMST identified the following migratory species which may occur within 30 km of the Project Area:

- Fork-tailed Swift (*Apus pacificus*)
- Yellow Wagtail (*Motacilla flava*)
- Satin Flycatcher (*Myiagra cyanoleuca*)
- Common Sandpiper (*Actitis hypoleucos*)
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Curlew Sandpiper (*Calidris ferruginea*)
- Pectoral Sandpiper (*Calidris melanotos*)
- Latham's Snipe, Japanese Snipe (*Gallinago hardwickii*)
- Eastern Curlew, Far Eastern Curlew (*Numenius madagascariensis*)
- Common Greenshank, Greenshank (*Tringa nebularia*).

The PMST identified the following state and territory reserves within 30 km of the Project Area:

- Oolambeyan National Park
- Murrumbidgee Valley National Park
- Murrumbidgee Valley Regional Park
- South West Woodland Nature Reserve.

Surveys to determine the presence and likelihood of impacts to MNES would be undertaken during the preparation of the EIS. Regardless, the Project is being referred to DCCEEW at the scoping stage. The purpose of this referral to DCCEEW is to determine whether the proposed action (i.e. the Project) will need formal assessment and approval under the EPBC Act. The referral provided to DCCEEW would be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be taken. In this case, the referral would be made even though the action may not have a significant impact, and potential impacts are uncertain. Refer to **Section 3.5** and **Section 3.6** of this report for more information regarding threatened species, **Section 3.4.2** for threatened ecological communities and **Section 3.7** for migratory species. Four wetlands of international importance are indicated in the search as their tributaries are located within 30 km of the Project boundary, but the wetlands themselves are between 200 and 500 km downstream of the Project.

4.0 Threatened Species Survey Requirements

All BAM assessments require extensive field surveys including the collection of floristic data, vegetation mapping and targeted seasonal species-credit species surveys. Seasonal requirements for threatened species surveys can be variable and up to a year is usually required to cover all predicted species-credit species survey periods. The exact survey requirements are driven by the PCT, patch size and presence of habitat constraints within the survey corridor. The Biodiversity Assessment Method Calculator (BAMC), BioNet Atlas records, and PMST was used to derive a list of candidate species that would likely require survey and assessment in accordance with the BAM. These species are detailed in **Section 4.1** and **Section 4.2** below.

4.1 Flora species-credit-species survey requirements

Threatened flora species-credit-species which would likely require survey and assessment as part of an EIA for the Project is detailed in **Table 4.1.**

Table 4.1 Threatened flora species credit species likely requiring survey

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Austrostipa wakoolica	E	E	Alluvial plains and plains	South of the Murrumbidgee River	No												
Claypan Daisy (*Brachyscome muelleroides*)	V	V	Floodplains or wetland - grassland communities on grey-brown or red-brown clays and claypans	East of the Cobb Highway and south of Griffith	Yes												
Mossgiel Daisy (*Brachyscome papillosa*)	V	V	-	-	No												
Calotis moorei	E	E	NA	NA	Yes												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bindweed (*Convolvulus tedmoorei*)	E	-	-	-	Yes												
Spike-Rush (*Eleocharis obicis*)	V	V	NA	NA	No												
Yellow Gum (*Eucalyptus leucoxylon subsp. pruinosa*)	V	-	-	-	No												
Winged Peppercress (*Lepidium monoplocoides*)	E	E	-	-	No												
Lanky Buttons (*Leptorhynchos orientalis*)	E	-	-	-	No												
Chariot Wheels (*Maireana cheelii*)	V	V	Heavy grey clay soils and claypans or shallow depressions	West of Darlington Point, west of Jerilderie	No												
Austral Pillwort (*Pilularia novae-hollandiae*)	E	-	-	East of Deniliquin	Yes												
Turnip Copperburr (*Sclerolaena napiformis*)	E	E	-	Hay Plain	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Slender Darling Pea (*Swainsona murrayana*)	V	V	-	-	No												
Red Darling Pea (*Swainsona plagiotropis*)	V	V	-	Hay Plain	No												
Silky Swainson-pea (*Swainsona sericea*)	V	-	-	-	No												

4.2 Fauna species credit species survey requirements

Threatened fauna species-credit-species which would likely require survey and assessment as part of an EIA for the Project is detailed in **Table 4.2**.

Table 4.2 Threatened fauna species credit species likely requiring survey

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Australian Bustard (*Ardeotis australis*)	E	-	-	-	No												
Bush Stone-curlew (*Burhinus grallarius*)	E	-	Fallen/standing dead timber including logs	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
White-Bellied Sea-Eagle (*Haliaeetus leucogaster*)	V	-	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	-	No												
Little Eagle (*Hieraaetus morphnoides*)	V	-	Nest trees - live (occasionally dead) large old trees within vegetation)	-	No												
Southern Bell Frog (*Litoria raniformis*)	E	V	NA	NA	No												
Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)	V	-	Living or dead tree with hollows greater than 10cm diameter	-	No												
Square-tailed Kite (*Lophoictinia isura*)	V	-	Nest trees	-	No												
Southern Myotis (*Myotis macropus*)	V	-	Hollow bearing trees Within 200m of riparian zones or waterbodies Bridges, caves or artificial structures within 200 m of riparian zone or waterbodies	-	No												
Barking Owl (*Ninox connivens*)	V	-	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground	-	No												

Common Name (*Scientific Name*)	BC Act	EPBC Act	Habitat Constraints	Geographic Limitations	Entity with the potential for SAII	Survey period											
						Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Plains-wanderer (*Pedionomus torquatus*)	E	CE	Important Habitat Mapping	-	Yes												
Koala (*Phascolarctos cinereus*)	E	E	Areas identified via survey as important habitat	-	No												
Regent Parrot (*Polytelis anthopeplus monarchoides*)	E	V	Living or dead *E. camaldulensis* with hollows greater than 5 cm diameter, greater than 5 m above the ground OR trees with DBH of greater than 40cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee	Within 10 km of the junction of the Murray River	No												
Superb Parrot (*Polytelis swainsonii*)	V	V	Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5cm diameter	-	No												
Masked Owl (*Tyto novaehollandiae*)	V	-	Living or dead trees with hollows greater than 20cm diameter	-													

5.0 Potential Impacts

The BAM requires the assessment of discrete types of impacts on biodiversity values resulting from proposed development during both construction and operational phases. The types of impacts requiring assessment are as follows:

- **Direct impacts**: impacts on biodiversity values and threatened species habitat that relate to clearing native vegetation and impacts on biodiversity values prescribed by the BC Regulation.
- **Indirect impacts**: impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish).
- **Prescribed impacts**: means the prescribed impacts identified in clause 6.1 of the BC Regulation. Prescribed impacts can be direct or indirect impacts.
- **Serious and irreversible impacts (SAII)**: impacts likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct in accordance with the principles set out in clause 6.7(2) of the BC Regulation.

Based on the findings of the desktop assessment and site inspection, the potential impacts to biodiversity from the Project are detailed in **Table 5.1** below.

Table 5.1 Potential impacts associated with the Project

Impact Type	Potential Impact	Details
Direct impact	Removal of native vegetation Removal of threatened species and their habitat Fauna mortality	• The Project may result in the removal of native vegetation, including TEC listed under both the BC Act and EPBC Act. Vegetation removal that may be required for the proposed works would likely contribute to further fragmentation of native vegetation communities within the locality. • Removal of grassland habitat may impact suitable habitat for Plains-wanderer known to occur within the Project Area. • Hollow-bearing trees provide habitat for threatened species such as forest owls, woodland and forest birds and microbats, which may occur within the Project Area. As such, the proposal has the potential to remove these tree hollows impacting on threatened species that may utilise them as habitat. • Construction of wind turbines and other infrastructure may clear logs and debris used by threatened flora and fauna species predicted to occur within the Project Area.
Indirect impact	Inadvertent impacts on adjacent habitat or vegetation Reduced viability of adjacent habitat due to edge effects Reduced viability of adjacent habitat due to noise, dust, or light spill	• Inadvertent disturbance to native vegetation and threatened species habitat may occur during construction and operational phases of the Project. • Priority weeds are likely to occur in parts of the Project Area. Continued weed invasion and encroachment could have potentially severe consequences for the habitat of flora and fauna occurring in the area. • Potential sediment, nutrient and pollutant run-off into adjacent vegetation and fauna habitat.

Impact Type	Potential Impact	Details
	Transport of weeds and pathogens from the site to adjacent vegetation	• Noise and vibration disturbances to fauna. • Fire mitigation strategies may result in changes to fire regime across the Project Area. Changes to fire regime is known to negatively impact Plains-wanderer and its habitat (DoE, 2016).
	Changed fire regimes	
Prescribed impacts	Impacts from wind turbine strike	• The operation of wind turbines has the potential to directly impact upon threatened birds and bats. Direct impact would take the form of birds and bats being struck by the turbine blades when moving within or through the wind farm. • The Project may create a barrier to movement across the landscape. • The Project may create a barrier to movement longitudinally for some threatened bird species. • Increased vehicle movement during construction may increase risk of vehicle strike on ground-dwelling species such as Plains-wanderer, as well as protected species such as emus and kangaroos. • Construction of the wind farm may require the removal of natural or made-made waterbodies, or could alter subterranean or overland waterflows across the Project Area.
	Impacts to water bodies, water quality and hydrological processes	
	Impacts to habitat connectivity	
	Impacts from vehicle strike	
Serious and Irreversible Impacts (SAII)	As per examples listed above	• A number of entities with the potential for SAII could be present within the Project Area. • As per **Section 3.3** of this report, important habitat mapping for the Swift Parrot, Regent Honeyeater and Migratory Shorebirds are not present within the Project Area. Important habitat mapping for the Plains-wanderer is present within the Project Area as shown in **Figure 3.3** of **Section 3.3**. Mapped important habitat for Plains-wanderer is considered an SAII. • Notably, Plains-wanderer was also recorded onsite during recent bird and bat utilisation surveys. • The BAM assessment will likely require an assessment of SAII on Plains-wanderer, if not additional SAII entities.

6.0 References

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Department of the Environment, Water, Heritage and the Arts (DoEWHA) Threatened Species Scientific Committee (2009). *Commonwealth Listing Advice on Weeping Myall Woodlands*. Department of the Environment, Water, Heritage and the Arts

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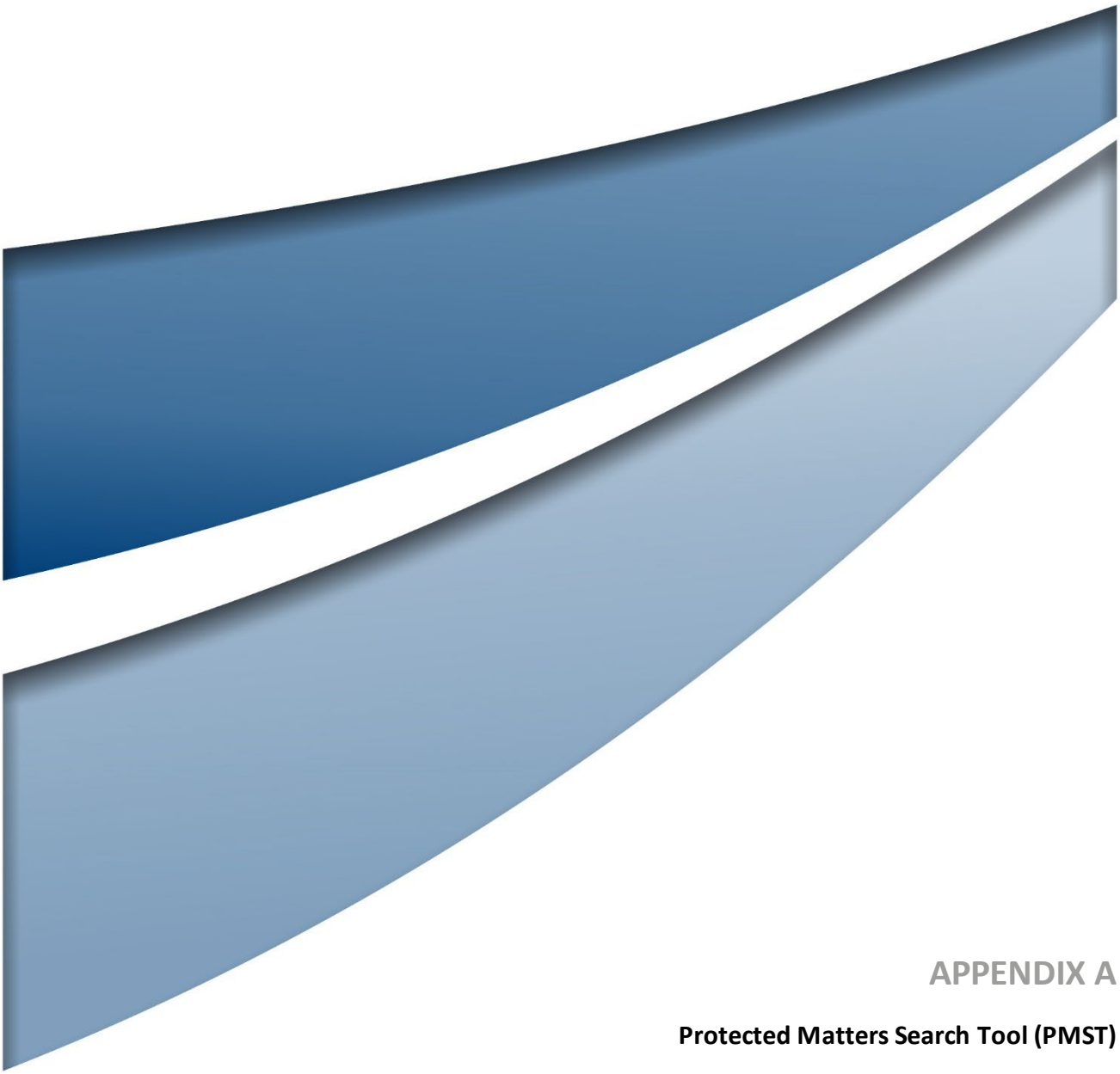
Serov, P., Kuginis, L. and Williams, J.P., (2012) *Risk assessment guidelines for groundwater dependent ecosystems*. NSW Department of Primary Industries, Office of Water, Sydney.



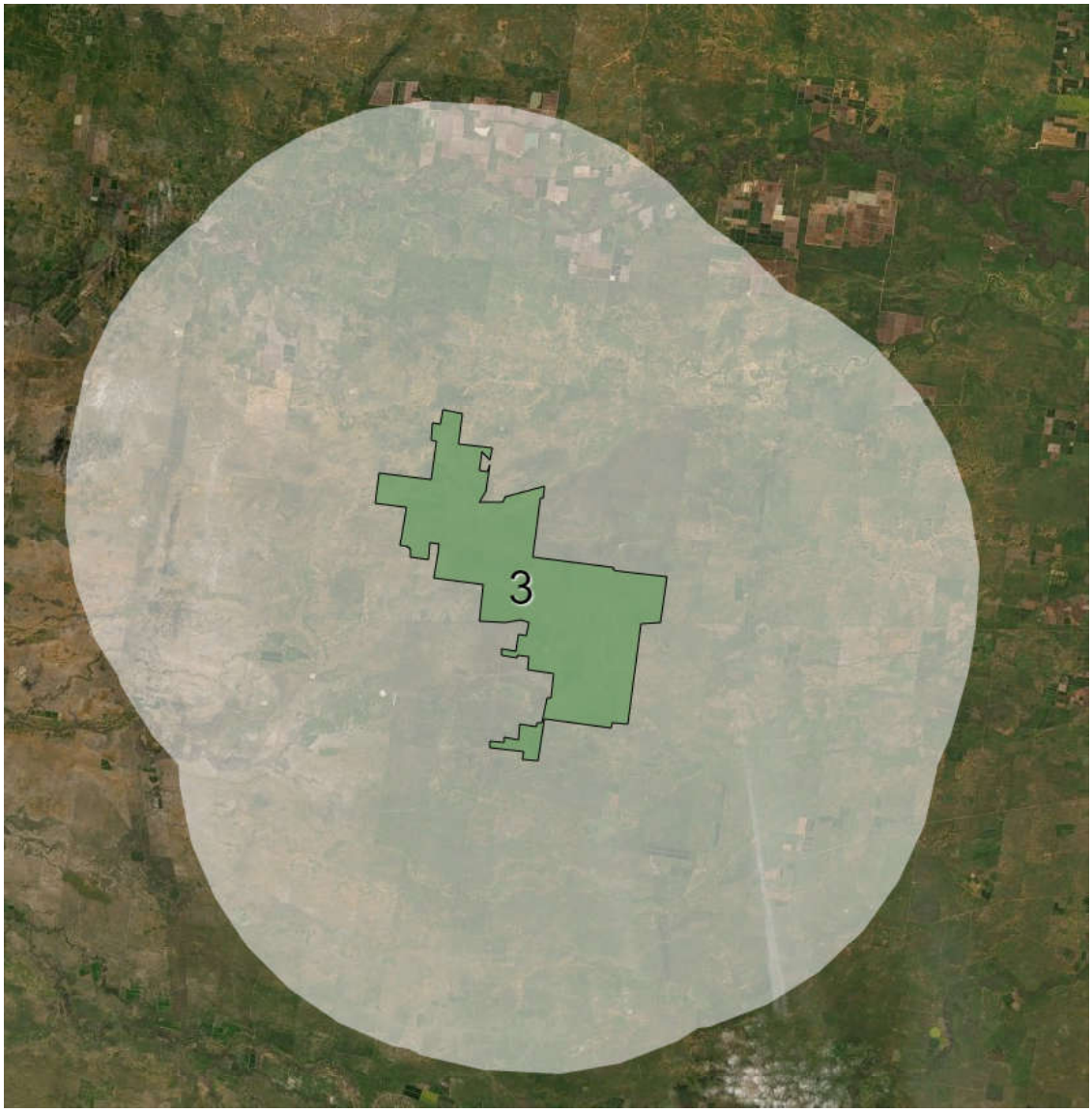
APPENDIX A

Protected Matters Search Tool (PMST)

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 16-Jun-2022



Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	27
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	6
Commonwealth Heritage Places:	1
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	4
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	400 - 500km upstream from Ramsar site	In feature area
Hattah-kulkyne lakes	200 - 300km upstream from Ramsar site	In feature area
Riverland	300 - 400km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	400 - 500km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area	In feature area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area	In feature area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area	In buffer area only
Weeping Myall Woodlands	Endangered	Community likely to occur within area	In feature area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area	In buffer area only

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
FISH			
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Maccullochella macquariensis			
Trout Cod [26171]	Endangered	Species or species habitat may occur within area	In feature area
Maccullochella peelii			
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area	In feature area
Macquaria australasica			
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
FROG			
Litoria raniformis			
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat known to occur within area	In feature area
MAMMAL			
Dasyurus maculatus maculatus (SE mainland population)			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In buffer area only
Nyctophilus corbeni			
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In feature area
PLANT			
Austrostipa wakoolica			
[66623]	Endangered	Species or species habitat likely to occur within area	In feature area
Brachyscome muelleroides			
Mueller Daisy [15572]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Brachyscome papillosa			
Mossgiel Daisy [6625]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eleocharis obicis a spike rush [15320]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat known to occur within area	In feature area
Maireana cheelii Chariot Wheels [8008]	Vulnerable	Species or species habitat known to occur within area	In feature area
Sclerolaena napiformis Turnip Copperburr [11742]	Endangered	Species or species habitat may occur within area	In buffer area only
Solanum karsense Menindee Nightshade [7776]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Commonwealth Bank of Australia		
Commonwealth Land - Commonwealth Bank of Australia [15296]	NSW	In buffer area only
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Commission [15294]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [15295]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [15293]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [15351]	NSW	In buffer area only
Defence		

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Service Homes Corporation [15292]	NSW	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Hay Post Office	NSW	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat known to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Murrumbidgee Valley	National Park	NSW	In buffer area only
Murrumbidgee Valley	Regional Park	NSW	In buffer area only
Oolambeyan	National Park	NSW	In feature area

Protected Area Name	Reserve Type	State	Buffer Status
South West Woodland	Nature Reserve	NSW	In buffer area only

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
EnergyConnect NSW - Eastern Section	2020/8766	Controlled Action	Assessment Approach	In feature area
Not controlled action				
Construction of a nominal 150mm diameter water main	2011/5839	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX 6

Preliminary Heritage Constraints Assessment

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Environmental & Social Consultants

BayWa r.e.

BULLAWAH WIND FARM

Preliminary Heritage Constraints Assessment

FINAL

September 2022

BULLAWAH WIND FARM

Preliminary Heritage Constraints Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
BayWa r.e. Projects Australia Pty Limited

Project Director: Nathan Baker
Project Manager: Lauren Evans
Report No. 22110/R10
Date: September 2022

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
01	Lauren Evans	23 June 2022	Nathan Baker	24 June 2022
02	Lauren Evans	23 September 2022	Nathan Baker	23 September 2022

Abbreviations

Abbreviation	Definition
ACHAR	Aboriginal Cultural Heritage Assessment Report
AGL	above ground level
AHIMS	Aboriginal Heritage Information Management System
BayWa r.e.	BayWa r.e. Projects Australia Pty Ltd
BESS	Battery Energy Storage System
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning & Assessment Act 1979
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
HHA	Historic Heritage Assessment
IBRA	Interim Biogeographic Regionalisation for Australia
ICOMOS	International Council on Monuments and Sites
ILUA	Indigenous Land Use Agreements
LEP	Local Environment Plan
MNES	Matters of Environmental Significance
MW	megawatts
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
RAPs	Registered Aboriginal Parties
RES	Renewable Energy Systems
REZ	Renewable Energy Zone
SEARs	Secretary's Environmental Assessment Requirements
State Heritage Inventory	SHI
Umwelt	Umwelt (Australia) Pty Limited

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1.0 Introduction

BayWa r.e. Projects Australia Pty Ltd (BayWa r.e.) propose to develop the Bullawah Wind Farm (the Project) to provide a reliable and affordable source of energy for the people of New South Wales (NSW) and contribute to reducing greenhouse gas (GHG) emissions associated with energy generation.

The Project is located approximately 28 km south east of Hay and in the Riverina region of south-western NSW, within the Hay Shire, Murrumbidgee and Edward River Local Government Areas (LGA). It will include the installation, operation, maintenance and decommissioning of up to 170 wind turbines, Battery Energy Storage System (BESS) facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The current BayWa r.e. development design incorporates approximately 170 wind turbines, with a maximum blade-tip height of 300 m above ground level, and an installed capacity of up to 1,000 megawatts (MW) (1 gigawatts (GW)).

Umwelt (Australia) Pty Limited (Umwelt) was engaged by BayWa r.e. to prepare a Scoping Report for planning and environmental aspects of the Project, and in support the proponents Request for Secretary's Environmental Assessment Requirements (SEARs).

1.1 Purpose and Objectives

This preliminary heritage constraints assessment report has been prepared to document the outcomes of preliminary desk-based investigations conducted for the Project. It aims to support the Scoping Report prepared by Umwelt, and more broadly the proponents request for SEARs. It presents any already identified heritage sites, objects or places established via searches of existing and publicly available resources and databases, and other environmental and archaeological information accessible at the time the investigations were completed.

It presents recommended next steps formed on the basis of anticipated requirements for a Project of this type and scale, and the preliminary research conducted to date. The assessment of constraints documented herein are preliminary only and any guidance is limited to likely future heritage assessment requirements and compliance obligations.

This report is not designed to achieve the legislative and statutory requirements of the *National Parks and Wildlife Act 1974* (NPW Act) or the *Heritage Act 1977*, however these requirements would be achieved in the future with the implementation of recommendations documented herein, and confirmation of these requirements following receipt of the SEARs.

The preliminary investigations referenced in this report are based on desk-top searches and research, and independent verification of third party results or interpretations did not occur. AHIMS data was sourced from Heritage NSW and, in the absence of verification, reflects the accuracy of that AHIMS data, which can be limited. No field investigations and/or detailed site surveys, or Aboriginal stakeholder consultation was completed during the preparation of this report. These obligations would again be achieved in the future with the implementation of the recommendations documented herein, and confirmation of these requirements following receipt of the SEARs.

1.1.1 Contributing Authors

This report was prepared by the following contributing authors:

- Gemma Hopkins – Environmental Consultant
- Andrew Crisp – Senior Archaeologist
- Nathan Baker – Principal Environmental Consultant.

1.2 Project Overview

The Project is located approximately 28 km south east of Hay and in the Riverina region of south-western NSW, within the Hay Shire, Murrumbidgee and Edward River LGA. The Project Area is situated on predominately grazing land, with the closest larger population centres being Deniliquin (66 km southwest of the Project Area, population 7,862) and Griffith (88 km northeast of the Project Area, population 27,300). Smaller townships of Darlington Point, Jerilderie and Coleambally are nearer to the Project.

While the exact Project boundaries are still being refined, the Project will take in an area mostly east of the Jerilderie, North Boundary and Willurah roads junction, either side of the Balranald to Darlington Point transmission line, and south of the Oolambeyan National Park. The Cobb Highway is situated ~20 km west of the Project Boundary (western most extent) and Conargo Road is ~8.5 km east of the Project Boundary (eastern most extent), while Jerilderie Road traverses the Project Area (north to south direction), until the intersection of North Boundary Road and Willurah Road. North Boundary Road crosses the middle section of Project Area (east to west direction), whilst Willurah Road is adjacent to the western side of the southern extent of the Project Boundary, running parallel in a north to south direction. The Sturt Highway (which goes through Hay) is directly north of the Project Boundary at a distance of >20 km.

The Project Area is zoned as RU1 Primary Production within the Hay Local Environment Plan (LEP) 2011, the Murrumbidgee LEP 2013 and Conargo LEP 2013. The majority of land that surrounds the Project is also zoned RU1 Primary Production, however the Oolambeyan National Park (directly north and adjacent to the Project Boundary) is zoned as E1 National Parks and Nature Reserves.

The indicative Project Boundary encompasses an area of approximately 33,000 hectares. The topography of the Project Area (all land within and including the Project Boundary) is relatively flat and homogenous ranging from between 90 and 100 m above sea level (ASL). The Project Area is dissected by a number of larger waterways namely Abercrombie and Eurolie Creek in the north and Coleambally Outfall Drain in the south.

The Project is located ~420 km from the Port of Melbourne (closest port to Project) and ~850 km from the Port of Newcastle (farthest port from the Project). Transportation access to the Project would be provided via the existing public road network and BayWa r.e. is currently considering multiple port, transportation and access route options. Preferred options are to be selected following feasibility and logistics studies, and during the detailed design stages of the development.

1.2.1 South West Renewable Energy Zone (REZ)

The NSW Government's 'Electricity Strategy' and 'Electricity Infrastructure Roadmap' set out a plan to deliver the state's first five (5) Renewable Energy Zones (REZs) in the Central-West Orana, New England,

South-West, Hunter-Central Coast and Illawarra regions. This builds on the 'NSW Transmission Infrastructure Strategy' and supports the implementation of the Australian Energy Market Operator's (AEMO) 'Integrated System Plan'.

The South-West REZ was chosen due to an abundance of high-quality solar resources, proximity to Project EnergyConnect, relative land-use compatibility, and a strong pipeline of proposed projects. EnergyCo NSW is responsible for planning and is continuing to refine the geographical extent of REZ, however based on current mapping the proposed Project is within the boundaries of the REZ. **Figure 1.1** shows the current proposed REZ.

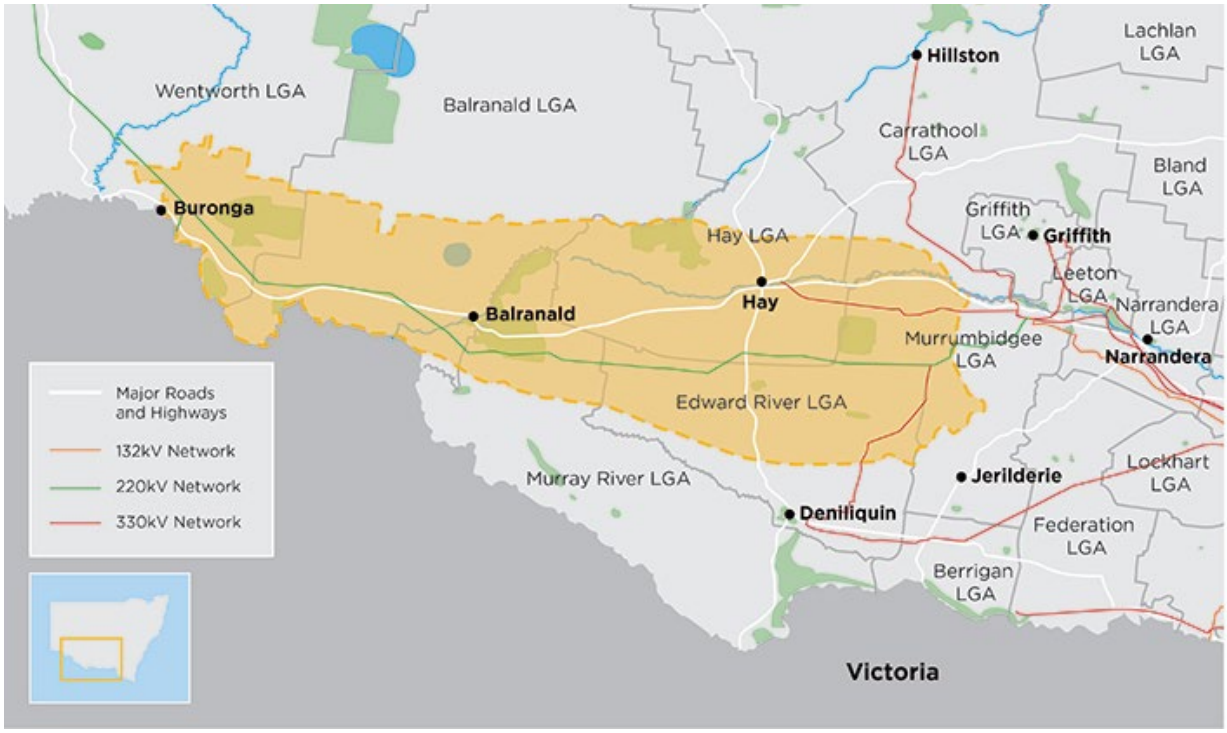


Figure 1.1 South-West Renewable Energy Zone

The Project Boundary is entirely within the South-West REZ. There are various other renewable projects currently operational in the REZ, including Darlington Point Solar Farm, Coleambally Solar Farm and Lang's Crossing Solar Farm. In addition, Hay Solar Farm has been approved, with various other projects in the planning phase including the Burrawong Wind Farm and Coleambally BESS.

1.2.2 Indicative Project Design

The Project will include the installation, operation, maintenance and decommissioning of 170 wind turbines, BESS facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The key components of the Project include:

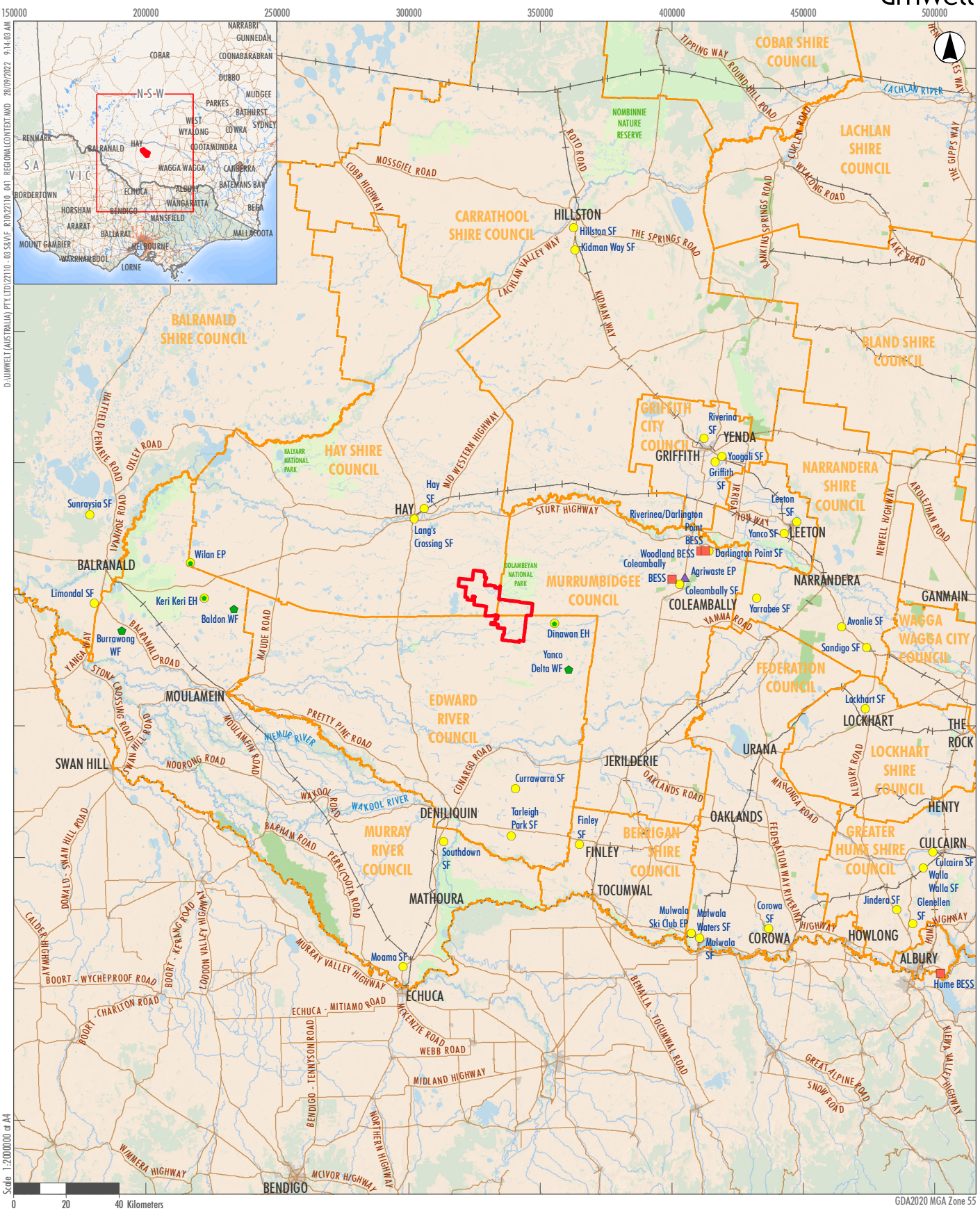
- ~170 (3 blade) wind turbines, with a maximum blade-tip height of 300 metres (m) above ground.
- Power infrastructure providing connection to Project EnergyConnect i.e. on-site substations/switchyards to connect the proposed wind turbines to the South-West REZ transmission line, that runs through the Project Area.

- Internal electrical reticulation network i.e. electrical connections between the proposed wind turbines and substation consisting of a combination of underground cables and overhead powerlines.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, access point/s from public roads, operation and maintenance buildings.
- A single grid-scale BESS (~500 MW, up to four-hour battery).
- Temporary and permanent meteorological monitoring masts.
- Temporary construction facilities including:
    - construction compound/s and site office buildings and storage areas
    - on-site concrete batching plants for use during the construction phase
    - laydown areas used for wind turbine installation and storage of wind turbine components.
- Targeted road network upgrades to facilitate delivery of wind turbine components to the Project Area as required.
- Provision for a temporary accommodation camp on site (if required).

The South-west REZ is relatively undeveloped, but there is substantial commercial interest in the area, such that there are several other renewable energy developments in the vicinity of the Project, most at the early stages of the planning and approvals pathway. Other new and nearby renewable energy projects include, but are not limited to, the Yanco-Delta Wind Farm (~16 km south-east of the Project, being developed by Virya Energy), and then Baldon Wind Farm, Keri Keri Renewable Energy Hub, and Burrawong Wind Farm (each >50 km from the Project), as well as The Plains Renewable Energy Park (south of Hay, precise location yet to be announced). Other new renewable energy projects in the South-West REZ are anticipated.

The Project Area encompasses lands within both the Hay and Griffith Local Aboriginal Land Council (LALC), and the Deniliquin LALC is in close proximity to the southwest of the Project.

The Project's regional context, indicative layout, land-use zoning and other relevant features are identified in **Figure 1.2** to **Figure 1.4**.



Legend

- Project Boundary
- Local Government Areas
- Major Roads
- Railway
- Hydro Areas
- Watercourses
- State Forest
- NPWS Estate

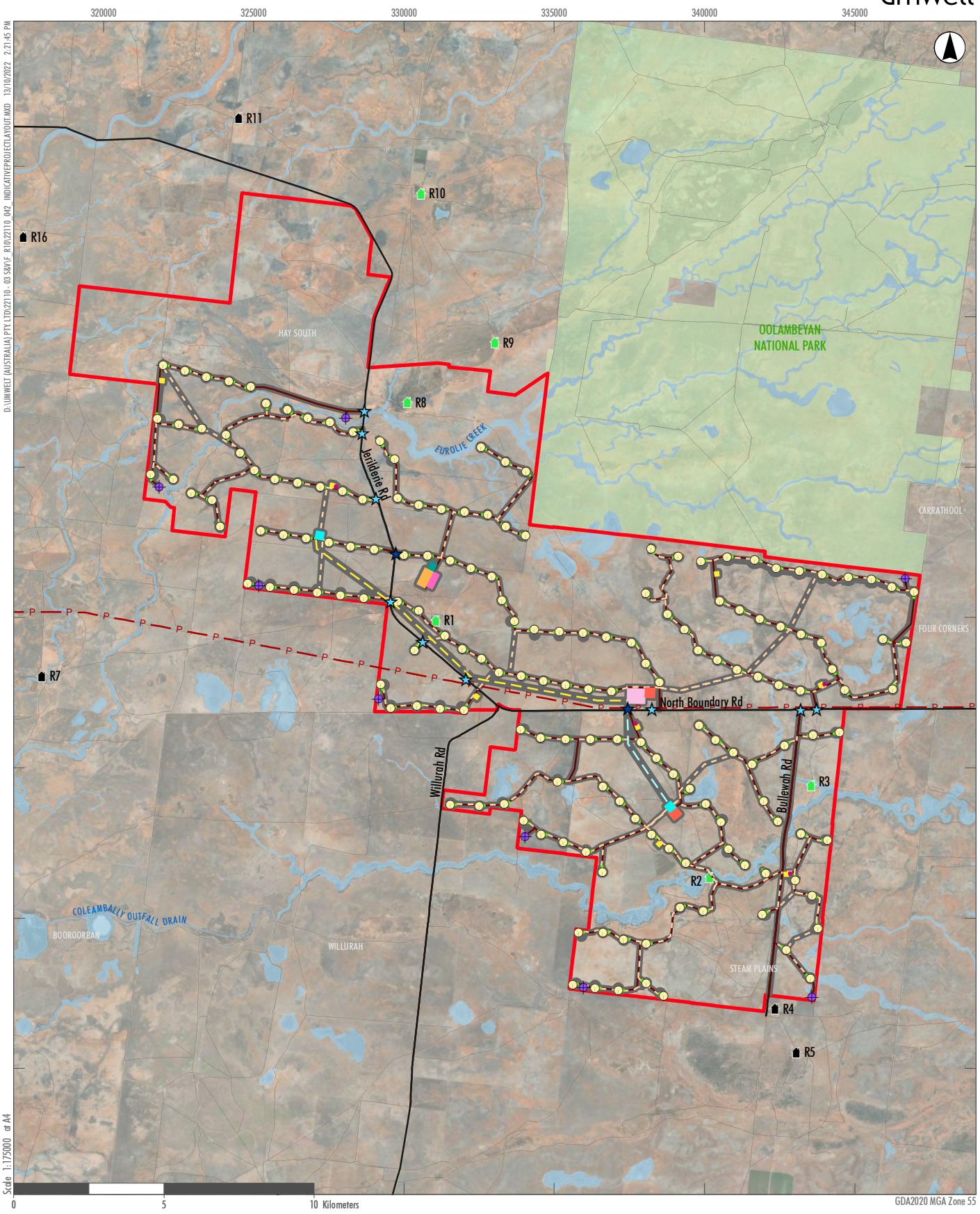
South-West REZ Renewable Projects

- Battery Energy Storage System (BESS)
- Bioenergy
- Renewable Energy Hub (EH)/Energy Park (EP)
- Solar Farm (SF)
- Wind Farm (WF)

FIGURE 1.2

Regional Context

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Indicative Development Area
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Main Site Entry
- Secondary Site Entry
- Existing 220kV Electricity Transmission Line
- Public Roads
- NPWS Estate

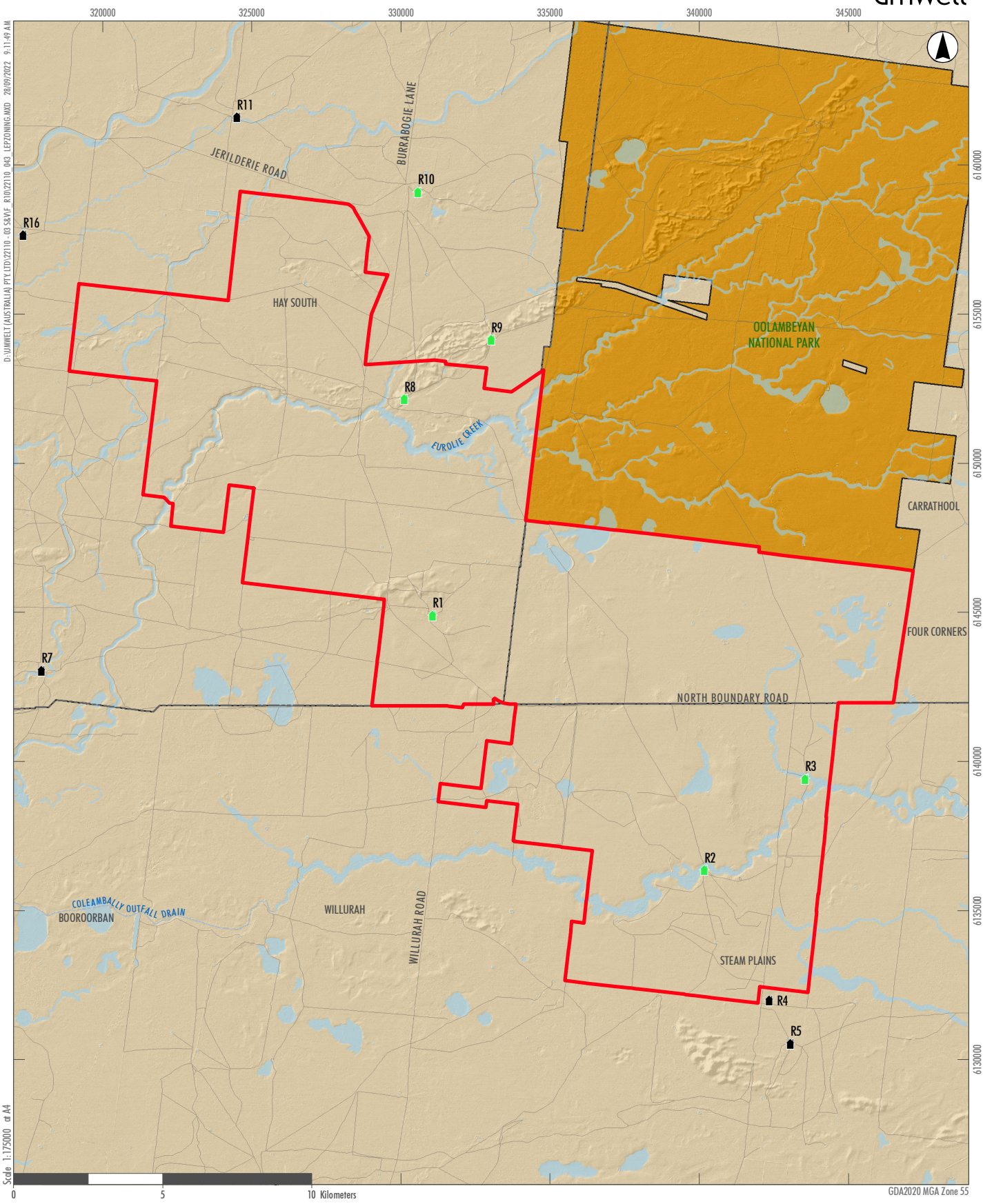
Project Infrastructure

- Internal 330kV Transmission Line (Central to South)
- Internal 330kV Transmission Line (North to Central)
- Cable Route
- Access Tracks
- Permanent Meteorological Masts
- Collector Substation
- Conceptual Temporary Accommodation Camp
- Hardstands
- Main Substation including BESS
- Operation and Maintenance Building
- Main Temporary Construction Compound
- Main Temporary Laydown
- Temporary Construction Compound
- Temporary Satelitte Laydown

FIGURE 1.3

Preliminary Layout

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Road
- Watercourse

Local Environment Plan - Land Zoning

Hay (2011), Murrumbidgee (2013), Conargo (2013)

- E1 National Parks and Nature Reserves
- RU1 Primary Production

FIGURE 1.4

Land Use Zoning

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

1.3 Study Area

For the purpose of this assessment, the Study Area has been defined based on all land within and including the Project Boundary plus a buffer of 10 km. This area (Project Boundary + 10 km) is the extent of all searches made for this assessment. Information beyond the Study Area has not been sought for this assessment.

2.0 Environmental Context

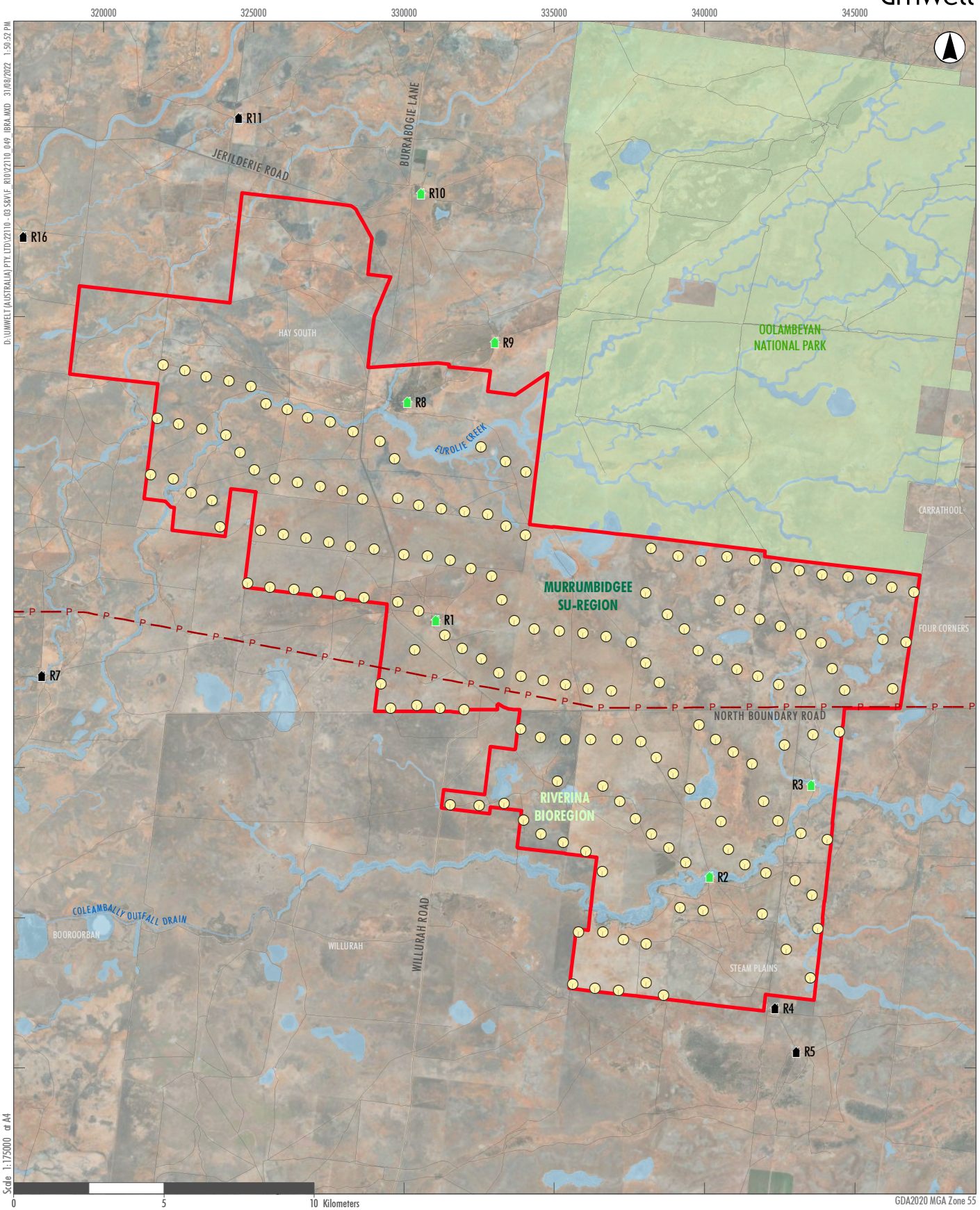
2.1 Vegetation

The Project Area falls within the Riverina IBRA Region and Murrumbidgee IBRA Sub-region (refer to **Figure 2.1** below). The Riverina IBRA Region lies in southwest NSW, extending into central-north Victoria. The climate is dry and semi-arid with hot summers and cool winters.

This bioregion is dominated by river channels, floodplains, backplains, swamps, lakes and lunettes that are all of Quaternary age. The Murray and Murrumbidgee Rivers and their major tributaries, the Lachlan and Goulburn Rivers, flow from the highlands in the east, westward across the Riverina plain (NPWS, 2003).

Several significant wetlands occur in the Riverina bioregion, including NSW Central Murray Forests and Fivebough and Tuckerbil Swamps, and these support many waterbirds and migratory species (NPWS, 2003).

Vegetation in the Riverina bioregion ranges from river red gums along river channels, to saltbush on the plains. The Project Area is predominately grassland in a cleared agricultural landscape, with patches of cotton bush and Callitris mixed woodland (NPWS, 2003).



Legend

- Project Boundary
- IBRA Bioregions
- IBRA Sub-regions
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Existing 220kV Electricity Transmission Line
- NPWS Estate

FIGURE 2.1

IBRA Bioregions and Sub-regions

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

2.2 Geology and Soil Landscape

Soil landscape mapping is limited for the Project Area. A search of DPE eSPADE v2.2 information system was undertaken on 15 June 2022, which identified that there is currently no publicly available soil mapping data for the Project Area and surrounding environment. As a result, there are no geological sheets available for the Project that describes the geology and soil landscape.

The Australia Government Geoscience Australia Portal indicates that the Project Area is situated in a landscape predominately comprised of Shepparton Formation. This geological formation is characterised by unconsolidated to poorly consolidated mottled variegated clay, silty clay with lenses of polymictic, coarse to fine sand and gravel. The Shepparton Formation is of late Neogene and forms extensive flat alluvial floodplains (Bowler & Macumber, 1967).

The Riverina IBRA Bioregion area generally comprises three overlapping alluvial fans centred on the eastern half of the Murray Basin. The Lachlan fan is predominately clay. The Murray fan is more confined and has more active anabranch channels where it is forced to flow around the obstacle of the Cadell fault near Echuca. At times of extreme flood flow, water from the different streams can cross the fan surfaces and enter channels of another system (NPWS, 2003).

The river systems within the Riverina IBRA Bioregion consist mostly of sandy soils. The outer perimeter of floodplains are characterised by predominate saline heavy grey and brown clays. Red-brown and grey clays are present throughout the bioregion, which support grassland communities.

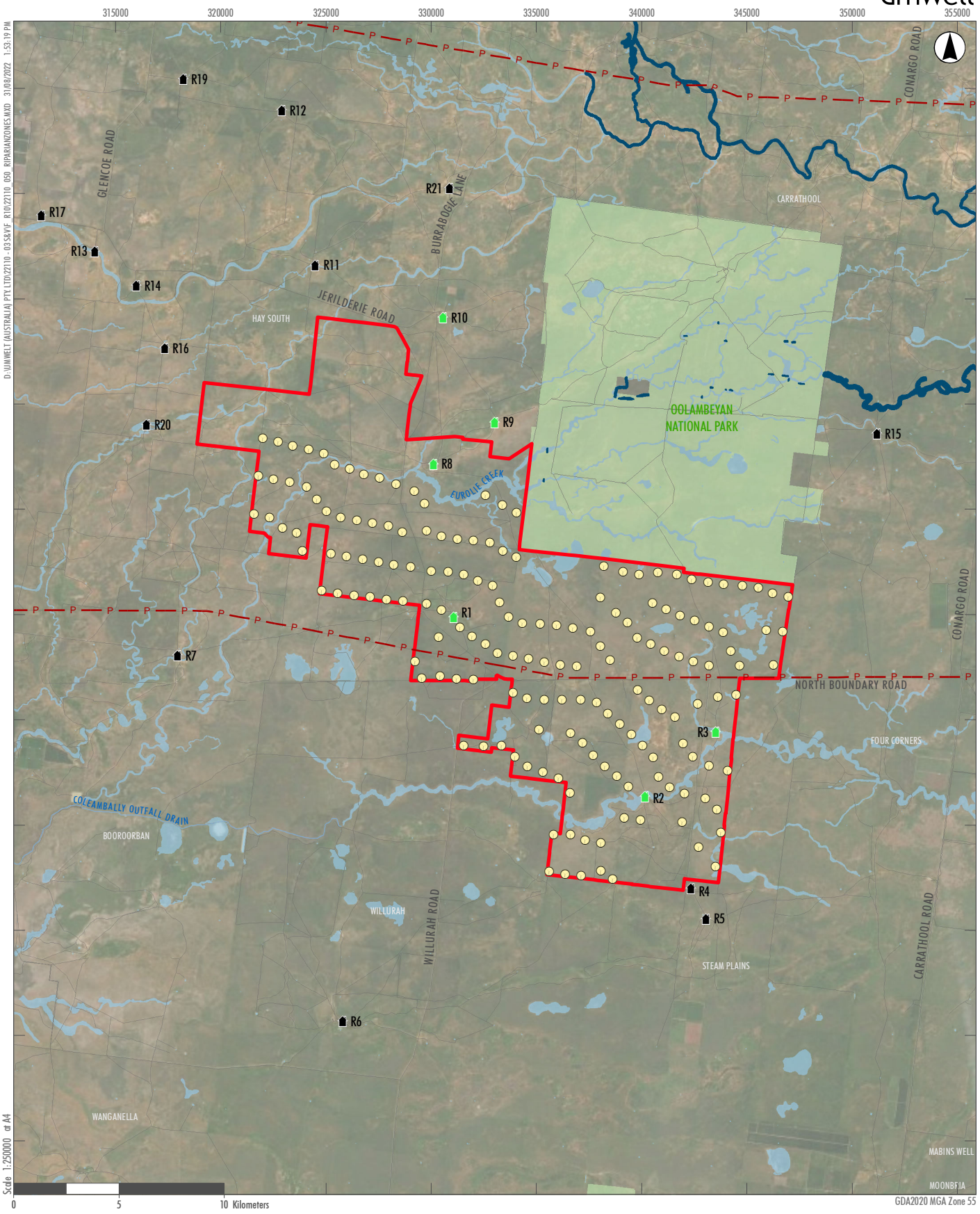
2.3 Riparian Zones and Waterways

The Murrumbidgee River runs parallel to the Project Boundary, approximately 21 km from the northern boundary. Coleambally Creek, Eurolie Creek, Nyangay Creek and Abercrombie Creek traverse the Project Area, as well as several unnamed waterways.

Figure 2.2 illustrates the riparian land identified in the Hay Local Environment Plan 2011, Conargo Local Environmental Plan 2013 and Murrumbidgee Local Environmental Plan 2013, as well as the waterways within proximity to the Project.

During the Scoping Report, the stream order data (Strahler) for these watercourses within the Project area was obtained to provide further information on the nature of these watercourses and the associated implications for resource availability for Aboriginal people. This stream order data was utilised during the Scoping stage to situate WTG and ancillary infrastructure outside identified buffers, where possible.

Water availability is a major influence on the range of resources available and the suitability of an area for Aboriginal occupation. Water resources are key for the identification and interpretation of areas of occupation, environment, archaeological potential and depositional formation. All deterministic models must be understood in the project-specific context (disturbance level, catchment type, soil landscapes etc), however, in essence the higher the Strahler order (3+), the larger the watercourse, the more likely there is perennial water, the higher density of resources and the higher the archaeological potential.



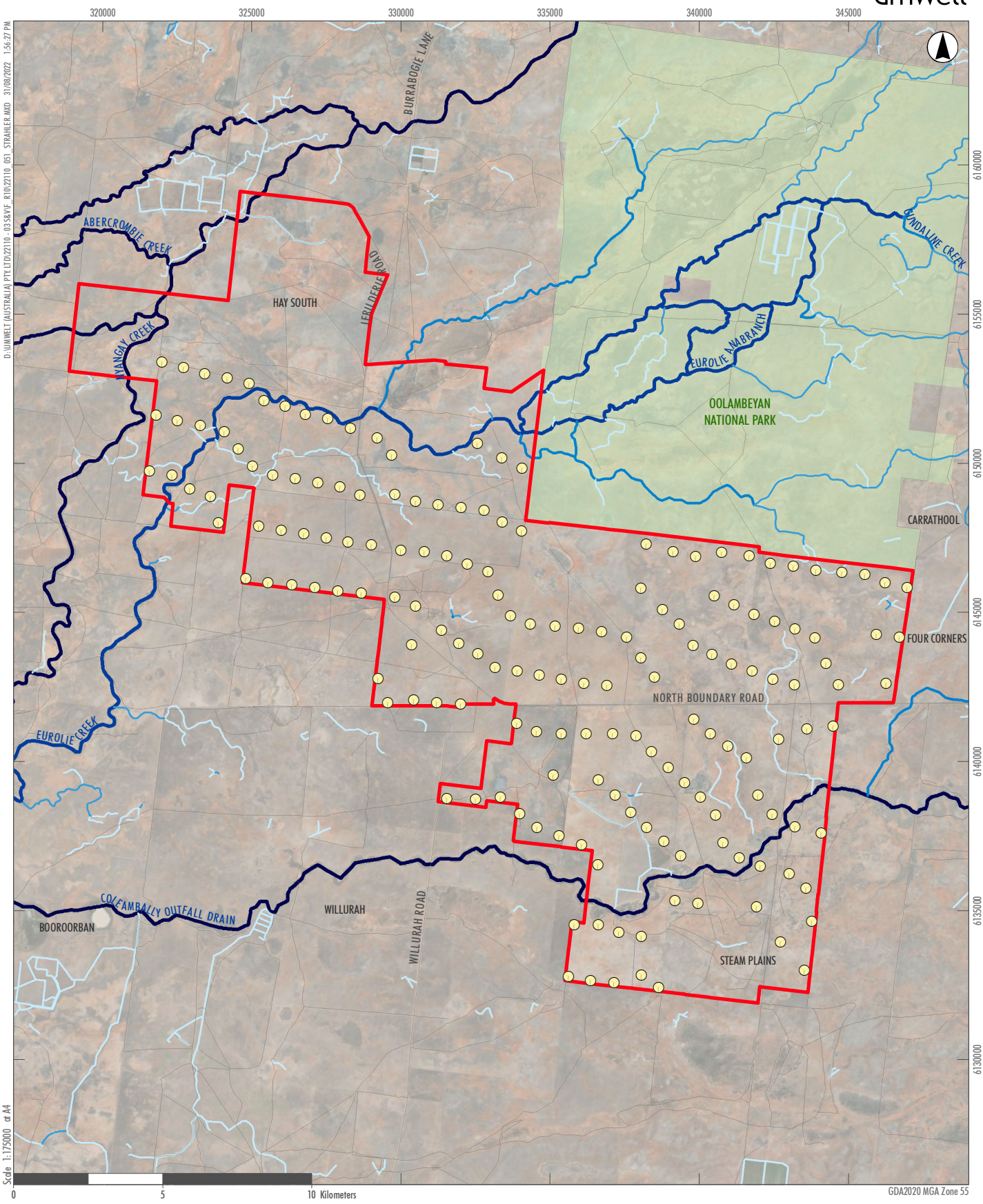
Legend

- Project Boundary
- Riparian Lands and Watercourses
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Existing 220kV Electricity Transmission Line
- NPWS Estate

FIGURE 2.2

Riparian Zones and Waterways

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Indicative Wind Turbine Locations
- NPWS Estate
- Road

Strahler Stream Ordering

- 1
- 2
- 3
- 4
- ≥ 5

FIGURE 2.3

Strahler Stream Order

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021); NSW DPI (2013)

2.4 Statutory Context

This preliminary heritage constraints assessment report was prepared in the context of the following key legislation:

- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Native Title Act 1993*
- *Aboriginal Lands Right Act 1983*
- *Crown Lands Management Act 2016.*

It is noted that no native title schedule, applications, determinations or Indigenous Land Use Agreements (ILUA) were identified within the Project Area. VC2021/001 is the closest application and is situated south-west of the Project.

3.0 Cultural Context

To adequately undertake an assessment of Aboriginal cultural heritage within an area, it is necessary to also understand the cultural context of the area. The term cultural context encompasses both ethnohistoric information regarding how Aboriginal people lived in the region during the period of non-Aboriginal settlement, and the information that we currently have access to regarding the patterns of distribution of archaeological evidence, based largely on the outcomes of previous archaeological assessments.

Ethnohistoric information and previous archaeological research is considered to provide the cultural context for a project. Ethnohistoric information such as official historic records, personal observations recorded in diaries or publications and paintings can provide information on Aboriginal lifestyles at the period of European contact. However, these sources of information must be considered with the knowledge that colonial observers tended to record the unusual rather than the everyday, religious and social activities rather than economic and men's behaviour rather than women and children. These records are far from complete and include significant bias and the observers often did not understand the meaning/background of the events they witnessed and thus may have drawn conclusions/made assessments that were not accurate.

This section does not comprise a comprehensive evaluation of ethnohistoric records for the region but provides a summary Aboriginal Ethnohistory compiled by Navin Officer Heritage Consultants Pty Ltd (NOHC 2021) and Biosis (2017).

3.1 Riverine Plains

As the Murrumbidgee River moves further west, away from the western slopes of the Wagga Wagga region and towards the wide plains of the Hay and Griffith areas, the landscape becomes increasingly arid with the western flow of the river shifting to an open plain dominated by grasslands and woodlands. The Aboriginal heritage of the region consists of numerous burials, mounds, campsites, artefact scatters, scarred trees, natural/mythological sites and post-contact sites such as missions, fringe camps and stations.

Within the Riverine Plains region are three major language groups, the Kulin language group (Mathi Mathi, Wathi Wathi, Nari Nari and Wemba Wemba) which cover the western side of the region, the Wiradjuri language groups which covers the northern portion of the region, and the Murray River language group (Yita Yita, Yota Yota and Pangerang) covering the southern portion of the region (Pardoe and Martin, 2011).

Owing to the disturbance of Aboriginal culture by the arrival and colonisation of Australia by Europeans in the 18th and 19th centuries, the actual boundaries of these groups are difficult to identify with great confidence. Martin (2006) studied ethnographic sources from early European observers in an attempt to define these boundaries. Martin notes that the Muthi Muthi group was likely to have originally been comprised of two groups with similar languages, the Muthi Muthi, located near the junction of the Murray and Murrumbidgee, and the Wathi Wathi, located around present-day Balranald (Martin 2006 p. 151). Martin states that it is likely that these groups amalgamated at some point in recent history to form one group. The Mutthi Mutthi people were associated with Balranald, Carrawathal, Lake Benanee, Lake Reedy and Murrumbidgee River. More broadly the Mutthi Mutthi language group is associated with the Kulin language group of western Victoria (Martin 1999:25).

4.0 Database Searches

Umwelt conducted the desk-top heritage investigations utilising available resources to map and then provide an indication of potential heritage constraints that may occur within the Project Area.

A high-level Aboriginal heritage assessment was then conducted to provide an overview of identified heritage constraints and the associated risk, based on a review of relevant databases and subsequent analysis of identifiable landscape features. Historic (Non-Aboriginal) heritage was also considered.

This desk-based scope considered the following publicly available online databases:

- Australian Heritage Database, accessed on 15 June 2022
- Aboriginal Heritage Information Management System (AHIMS), accessed on 10 June 2022
- NSW State Heritage Inventory (SHI), accessed on 15 June 2022
- Schedule 5 of relevant Local Environmental Plans (LEP), accessed on 15 June 2022.

In addition to these searches the heritage assessment provides an overview of matters relating to the EPBC Act, *Heritage Act 1977* (Heritage Act), and NPW Act noting:

- The EPBC Act provides protection of the environment from actions proposed to '*have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land*'. Approval is required by the Commonwealth Minister for the Environment for actions that may have a significant impact on MNES. MNES under the Act relating to heritage include World Heritage Properties and National Heritage Places.
- The Heritage Act is administered by Heritage NSW and aims to protect the cultural and natural history of NSW with emphasis on historic (European) heritage items, including places, buildings, works, relics, moveable objects, or precincts with significance to the State or a local area. It provides blanket protection for surface and sub-surface relics and for heritage items of state significance listed on the SHR. The Heritage Act defers to local planning instruments under *the Environmental Planning & Assessment Act 1979* (EP&A Act) for the protection of items of local significance.
- The objective of the NPW Act is to consolidate and amend the law relating to the establishment, preservation and management of national parks, historic sites, certain other area, and the protection of certain fauna, native plants, and Aboriginal objects. Any proposed development would have to assess Aboriginal cultural heritage values at the site location. Under the provisions of Section 4.4.1 of the EP&A Act, a Section 90 Aboriginal heritage impact permit is not required for SSD developments.
- Local Environmental Plans (LEPs) list the types of development that are allowed in each zone of a local government area, and those that do not need development consent. A LEP may also be used to reserve land for open space, as well as protecting trees and vegetation, and items and areas of cultural heritage significance. Schedule 5 of the following LEPs identifies registered heritage items of local significance for the Project:
    - Hay Local Environment Plan 2011

- Conargo Local Environmental Plan 2013
- Murrumbidgee Local Environmental Plan 2013.

The outcomes of preliminary desk-based investigations including searches of the abovementioned existing and publicly available resources and databases, and other environmental and archaeological information accessible at the time the investigations were completed, are provided in **Section 4.1** and **Section 5.3** of this report.

4.1 Search Results

4.1.1 Environmental Protection and Biodiversity Conservation Act 1999

Approval is required by the Commonwealth Minister for the Environment for actions that may have a significant impact on MNES. MNES under the Act include the following:

- World Heritage Properties
- National Heritage Places
- Ramsar Wetlands
- Threatened species or ecological communities listed in the EPBC Act
- Migratory species listed in the EPBC Act
- Commonwealth marine environment
- Nuclear actions
- Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development.

The Australian Government has formally endorsed the NSW Biodiversity Offsets Scheme (BOS) through the EPBC Act Condition-setting Policy. This Bilateral Agreement only covers Major Developments (where the NSW Government is the consent authority) as it is an agreement between the NSW and Australian Governments.

A search of the EPBC Protected Matters Search Tool (PMST) was undertaken on 16 June 2022. The search included a 10 km buffer from the indicative Project Area as at June 2022. The search results are summarised below in **Table 4.1** and a record of the PMST report is provided in Appendix A of the Bullawah Wind Farm – Biodiversity Constraints Assessment (Umwelt, 2022).

It is noted that the Project Area was subsequently reduced as part of the avoidance and minimisation strategy outlined in Section 3.9 of the Project's Scoping Report. As such, **Table 4.1** provides a precautionary summary of MNES of potential relevance to the Project.

Table 4.1 Matters of National Environmental Significance (MNES)

MNES	Quantity
World Heritage Properties	None
National heritage properties	None
Wetlands of international importance (Ramsar)	4 (tributaries only located within buffer area)
Great Barrier Reef Marine Park	None
Commonwealth Marne Area	None
Listed Threatened ecological communities	3
Listed Threatened species	24
Listed Migratory species	10
Commonwealth Land	None
Commonwealth Heritage Places	None
Listed Marine Species	16
Whales and Other Cetaceans	None
Critical Habitats	None
Commonwealth Reserves Terrestrial	None
Australian Marine Parks	None
Habitat Critical to the Survival of Marine Turtles	None

Four (4) wetlands of international importance are indicated in the search as their tributaries are located within 10 km of the Project Boundary, but the wetlands themselves are more than 200 km downstream of the Project.

4.1.2 Australian Heritage Database

A search of the World Heritage List, National Heritage List and Commonwealth Heritage List on the Department of Agriculture, Water and Environment's website was undertaken on 15 June 2022. No items were identified within 10 km of the Project Boundary that were listed as World, National or Commonwealth heritage.

Additionally, no items listed in the Register of the National Estate were identified within 10 km of the Project Boundary. This register was closed in 2007 and is no longer a statutory list.

4.1.3 NSW State Heritage Inventory (SHI)

A search of the NSW State Heritage Inventory was undertaken on 15 June 2022 for the Study Area.

No listed heritage items were identified within 10 km of the Project.

4.1.4 Schedule 5 of relevant Local Environmental Plans (LEP)

Searches of the Hay Local Environment Plan 2011, Conargo Local Environmental Plan 2013, Murrumbidgee Local Environmental Plan 2013 were undertaken on the 15 June 2022.

No listed heritage items were identified within 10 km of the Project.

5.0 Aboriginal Archaeological Context

A review of available archaeological information is crucial to the cultural heritage assessment process, as it informs the understanding of archaeological site patterning, site survival and the potential for detection of extant archaeological sites. This information is discussed with reference to the outcomes of a search of the Aboriginal Heritage Information Management System (AHIMS) database (which documents the location and nature of sites for which site cards have been lodged with Heritage NSW) and a summary of the outcomes of previous archaeological investigations in the local area. This information is then considered with reference to key environmental characteristics discussed above to review the archaeological implications for the Project Area.

In summary, the desktop review of available resources to map and provide indication of potential heritage constraints that may occur within the Project Area identified the following key matters:

- 13 AHIMS registered sites have been identified within the Project Boundary.

5.1 Regional Archaeological Context

A range of previous archaeological and Aboriginal cultural heritage assessments have been undertaken that provide information relevant to this report. These are discussed below.

Bonhomme (1987) conducted a study of burials in the Riverine Plain bringing together site surveys, relevant literature, and an assessment of the site register. Three burial categories were noted; isolated and individual burials; many individual and unrelated burials; and cemeteries. Burials varied significantly across the Riverine Plain, with burials generally increasing in number and density towards the southwest. Cemeteries are largely concentrated in the western portion of the Riverine Plains while none were recorded in the eastern part of the plain. A large focus of the interpretation was on the role that geomorphology plays in the site location. A clear preference was noted for particular landforms, lunettes and dunes along stream channels, which had been used over long periods of time and therefore contained large numbers of burials. The increase in burials in the west was thought to be reflective of a larger population.

The western Riverine Plains has a wider variety of landscape features and as a result would have greater resource availability which would have been able to support a larger population. In the early 1990s the Hay Local Aboriginal Land Council identified several mound sites at Dry Lake and Tchelery on the Riverine plain approximately 60 kilometres west of Hay. A number of these mound sites contained burials and so, as part of the Burials Conservation program, the sites were investigated and recorded by the NPWS to discuss the management of these sites (Littleton and Johnston, 1993).

Several sites have already been recorded on the eastern banks of Dry Lake, including a complex of three mounds, however, this study focused on the western side of the lake (Littleton and Johnston, 1993). Nine mounds were recorded on the western side of Dry Lake, and of these recorded mounds, five contained human burials. Three of these burial mounds, Mounds 1, 6, and 8, were highly disturbed and contained scatters of highly fragmented bone so that no further information could be inferred from these sites. Two of the burial mounds were reasonably intact and contained multiple burials, Mound 2 and Mound 4. Mound 2 contained the remains of four burials within an area of approximately 26 metres by 10 metres. These burials were thought to be the remains of two adults and two children. Mound 2 also contained a

concentration of heat retainers which were not thought to be associated with the burials but rather occupation debris.

Mound 4 is a far more confined burial mound with a defined concentration of heat retainers containing the burials of six individuals, all thought to be adults. Most of these burials were at least partially in situ and in reasonable condition.

Another three mounds were located at Tchelery, two kilometres west of Dry Lake, within a 355 metre area (Littleton and Johnston, 1993). One of the mounds contained only heat retainers, while another contained heat retainers, shell fragments and fragmented burnt animal bones, possible human bone was identified within this mound following this assessment. The third mound contained three burials across an area of 55 metres by 45 metres, approximately 1.3 metres high. Two of the burials are partially in situ while the other is highly fragmented. The individuals were estimated to be a young adult and two children. Littleton and Johnston (1993) note a strong association between burials and mound occupation sites within the Hay Plain region.

The burials encountered in this investigation were thought to demonstrate several characteristics that differentiate the region from surrounding areas including variability in burial position and posture, the presence of children within burial areas, the presence of small dense burials within occupation debris, and because it was a large, dispersed burial grounds of 20 to 50 individuals (Littleton and Johnston, 1993).

In 1998, Telstra commissioned Central West Archaeological and Heritage Services Pty Ltd to conduct an archaeological assessment of a proposed optic fibre cable route between Morundah and Bundure in the Riverina district, NSW (Kelton, 1998). The survey area traversed alluvial floodplains with bordering dune formations. No known Aboriginal sites had been previously recorded within the study area; however, three mound sites had been recorded within two kilometres of the proposed route. As a result of this study five Aboriginal sites were recorded during the survey. Sites included a scarred tree, three mound sites, and a mound associated with a surface artefact scatter. In addition to the sites located by the survey, five locations of PAD were identified where the route intersected dune formations. Monitoring of impacts at these dune deposits and avoidance of all surface sites was recommended by the study.

An archaeological survey was undertaken in 1985 for a proposed 132 kV transmission line from Darlington Point to Deniliquin, NSW (McIntyre, 1985). The route is situated within the Riverine Plains region and is 167 kilometres in length. The landscape of study area is characterised by occasional sand hills and long tree lined creeks. A total of 27 Aboriginal sites and two historic sites were recorded during the survey, one of the sites contained both Aboriginal and historic features. Site types included scarred trees (6), hearths (3), artefact scatters (6), and site complexes (12) with a large range of site features including artefact scatters, oven mounds, hearths, and scarred trees.

A total of 31 scarred trees were encountered during the survey, these were the most encountered site feature. A wide range of raw material types were encountered within the artefact scatters including silcrete, quartz, basalt, siltstone, chert and unidentified fine grained siliceous rock. It is likely that the historic site associated with an Aboriginal site postdates the Aboriginal site and that there was no overlap in the occupation. The historic remains at this site were of the Thulabin Provisional School, built in 1879, falling out of use around 1925. The other historic site encountered was a small weatherboard and iron hall that housed the Birganbigil Literary Institute, established in 1894. Seven sites were to be impacted by the project (either whole or partial destruction), and all site features impacted were scarred trees as they were deemed a safety risk for the project, this equated to 13 scarred trees in total.

Several heritage assessments were undertaken between 2013 and 2017 for the Abercrombie Water Efficiency Project (RPS, 2014, OzArk 2014, 2016a, 2016b, OzArk 017a, 2017b). The project is located in the Balranald, Murray River and Hay Local Government Areas and includes a 276 kilometre long, 10-metre-wide corridor for the installation of an underground pipeline. Initial surveys for the project were undertaken by the Balranald Local Aboriginal Land Council (LALC) as part of the REF (RPS, 2014) in which seven sites were identified. Following this OzArk (2014) was engaged to assess the portion of the project area located within the rural property 'Keri Keri', approximately 40 kilometres south of Balranald and, east of Keri Keri Road which covered an approximately 23.9-kilometre section of the proposed pipeline route. Three Aboriginal sites were recorded during this assessment, the sites comprised three open campsites or artefact scatters.

In 2017, OzArk was engaged by the NSW Department of Primary Industries, Water (DPI Water) to conduct a due diligence archaeological assessment for several amendments to the design of the Abercrombie Water Efficiency Project between Balranald and Hay (OzArk, 2017a). Two new Aboriginal sites were recorded during the assessment, YA-AWEP-OS1 and YA-AWEPOS2. These sites were able to be avoided by the project.

In 2018 skeletal remains were located near Dry Lake Travelling Stock Route, Maude Road, Moulamein (Gilding, 2018). Three sites were identified as having suspected Aboriginal human remains and so John Gilding (OEH) visited the sites to assess the nature of the skeletal material. The remains of two individuals in two separate locations were able to be identified. One individual was discovered eroding out of a large Aboriginal earth mound and the other eroding out of a lunette along a mild slope. A second earth mound was identified during the assessment, the skeletal remains associated with the mound were of indeterminant species and could not be definitively assessed.

5.2 Previous Archaeological Assessments

Assessments of particular relevance to the current Project, due to proximity and/or overlap to the current Project Area, are discussed in detail below.

5.2.1 Navin Officer Heritage Consultants (2022) – EnergyConnect (NSW – Eastern Section) Buronga to Wagga Wagga, NSW. Aboriginal Cultural Heritage Assessment

Navin Officer Heritage Consultants (NOHC) was engaged by Transgrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) to produce and Aboriginal cultural Heritage Assessment (ACHA) as part of the environmental assessment suite of reports prepared for the project Environmental Impact Statement (EIS). The proponent was seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north west Victoria. Collectively, the proposed interconnector is known as EnergyConnect.

Extensive archaeological survey was undertaken for the project, a portion of this survey crossed a central portion of the current Project Area, specifically Lot 41 DP591554. This portion of the NOHC study area was categorised as being located on a plain landform within the Riverina bioregion. The nearest water source from the corridor alignment within this property is located approximately 1.9 kilometres north and it consist of a non-perennial watercourse with several registered Aboriginal sites around it, is located within the same landholding.

Aerial imagery analysed by NOHC indicated to them that the section of the property where the proposal study area extended had been subjected to land clearance and agricultural practices. Sandy soils were visible on aerial imagery and likely displayed moderate levels of soil erosion. Several road tracks run across the proposal study area within this property. The area was considered by NOHC to have moderate archaeological potential.

Two previously unknown Aboriginal sites were identified during NOHC survey within the current Project Area. These sites are:

- PEC-E-38 (AHIMS ID: 48-6-0160) is a surface scatter containing seven artefacts. Due to low artefact numbers the site was assessed to have no archaeological potential and would be partially impacted by development.
- PEC-E-39 (AHIMS ID: 48-6-0161) is a surface scatter containing over thirty artefacts. The site had moderately high artefact numbers and associated PAD. The site would be partially impacted by development.

5.2.2 Biosis (2017) – Hay Sun Farm, NSW. Aboriginal Cultural Heritage Assessment Report

Biosis Pty Ltd was commissioned by Overland Sun Farming Pty Ltd (Overland) on behalf of Plains SF No1 Pty Ltd to undertake an ACHA for the proposed Hay Sun Farm, a large-scale solar photovoltaic (PV) generation facility and associated infrastructure in the Hay region of south-western NSW. The assessment included a field survey and a review of background resources including soil landscapes, geology, hydrology and past reports and site records to inform predictive statements about the likelihood of Aboriginal heritages sites to occur within the study area. The Biosis study area is approximately 43 km to the north-west of the current Project Area.

The study area is relatively disturbed due to previous and ongoing agricultural uses, such as grazing and cropping; however, the landscape still showed evidence of Aboriginal land use in areas of remnant vegetation and less disturbed landforms. A total of 42 heritage sites were located in the study area, including hearths, artefacts scatters, modified trees and earth mounds.

The majority of the Aboriginal heritage sites located during the field survey were either stone artefacts, hearths or modified trees. The largest site encountered during the surface survey was site HSF 1 which contained a site complex of artefact scatters, isolated artefacts, and seven hearths. This site was located on a clay pan in the Murrumbidgee Scalded Plain landscape and was 400 metres by 200 metres in dimension. All of the hearths found in the study area were found in the Murrumbidgee Scalded Plain soil landscape and contained either burnt clay or termite mound. The number of hearths in the study area suggest that occupation of the area was frequent or long term. This is supported by the presence of an earth mound, which are formed from intensive or long term occupation of an area. A number of modified trees were also found in areas of remnant vegetation in the study area.

This conforms to the predictive modelling of the region which identified modified trees as the most commonly recorded site type in the region. The presence of modified trees indicates the area was used as a resource gathering zone, with a focus towards making wooden tools and implements. In comparison, the lithic assemblage contains heavily reduced stone artefacts and is indicative of a long distance to raw materials.

There are 39 Aboriginal cultural heritage sites registered with the Aboriginal Heritage Information Management System (AHIMS) register, in the vicinity of the Biosis study area.

A survey of the study area located a further 42 Aboriginal sites, including artefacts scatters, hearths, earth mounds and modified trees. Two of the Aboriginal sites also had historical objects indicating that they are post-contact sites.

Project redesign resulted in avoidance of the majority of identified Aboriginal sites. The remaining two sites HSF1 and HSF2 were recommended to be the subject of archaeological test excavation under the project Cultural Heritage Management Plan (CHMP).

HSF 1 is a highly scientifically and culturally significant site complex measuring 400 metres by 200 metres that consists of 7 hearths with artefact scatters and a series of isolated artefacts. The site complex is located on the Murrumbidgee scalded plain landscape with individual hearths located on clay pan exposures in an irrigation area. The hearths are in good condition with burnt clay, charcoal and termite mound visible.

HSF 2 is a highly scientifically and culturally significant site complex located on the Murrumbidgee Scalded Plains landform. The site contained 4 hearths with artefact scatters, 4 isolated hearths, and a total of 9 surface artefacts. The surface artefacts included six flakes, two cores, and one grinding stone.

Note: The landform was reasonably uniform meaning that the predictive model gave minimal indication of areas to target for survey therefore the survey effort was targeted to micro landforms such as rises in the landscape, areas of intact vegetation and areas of increased visibility such as tracks, fence lines and exposures. The results of the survey are expected to be representative of the whole property and it is concluded that Aboriginal heritage sites occur in high concentration within the study area. The survey was occasionally hampered by poor surface visibility however this occurred in areas of extensive ploughing including wheat crops.

5.2.3 Biosis (2016) – Darcoola West Aboriginal Cultural Heritage Assessment

Biosis (2016) undertook an assessment of a proposed water pipeline between Maude and Hay in NSW. The study area assessed a 65 km pipeline route and located 21 Aboriginal heritage sites which included artefact scatters, hearths, earth mound and midden sites as well as a post contact site. Archaeological test excavation was undertaken at four locations within the study area and the subsurface assessment revealed archaeological deposits dating to 49,200 BP.

5.2.4 Witter (2004) – Regions and Resources. Unpublished PhD. Australian National University, Canberra ACT

Witter (2004) undertook a large-scale assessment of Aboriginal sites in NSW, looking at regional variation on site types and distributions to develop a better understanding of how sites are preserved, and what natural processes impact on site preservation, with a particular focus on open camp sites. As a part of that study, Witter divided the state in to eight archaeological regions, based on the pre-existing Interim Biogeographic Regionalisation for Australia. The current study area falls under the Riverine Plain Region (Witter 2004, pg. 140).

The Riverine Plain Region is described as an area of alluvial plains cut by the Murray, Murrumbidgee, and Lachlan Rivers. It also contains a network of paleo channels and lake beds, containing deposits dating to the

late Holocene and early Pleistocene. Witter (2004) noted that owing to a lack of raw material in the region, stone artefacts are relatively scarce and small, although the presence of hearths can assist in identifying camp sites. Mounds are also a noted feature of this region, particularly on the Hay Plain, where they reach a larger size than elsewhere, and tend to contain larger numbers of stone artefacts.

Witter (2004) notes that in the past 200 years, a large part of the region had been cultivated, which has led to the destruction of archaeological traces through the flattening of mounds and ploughing of the ground surface. Witter (2004) describes the mound settlements as the most extraordinary features in Australian archaeology, as they suggest the region to be a major population centre of Aboriginal Australia (Witter 2004, p. 142).

It is concluded that although the factors impacting on the preservation of open campsites in NSW vary, there are several main ones, including the erosion of soil profiles, hill slope erosion, gullying and rilling, blowouts, and clay pan expansion. He also notes that the introduction of domestic grazing animals has had a large impact on the archaeological record, as they accelerate the natural factors mentioned above (Witter 2004, p. 146).

5.3 Local Archaeological Context - AHIMS Database Search Results

A search of the AHIMS database was undertaken for the Project on 10 June 2022 (AHIMS search ID: 691058). The AHIMS database identifies the presence of registered Aboriginal sites and declared Aboriginal places within the specified Study Area.

5.3.1 AHIMS Sites Within 10 km of the Project Boundary

A total of 115 AHIMS registered sites were identified within 10 km of the Project boundary (Study Area), including:

- Three (3) Aboriginal Resource and Gathering
- Seven (7) Artefacts
- Two (2) combinations of Artefact, Earth Mound
- Five (5) combinations of Artefact, Hearth
- One (1) combination of Artefact, Hearth, Modified Tree (Carved or Scarred)
- One (1) Grinding Groove
- 85 Hearths
- Two (2) combinations of Hearth, Aboriginal Resource and Gathering
- Eight (8) Modified Tree (Carved or Scarred)
- One (1) Water Hole.

Ninety-six of these sites were identified in the vicinity of waterways within the Oolambeyan National Park. As the Project will avoid the Oolambeyan National Park and has applied a 300 m buffer to it, direct (and indirect) impacts are unlikely. Direct and indirect impacts to the remaining sites outside the Project

Boundary are also unlikely but these matters would be further investigated during the EIS phase of works as a component of the Aboriginal Cultural heritage assessment.

5.3.2 AHIMS Sites Within the Project Boundary

The results of the search indicated that there are 13 Aboriginal sites registered within the Project Boundary. No Aboriginal places were identified within the Project area. A copy of the extensive AHIMS search results is provided in **Appendix 1**, and a summary of registered AHIMS sites is presented in **Table 5.1** and illustrated on **Figure 5.1**.

Table 5.1 AHIMS Sites within the Project Boundary

Name	ID	Site Type	Site Features
South Burrabogie 1.4	48-6-0134	Open Site	Artefact, Hearth
South Burrabogie 2	48-6-0139	Open Site	Artefact, Hearth
South Burrabogie 1.5	48-6-0135	Open Site	Artefact
CC5 (CORKILL 1994)	48-6-0130	Open Site	Grinding Groove
South Burrabogie 1.2	48-6-0132	Open Site	Artefact, Earth Mound
South Burrabogie 1.7	48-6-0137	Open Site	Water Hole
PEC-E-39	48-6-0161	Open Site	Artefact
South Burrabogie 1.3	48-6-0133	Open Site	Artefact, Hearth
South Burrabogie 1.1	48-6-0131	Open Site	Artefact, Earth Mound
South Burrabogie 3	48-6-0140	Open Site	Hearth
South Burrabogie 1.6	48-6-0136	Open Site	Artefact, Hearth
PEC-E-38	48-6-0160	Open Site	Artefact
South Burrabogie 1.8	48-6-0138	Open Site	Hearth

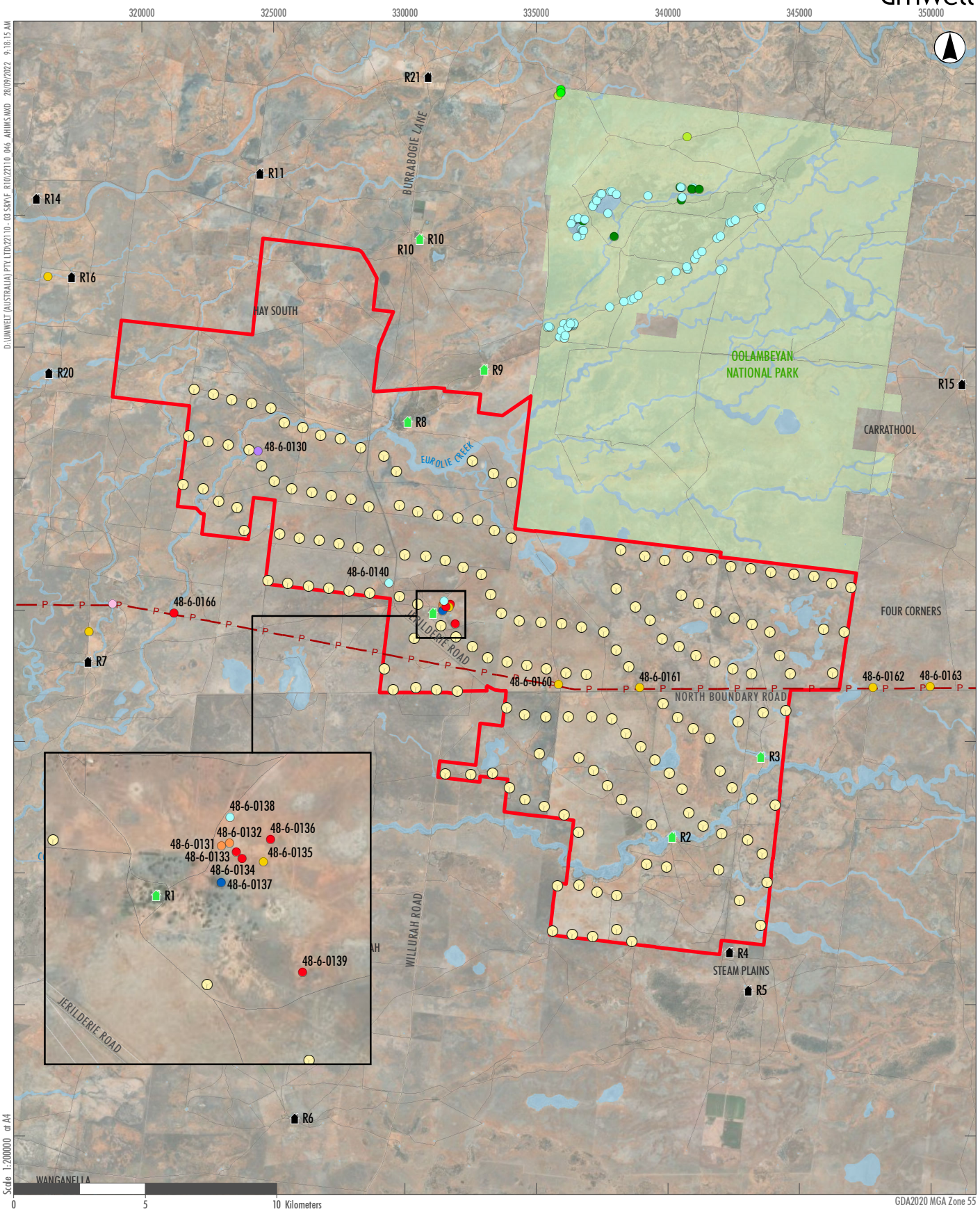
Site cards have been obtained for two (2) of these 13 AHIMS sites within the Project Boundary to gain an understanding of the nature and extent of each site, which are reproduced here in **Appendix 2**. Digital copies of site cards are not available for the other 11 AHIMS sites within the Project Boundary i.e. of the 13 sites, only two (2) digitised site cards were available. In the absence of multiple digital site cards for AHIMS sites within the Project Boundary, three (3) additional site cards were obtained for AHIMS sites within 4 km of the Project Boundary (again the extent of digital copies of site cards available). These include sites 48-6-0162, 48-6-0163 and 48-6-0166, which were reviewed to provide more context around the Aboriginal cultural heritage for the Project Area and surrounding environment. Refer to **Appendix 2** for these site cards.

The presence of these sites also indicates that an Aboriginal cultural heritage assessment or survey may have been undertaken in the area and this will be reviewed during the EIS phase. This information will assist to inform the pattern and distribution of the sites and will have implications for providing advice regarding the potential for other sites, at that later time.

The AHIMS sites within the Project Boundary (and those recorded more broadly, see below) demonstrate the presence of Aboriginal objects within the Project Area and the local area and suggest that additional Aboriginal objects/sites may be present within the Project Area.

The abovementioned potential is normal for a development of this scale and locality. Direct and indirect impacts would be further investigated during the EIS phase of works following normal Aboriginal cultural heritage assessment practices. It is noted that the presence of Aboriginal objects (including registered AHIMS sites) does not preclude any impact occurring in the vicinity of these sites. Rather, impacts to heritage sites (including total or partial loss of a site) would require detailed assessment and mitigation (e.g. surface collection or salvage excavation prior to works occurring).

Avoiding these 13 sites (and applying a suitable curtilage) would be advised to avoid direct and indirect impacts. However detailed design changes relevant to these AHIMS sites are best advised to occur during later planning approval stages e.g., Environmental Impact Statement (EIS), when detailed investigations have occurred, consultation has commenced and field works has occurred to ground-truth and survey these, and other important heritage matters. It is noted that the currently proposed wind turbine locations are at least 400 m from the identified AHIMS sites.



Legend

- Project Boundary
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- P Existing 220kV Electricity Transmission Line
- NPWS Estate
- Road
- Watercourse

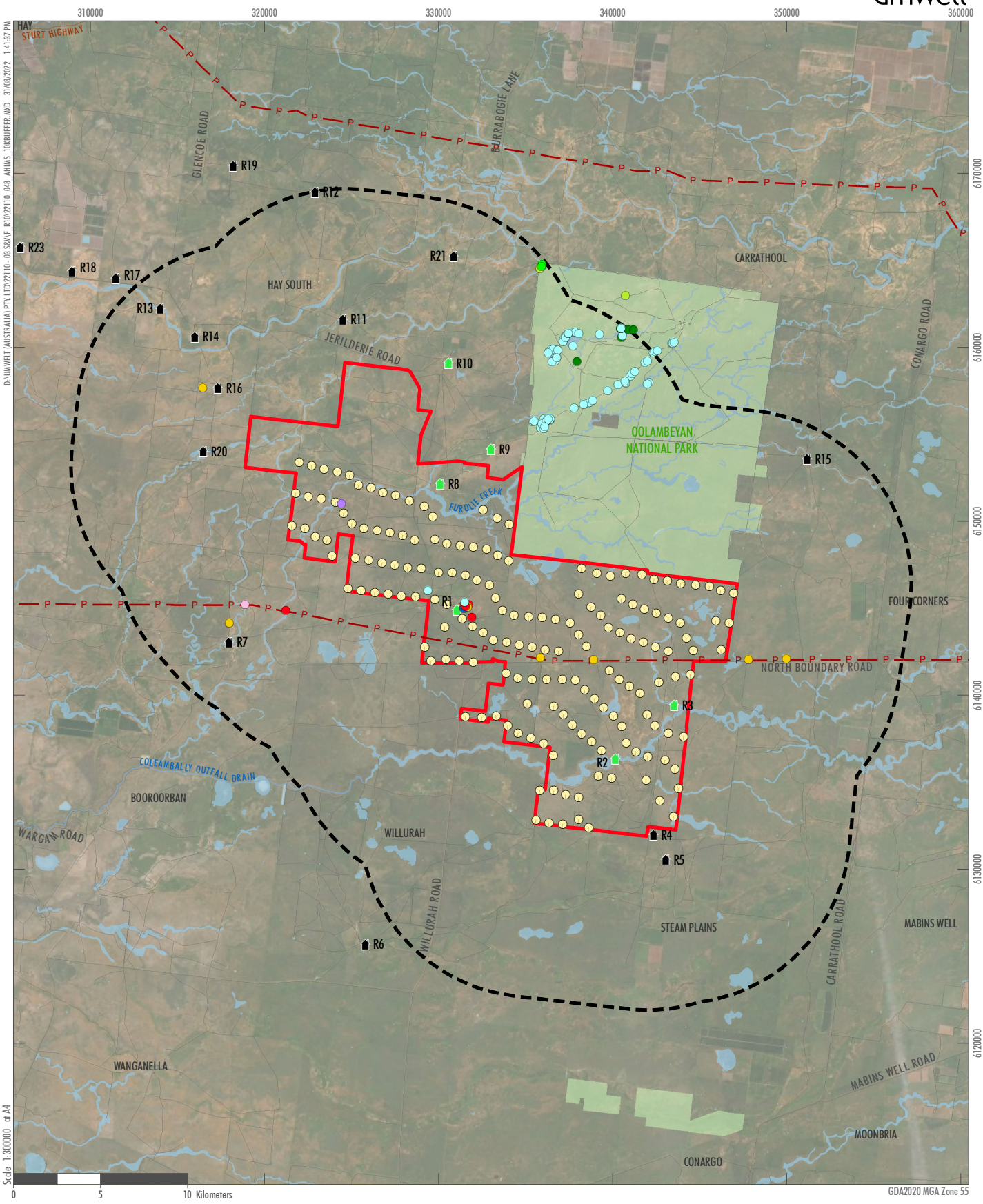
AHIMS

- Aboriginal Resource and Gathering
- Artefact
- Artefact, Earth Mound
- Artefact, Hearth
- Artefact, Hearth, Modified Tree (Carved or Scarred)
- Grinding Groove
- Hearth
- Hearth, Aboriginal Resource and Gathering
- Modified Tree (Carved or Scarred)
- Water Hole

FIGURE 5.1

Heritage Sites

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)



Legend

- Project Boundary
- Project Boundary - 10km Buffer
- Indicative Wind Turbine Locations
- Host Landowner (Dwelling)
- Non-associated Landowner (Dwelling)
- Existing 220kV Electricity Transmission Line
- NPWS Estate
- Road
- Watercourse

AHIMS

- Aboriginal Resource and Gathering
- Artefact
- Artefact, Earth Mound
- Artefact, Hearth
- Artefact, Hearth, Modified Tree (Carved or Scarred)
- Grinding Groove
- Hearth
- Hearth, Aboriginal Resource and Gathering
- Modified Tree (Carved or Scarred)
- Water Hole

FIGURE 5.2

AHIMS Sites within 10km of the Project Boundary

Image Source: ESRI Basemap (2022) Data source: NSW DFSI (2021)

5.4 Predictive Model

Predictive models provide an assessment of likely areas of archaeological potential within a given study area and are indicative of the likely types of present archaeological evidence at a given location. Predictive models comprise a series of inputs about the nature and distribution of evidence of Aboriginal land use that may be anticipated, the outcomes of which are derived based on:

- Landscape context and landform units
- Historical descriptions of Aboriginal land use
- Historical disturbance and landscape modification
- Results of previous archaeological work in the vicinity of the subject site
- Historical accounts of Aboriginal occupation, and landscape character
- Predictive modelling proposed in previous archaeological investigations.

5.4.1 Consideration of Archaeological Potential

The presence or absence of identified Aboriginal archaeological sites and non-Aboriginal heritage items/sites is often reflective of the extent of prior surveys or studies, with sites typically recorded where surveys or studies have been completed. In relation to the Project Area, it is necessary to consider the potential for additional sites/items to be present but not recorded.

The predictive statements made below (**Table 5.2**) have been drawn from publicly accessible information and technical studies, in particular the ACHAs produced by NOHC (2022) and Biosis (2017). In the absence of the same level of extensive detailed investigation undertaken by studies such as these it is deemed reasonable to utilise the below predictive statements as confident regional level predictions which would be further refined at the ACHA stage.

It is sometimes customary to visualise the below predictive statements as spatial extents within a predictive model. The research undertaken of publicly accessible information and technical studies, in particular the ACHAs produced by NOHC (2022) and Biosis (2017) has identified that a visual representation of the predictive statements below may misrepresent the spatial extent of potential sensitivities and constraints. This is due to the flat terrain and generally homogenous landscape of the Project Area. This is reflected in the Biosis (2017) ACHA that stated that the landform was reasonably uniform meaning that the predictive model gave minimal indication of areas to target for survey therefore the survey effort was targeted to micro landforms such as rises in the landscape, areas of intact vegetation and areas of increased visibility such as tracks, fence lines and exposures. It is anticipated that the landscape within the current Project Area is analogous to that assessed by Biosis (2017). Accordingly, it is recommended that these preliminary predictive statements are verified via site surveys for the Project at the ACHA stage.

Table 5.2 Aboriginal Site Predictive Statements (Modified Version of Table from Biosis 2017)

Site type	Site description	Potential
Modified Trees (scarred or carved)	Trees with cultural modifications	High: Scarred trees are the most common site type within the vicinity of the study area. Due to extensive vegetation clearance only a small number of mature native trees have survived however these do have potential to be cultural modified.
Earth Mounds	Deposits of baked clay, charcoal, shell and bone which indicate multiple occurrences of occupation. Often contain human remains.	High: Earth mounds have been recorded on AHIMS within the project area and are common in the region. They can be found near the river banks as well as in the hinterland near less permanent water sources.
Hearths	Deposits of baked clay, charcoal, shell and bone which indicate a single use event.	High: Hearths have been recorded on AHIMS within the project area and are common in the region.
Shell Middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Moderate: Shell midden sites have been recorded near to the study area and are common in the riverine and lacustrine environments.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the project area. The highly reduced lithic assemblage I the region suggests limited raw material sources.
Potential Archaeological Deposits (PADs)	Potential sub surface deposits of cultural material.	Moderate: PADs have been previously recorded in the region across a wide range of landforms. PADs are likely to be present within areas adjacent to water courses or on high points in undisturbed landforms.
Flaked Stone Artefact Scatters and Isolated Artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	High: Stone artefact sites have been previously recorded in the region on level, well-drained topographies in close proximity to reliable sources of fresh water. Due to disturbance of the site, the potential for locating stone artefacts is high.
Grinding Grooves	Grooves created in stone platforms through ground stone tool manufacture.	Moderate: grinding grooves have been recorded on AHIMS within the project area but are uncommon in the region: Suitable horizontal sandstone rock outcrops occur in the project area.
Burials	Aboriginal burial sites.	Moderate: Aboriginal burial sites are generally situated within deep, soft sediments, caves or hollow trees. Areas of deep sandy deposits will have the potential for Aboriginal burials. The soil profiles associated with the study area are associated with burial sites. Burial sites have been recorded nearby.

Site type	Site description	Potential
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Low: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist, which are not present in the project area.
Aboriginal Ceremony and Dreaming Sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Moderate: There are currently no recorded mythological stories for the project area however they are known to occur in the region.
Post-Contact Sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post contact Aboriginal use.	Moderate: There are currently no recorded post-contact sites recorded in the project area however they are known to occur in the region.
Aboriginal Places	Aboriginal places may not contain any “archaeological” indicators of a site, but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often, they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low: There are currently no recorded Aboriginal historical associations for the project area.

6.0 Recommendations

In summary, the AHIMS database search indicated that there are 115 Aboriginal sites registered within the Study Area. No Aboriginal places were identified within the Study Area. There are no heritage items within the Project Area listed on World, National or Commonwealth heritage registers. Searches of the Hay Local Environment Plan 2011, Conargo Local Environmental Plan 2013, Murrumbidgee Local Environmental Plan 2013 and NSW State Heritage Inventory were undertaken and no listed heritage items were identified within 10 km of the Project.

6.1 Aboriginal Heritage

Based on prior windfarm experience, it is our understanding that SEARs for the project will require that an Aboriginal Cultural Heritage Assessment Report (ACHAR) be completed as a part of the EIS. The ACHAR would then be undertaken in accordance with the following key guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)
- *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010a).

The ACHAR will include consultation with the registered Aboriginal parties for the Project in determining and assessing impacts, developing and selecting options and mitigation measures, having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010b). The ACHAR would include:

- Consultation with the local Aboriginal community.
- Review of the Aboriginal cultural heritage context for the Project Area.
- Survey of the Project Area to identify any additional sites and to identify key areas of archaeological potential.
- Test excavation within identified areas of archaeological potential likely to be impacted by the Project.
- Assessment of the Aboriginal cultural significance for the Project Area.
- Assessment of impacts on Aboriginal cultural significance for the Project Area.
- Recommendations and mitigation measures for the development of the Project.

The significance of unknown Aboriginal objects cannot be determined until a survey of the Project is completed, and until then targeted mitigation and management measures cannot be defined. Salvage works should be anticipated where harm to significant sub-surface Aboriginal objects cannot be avoided. Where harm cannot be avoided to surface Aboriginal objects, regardless of significance, it is likely that a salvage of surface artefacts will be required.

A range of management strategies may be available in relation to the Project that include varying levels of mitigation of identified sites or potential harm to Aboriginal cultural heritage. The micro-siting of infrastructure will allow for some flexibility in the management of Aboriginal cultural heritage. When impacts to sites or areas of archaeological potential are unavoidable, a strategy will be developed that

involves implementing appropriate measures to manage and mitigate these impacts with reference to the archaeological and Aboriginal cultural significance of the sites/areas of potential.

It is noted that formal notification process for the Aboriginal Cultural Heritage Assessment may commence with the completion of this assessment, at the latest it should commence following receipt of the SEARs. Once commenced, detailed consultation will be undertaken should be the Registered Aboriginal Parties (RAPs) for the Project. Consultation should be undertaken in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

6.2 Historic Heritage

Despite no registered non-Aboriginal heritage items being located within the Study Area it is likely (based on our knowledge of other recent wind farm SEARs) that a Historic Heritage Assessment (HHA) would be conditioned within the SEARs to support the EIS.

The historic heritage assessment would assess the potential for unlisted heritage items and non-Aboriginal archaeological remains to be present within the Project area and evaluate the potential direct and indirect impacts of the Project. The HHA will be prepared with regard to the NSW Heritage Manual, relevant Heritage Council of NSW guidelines and with consideration of the principles contained in *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance* (ICOMOS, 2013).

6.2.1 Wind Farm Design Revisions

Based on the information reviewed to date Umwelt recommended BayWa r.e.:

- Consider the location and extent of AHIMS sites within the Project Area i.e. 48-6-0134, 48-6-0139, 48-6-0135, 48-6-0130, 48-6-0132, 48-6-0137, 48-6-0161, 48-6-0133, 48-6-0131, 48-6-0140, 48-6-0136, 48-6-0160 and 48-6-0138, and avoid these where possible.
- Avoid key watercourses by applying an appropriate buffer around waterbodies, riparian land and creek lines, where possible.

The above recommendations are suitable to the Project stage and have been considered by BayWa r.e. as part of Scoping stage Project design revisions. At this stage it is not be possible to provide advice on design considerations to avoid harm to unknown Aboriginal objects. Further, the background research has only resulted in the development of predictive statement regarding the likely location of Aboriginal objects that would be refined during the EIS and detailed design stages of the Project.

Note that Biosis (2017) stated in the ACHA for the Hay Solar Farm that the landform was reasonably uniform meaning that the predictive model gave minimal indication of areas to target for survey therefore the survey effort was targeted to micro landforms such as rises in the landscape, areas of intact vegetation and areas of increased visibility such as tracks, fence lines and exposures. It is anticipated that the landscape within the current project area is analogous to that assessed by Biosis (2017).

Preliminary analysis does however indicate that the Project design can accommodate the avoidance of existing registered sites. It is expected that additional Aboriginal sites and values will be present in the Project Area and a detailed ACHAR will be undertaken to assess potential impacts in accordance with the RAPs for the Project.

7.0 References

Biosis – *Darcoola West Aboriginal Cultural Heritage Assessment,* dated 2016 (Biosis, 2016)

Biosis – Hay Sun Farm, NSW. Aboriginal Cultural Heritage Assessment Report, dated 2017 (Biosis, 2017)

Bonhomme, T. - *An archaeological survey of the northwestern shore of Lake Benanee, NSW*, unpublished report to KA Simmons & Associates, Albury NSW, dated 1987 (Bonhomme, 1987)

Bowler, J.M., Macumber, P.G. - *The Riverine Plain in Northern Victoria Excursion No. 13.,* dated 1967 (Bowler and Macumber, 1967)

Kelton, J. – *An Archaeological Survey for the Proposed Gundaline Irrigation Development, between Darlington Point and Hay, South-Western New South Wales.* A Report to Twynam Pastoral Company & Booth Associates., dated 1998 (Kelton, 1998)

Littleton, J. and H. Johnston - *The Burials on Dry Lake and Tchelery.* A Report to the Hay Local Aboriginal Land Council, dated 1993 (Littleton and Johnston, 1993)

McIntyre, S - *Archaeological Survey of the Proposed Darlington Point to Deniliquin 132kV Transmission Line,* unpublished report to the Electricity Commission of NSW, dated 1985 (McIntyre, 1985)

Navin Officer Heritage Consultants – *EnergyConnect (NSW – Eastern Section) Buronga to Wagga Wagga, NSW. Aboriginal Cultural Heritage Assessment,* dated 2022 (NOHC, 2022)

NSW Government – Office of Environment and Heritage (OEH, now DPE) – *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW,* dated April 2011 (OEH, 2011)

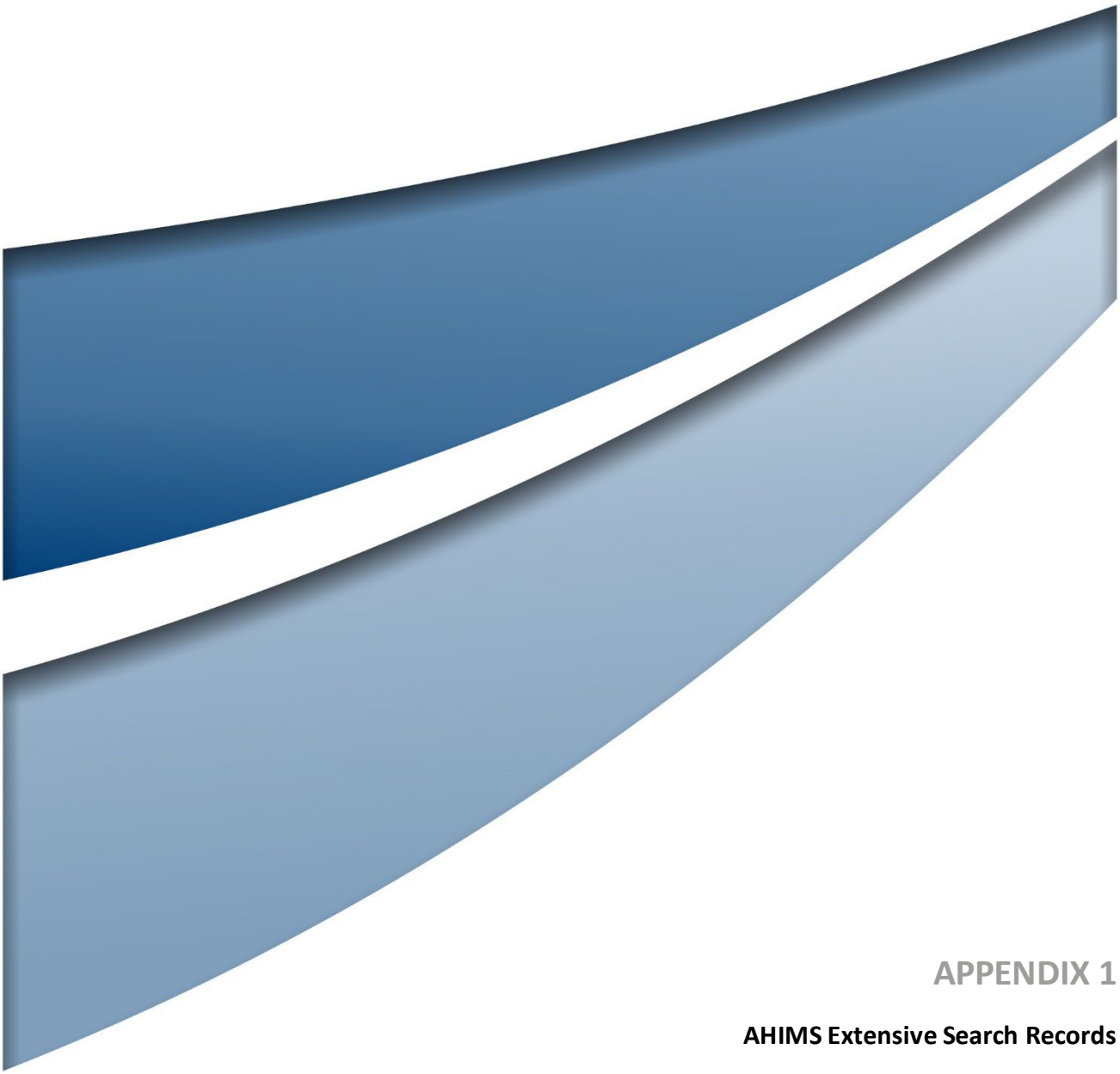
NSW Government – Department of Environment, Climate Change and Water NSW (DECCW) - *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW,* dated September 2010 (DECCW, 2010a)

NSW Government – DECCW - Aboriginal Cultural Heritage Consultation Requirements for Proponents, dated April 2010 (DECCW, 2010b)

NSW Government – National Parks and Wildlife Services - *The Bioregions of New South Wales - their biodiversity, conservation and history,* dated 2003 (NPWS, 2003)

International Council on Monuments and Sites (ICOMOS) - *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance*, dated October 2013 (ICOMOS, 2013)

Witter – *Regions and Resources.* Unpublished PhD. Australian National University, Canberra ACT, dated 2004 (Witter, 2004)



APPENDIX 1

AHIMS Extensive Search Records

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 22110_v2

Client Service ID : 691058

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
48-6-0090	Clump Paddock Three	AGD	55	338469	6156596	Open site	Valid	Hearth : 4		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0161	PEC-E-39	GDA	55	338916	6142038	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini					**Permits**		
48-6-0126	Powers 6	AGD	55	340838	6160855	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0066	ALPS PADDOCK FIVE	AGD	55	340911	6158170	Open site	Valid	Hearth : 3		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0013	Nargundi 1	AGD	55	341966	6157794	Open site	Valid	Hearth : 14		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0070	GAP PADDOCK FOUR	AGD	55	335759	6155193	Open site	Valid	Hearth : 3		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0056	Strip 3	AGD	55	335807	6164498	Open site	Valid	Aboriginal Resource and Gathering : -		98853
	Contact	**Recorders**	Mr.Kevin Kilby					**Permits**		
48-6-0080	GAP PADDOCK 14	AGD	55	336226	6155623	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0085	GAP PADDOCK NINETEEN	AGD	55	336298	6155693	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0028	Back Bromiumbong swamp 1	AGD	55	336584	6159303	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0043	Back Bromiumbong swamp 16	AGD	55	336668	6159662	Open site	Valid	Hearth : 3		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0025	Bromiumbong swamp 11	AGD	55	337039	6160219	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0022	Bromiumbong swamp 8	AGD	55	337161	6160440	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0117	little Tank	AGD	55	340397	6160396	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0140	South Burrabogie 3	AGD	55	329282	6145844	Open site	Valid	Hearth : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		
48-6-0131	South Burrabogie 1.1	AGD	55	331332	6144997	Open site	Valid	Artefact : -, Earth Mound : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		
48-6-0133	South Burrabogie 1.3	AGD	55	331415	6144960	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		

Report generated by AHIMS Web Service on 10/06/2022 for Gemma Hopkins for the following area at Search using shape-file 10km_Buffer_TB_Project_Area with a buffer of 0 meters.
Additional Info : Environmental Impact Assessment/ Development Application. Number of Aboriginal sites and Aboriginal objects found is 115

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
48-6-0163	PEC-E-41	GDA	55	349973	6142084	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini					**Permits**		
48-6-0067	GAP PADDOCK ONE	AGD	55	335311	6155570	Open site	Valid	Hearth : 2		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0097	Clump Paddock Ten	AGD	55	340661	6157760	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0124	Powers 4	AGD	55	340859	6160846	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0072	GAP PADDOCK SIX	AGD	55	335930	6155689	Open site	Valid	Hearth : 3		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0084	GAP PADDOCK EIGHTEEN	AGD	55	336288	6155623	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0035	Back Bromiumbong swamp 8	AGD	55	336244	6159576	Open site	Valid	Hearth : 3		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0041	Back Bromiumbong swamp 14	AGD	55	336574	6159670	Open site	Valid	Hearth : 9		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0029	Back Bromiumbong swamp 2	AGD	55	336635	6159240	Open site	Valid	Hearth : 5		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0093	Cllump Paddock Six	AGD	55	339620	6157338	Open site	Valid	Hearth : 4		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0118	Powers 1	AGD	55	340418	6160880	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0128	Powers 7	AGD	55	340441	6160498	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0111	Horse Paddock 18	AGD	55	343350	6160102	Open site	Valid	Hearth : -		
	Contact T Russell	**Recorders**	Steven Meredith					**Permits**		
48-6-0110	Horse Paddock 17	AGD	55	343376	6160107	Open site	Valid	Hearth : -		
	Contact T Russell	**Recorders**	Steven Meredith					**Permits**		
48-6-0136	South Burrabogie 1.6	AGD	55	331609	6145031	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		
48-6-0069	GAP PADDOCK THREE	AGD	55	335398	6155575	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0122	Scarred tree Powers 2	AGD	55	340798	6160835	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0125	Powers 5	AGD	55	340850	6160850	Open site	Valid	Hearth : -		

Report generated by AHIMS Web Service on 10/06/2022 for Gemma Hopkins for the following area at Search using shape-file 10km_Buffer_TB_Project_Area with a buffer of 0 meters.
Additional Info : Environmental Impact Assessment/ Development Application. Number of Aboriginal sites and Aboriginal objects found is 115

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0055	Strip 2	AGD	55	335819	6164592	Open site	Valid	Aboriginal Resource and Gathering : -		98853
	Contact	**Recorders**	Mr.Kevin Kilby					**Permits**		
48-6-0037	Back Bromiumbong swamp 10	AGD	55	336382	6159666	Open site	Valid	Hearth : 4		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0038	Back Bromiumbong swamp 11	AGD	55	336441	6159689	Open site	Valid	Hearth : 3		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0039	Back Bromiumbong swamp 12	AGD	55	336483	6159685	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0032	Back Bromiumbong swamp 5	AGD	55	336597	6159044	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0042	Back Bromiumbong swamp 15	AGD	55	336631	6159666	Open site	Valid	Hearth : 5		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0049	James Paddock 2	AGD	55	336659	6159598	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0027	Bromiumbong swamp 13	AGD	55	337606	6159897	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0017	Bromiumbong swamp 3	AGD	55	337691	6160714	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0016	Bromiumbong swamp 2	AGD	55	337763	6160712	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0015	Bromiumbong swamp 1	AGD	55	337935	6160622	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0129	Jacksons 1	AGD	55	339129	6160564	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0047	Spell Horse 3	AGD	55	342222	6159530	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0073	GAP PADDOCK SEVEN	AGD	55	335939	6155155	Open site	Valid	Hearth : 3		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0081	GAP PADDOCK FIFTEEN	AGD	55	336259	6155665	Open site	Valid	Hearth : 2		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0082	GAP PADDOCK SIXTEEN	AGD	55	336274	6155672	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0036	Back Bromiumbong swamp 9	AGD	55	336309	6159666	Open site	Valid	Hearth : 1		

Report generated by AHIMS Web Service on 10/06/2022 for Gemma Hopkins for the following area at Search using shape-file 10km_Buffer_TB_Project_Area with a buffer of 0 meters.
Additional Info : Environmental Impact Assessment/ Development Application. Number of Aboriginal sites and Aboriginal objects found is 115

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0040	Back Bromiumbong swamp 13	AGD	55	336477	6159701	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0030	Back Bromiumbong swamp 3	AGD	55	336659	6159240	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0024	Bromiumbong swamp 10	AGD	55	337062	6160253	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0121	Powers 3	AGD	55	340345	6160883	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0120	Scarred Tree Powers 1	AGD	55	340360	6160882	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0113	Horse Paddock 20	AGD	55	343295	6160091	Open site	Valid	Hearth : -		
	Contact T Russell	**Recorders**	Steven Meredith					**Permits**		
48-6-0137	South Burrabogie 1.7	AGD	55	331328	6144784	Open site	Valid	Water Hole : -		
	Contact	**Recorders**	Doctor.Colin Pardoe					**Permits**		
48-6-0132	South Burrabogie 1.2	AGD	55	331377	6145011	Open site	Valid	Artefact : -, Earth Mound : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		
48-6-0130	CC5 (CORKILL 1994)	GDA	55	324417	6151029	Open site	Valid	Grinding Groove : 2		
	Contact	**Recorders**	Mr.Oliver Brown					**Permits**		
48-6-0053	Four Corners 1	AGD	55	340618	6162808	Open site	Valid	Hearth : -, Aboriginal Resource and Gathering : -		98853
	Contact	**Recorders**	Mr.Kevin Kilby					**Permits**		
48-6-0065	ALPS PADDOCK FOUR	AGD	55	341016	6158333	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0063	ALPS PADDOCK TWO	AGD	55	341758	6158936	Open site	Valid	Hearth : 4		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0014	Nargundi 2	AGD	55	341877	6157723	Open site	Valid	Hearth : 9		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0046	Spell Horse 2	AGD	55	342299	6159569	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0075	GAP PADDOCK NINE	AGD	55	336086	6155576	Open site	Valid	Hearth : 2		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
48-6-0077	GAP PADDOCK ELEVEN	AGD	55	336169	6155736	Open site	Valid	Hearth : 3		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0034	Back Bromiumbong swamp 7	AGD	55	336192	6159504	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0083	GAP PADDOCK SEVENTEEN	AGD	55	336284	6155736	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0087	GAP PADDOCK TWENTY ONE	AGD	55	336323	6155688	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0044	Back Bromiumbong swamp 17	AGD	55	336732	6159648	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0026	Bromiumbong swamp 12	AGD	55	337038	6160154	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0021	Bromiumbong swamp 7	AGD	55	337191	6160475	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0020	Bromiumbong swamp 6	AGD	55	337275	6160561	Open site	Valid	Hearth : 7		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0088	Clump Paddock One	AGD	55	337674	6156331	Open site	Valid	Hearth : 1		
	Contact S Scanlon	**Recorders**	Steven Meredith					**Permits**		
48-6-0094	Clump Paddock Seven	AGD	55	340189	6157670	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0096	Clump Paddock Nine	AGD	55	340625	6157790	Open site	Valid	Hearth : 2		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0135	South Burrabogie 1.5	AGD	55	331569	6144904	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		
48-6-0062	Alps Paddock 1	AGD	55	341889	6159032	Open site	Valid	Hearth : 1		
	Contact Sarah Colley	**Recorders**	Steven Meredith					**Permits**		
48-6-0165	PEC-E-36	GDA	55	318875	6145231	Open site	Valid	Artefact : -, Hearth : -, Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini					**Permits**		
48-6-0166	PEC-E-37	GDA	55	321210	6144879	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini					**Permits**		
48-6-0078	GAP PADDOCK TWELVE	AGD	55	336179	6155682	Open site	Valid	Hearth : 7		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0091	Clump Paddock Four	AGD	55	338583	6156659	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		

Report generated by AHIMS Web Service on 10/06/2022 for Gemma Hopkins for the following area at Search using shape-file 10km_Buffer_TB_Project_Area with a buffer of 0 meters.
Additional Info : Environmental Impact Assessment/ Development Application. Number of Aboriginal sites and Aboriginal objects found is 115

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
48-6-0112	Horse Paddock 19	AGD	55	343347	6160064	Open site	Valid	Hearth : -		
	Contact T Russell	**Recorders**	Steven Meredith					**Permits**		
48-6-0109	Horse Paddock 16	AGD	55	343422	6160109	Open site	Valid	Hearth : -		
	Contact T Russell	**Recorders**	Steven Meredith					**Permits**		
48-6-0139	South Burrabogie 2	AGD	55	331793	6144274	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders**	Doctor.Sarah Martin					**Permits**		
48-6-0162	PEC-E-40	GDA	55	347789	6142051	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini					**Permits**		
48-6-0068	GAP PADDOCK TWO	AGD	55	335362	6155585	Open site	Valid	Hearth : 4		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0123	Scarred tree powers 3	AGD	55	340801	6160809	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders**	Mr.Mark Brettschneider					**Permits**		
48-6-0064	ALPS PADDOCK THREE	AGD	55	341170	6158440	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0045	Spell Horse 1	AGD	55	342447	6159633	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0071	GAP PADDOCK FIVE	AGD	55	335823	6155430	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0076	GAP PADDOCK TEN	AGD	55	336086	6155576	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0086	GAP PADDOCK TWENTY	AGD	55	336316	6155704	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0023	Bromiumbong swamp 9	AGD	55	337177	6160382	Open site	Valid	Hearth : 2		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0019	Bromiumbong swamp 5	AGD	55	337317	6160638	Open site	Valid	Hearth : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0048	James Paddock 1	AGD	55	337841	6159007	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		
48-6-0089	Clump Paddock Two	AGD	55	338220	6156539	Open site	Valid	Hearth : 6		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0092	Clump Paddock Five	AGD	55	338749	6156783	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders**	Steven Meredith					**Permits**		
48-6-0095	Clump Paddock Eight	AGD	55	340609	6157882	Open site	Valid	Hearth : 1		

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 22110_v2

Client Service ID : 691058

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact Searle	**Recorders** Steven Meredith						**Permits**		
48-6-0134	South Burrabogie 1.4	AGD	55	331448	6144923	Open site	Valid	Artefact : -, Hearth : -		
	Contact	**Recorders** Doctor.Sarah Martin						**Permits**		
48-6-0160	PEC-E-38	GDA	55	335834	6142168	Open site	Valid	Artefact : -		
	Contact	**Recorders** Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini						**Permits**		
48-6-0127	Scarred tree Powers 4	AGD	55	341083	6160806	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact Searle	**Recorders** Mr.Mark Brettschneider						**Permits**		
48-5-0204	Glenmore grinding stone 1	GDA	55	316429	6157671	Open site	Valid	Artefact : -		
	Contact	**Recorders** Mr.Peter Ingram						**Permits**		
48-6-0164	PEC-E-35	GDA	55	317974	6144178	Open site	Valid	Artefact : -		
	Contact	**Recorders** Navin Officer Heritage Consultants Pty Ltd,Mrs.Elisa Scorsini						**Permits**		
48-6-0057	Strip 4	AGD	55	335707	6164359	Open site	Valid	Aboriginal Resource and Gathering : -, Hearth : -		98853
	Contact	**Recorders** Mr.Kevin Kilby						**Permits**		
48-6-0054	Strip 1	AGD	55	335804	6164476	Open site	Valid	Aboriginal Resource and Gathering : -		98853
	Contact	**Recorders** Mr.Kevin Kilby						**Permits**		
48-6-0074	GAP PADDOCK EIGHT	AGD	55	335987	6155249	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders** Steven Meredith						**Permits**		
48-6-0079	GAP PADDOCK THIRTEEN	AGD	55	336190	6155716	Open site	Valid	Hearth : 1		
	Contact Searle	**Recorders** Steven Meredith						**Permits**		
48-6-0033	Back Bromiumbong swamp 6	AGD	55	336413	6158995	Open site	Valid	Hearth : 2		
	Contact	**Recorders** Steven Meredith						**Permits**		
48-6-0031	Back Bromiumbong swamp 4	AGD	55	336678	6159223	Open site	Valid	Hearth : 7		
	Contact	**Recorders** Steven Meredith						**Permits**		
48-6-0018	Bromiumbong swamp 4	AGD	55	337363	6160638	Open site	Valid	Hearth : 2		
	Contact	**Recorders** Steven Meredith						**Permits**		
48-6-0119	Powers 2	AGD	55	340383	6160884	Open site	Valid	Hearth : -		
	Contact Searle	**Recorders** Mr.Mark Brettschneider						**Permits**		
48-6-0138	South Burrabogie 1.8	AGD	55	331378	6145158	Open site	Valid	Hearth : -		
	Contact	**Recorders** Doctor.Sarah Martin						**Permits**		

Report generated by AHIMS Web Service on 10/06/2022 for Gemma Hopkins for the following area at Search using shape-file 10km_Buffer_TB_Project_Area with a buffer of 0 meters.
Additional Info : Environmental Impact Assessment/ Development Application. Number of Aboriginal sites and Aboriginal objects found is 115

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 22110_v2

Client Service ID : 691058

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports

**** Site Status**

Valid - The site has been recorded and accepted onto the system as valid

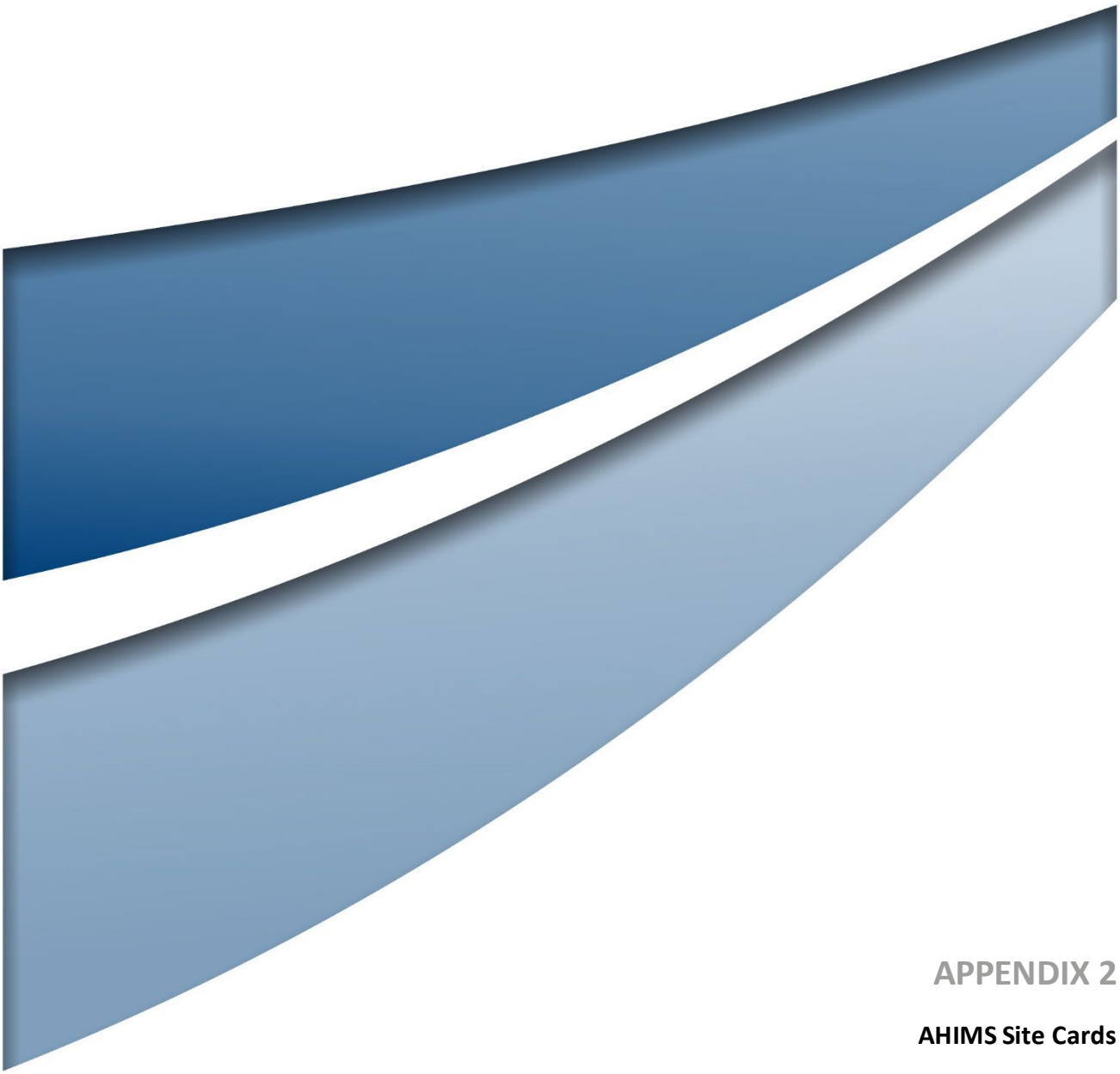
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 10/06/2022 for Gemma Hopkins for the following area at Search using shape-file 10km_Buffer_TB_Project_Area with a buffer of 0 meters.

Additional Info : Environmental Impact Assessment/ Development Application. Number of Aboriginal sites and Aboriginal objects found is 115



APPENDIX 2

AHIMS Site Cards

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville 2220 NSW

AHIMS site ID: 48-6-0160 **Date recorded:** 01-12-2021

Site Location Information

Site name: PEC-E-38

Easting: 335834 **Northing:** 6142168 **Coordinates must be in GDA (MGA)**

Horizontal Accuracy (m): 5

Zone: 55 **Location method:** Non-Differential GPS

Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
Mrs.	Scorsini	Elisa

Organisation: Navin Officer Heritage Consultants

Address: 44 French Street, Hackett, 2602

Phone: 0492490126 **E-mail:** escorsini@nohc.com.au

Site Context Information

Land Form Pattern: Plain **Land Use:** Farming Low Intensity

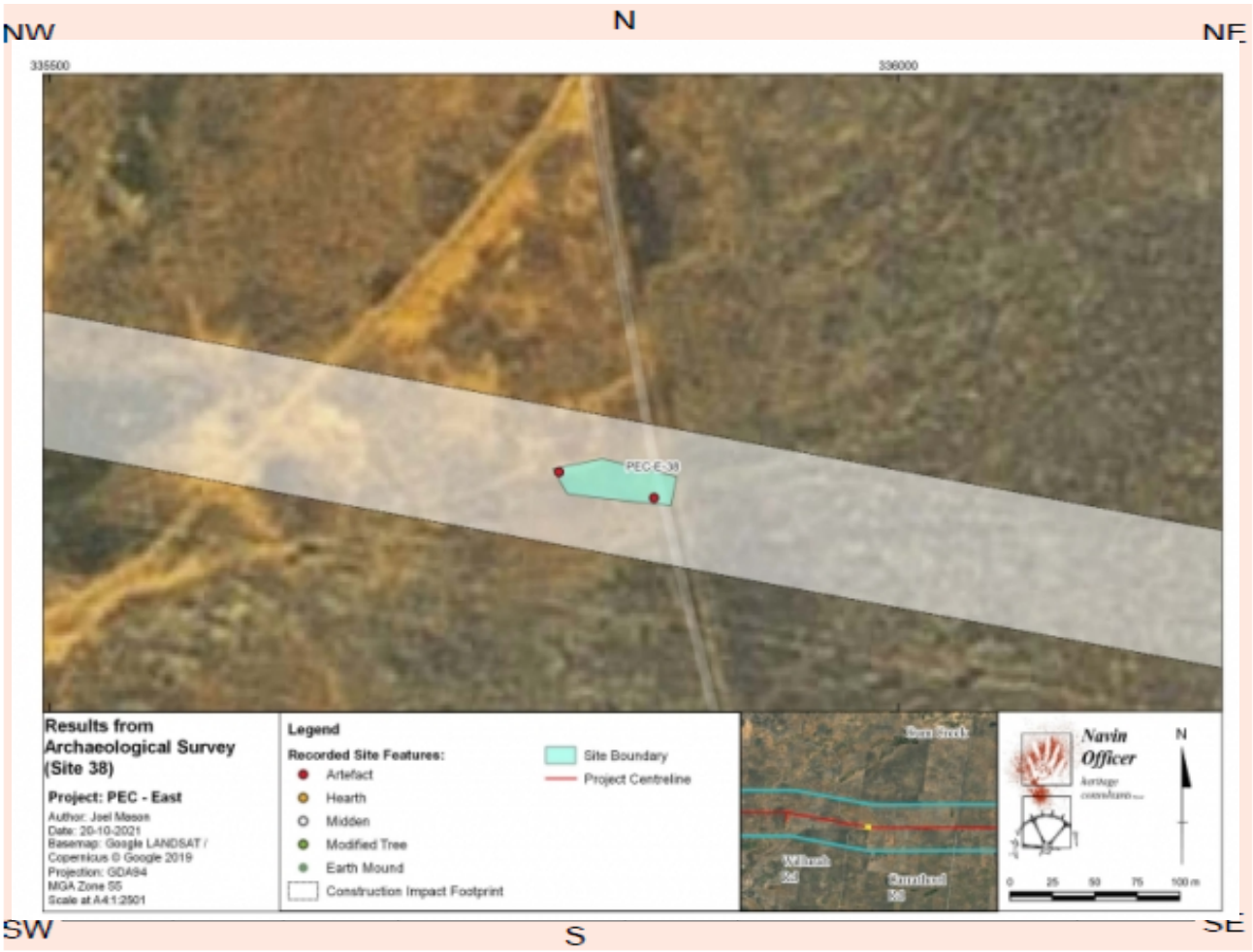
Land Form Unit: Flat **Vegetation:** Cleared

Distance to Water (m): 3218 **Primary Report:** EnergyConnect Eastern Section NSW

How to get to the site: The site is located 270 metres North of North Boundary Road

Other site information:

Site location map



Site contents information

open/closed site: Open

Site condition: Disturbed

Features:	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
1. Artefact	6	20	20				

Description:

Artefact types were flakes with material types including quartz, fgs and chalcedony

Features:	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
2.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
3.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
4.							

Description:

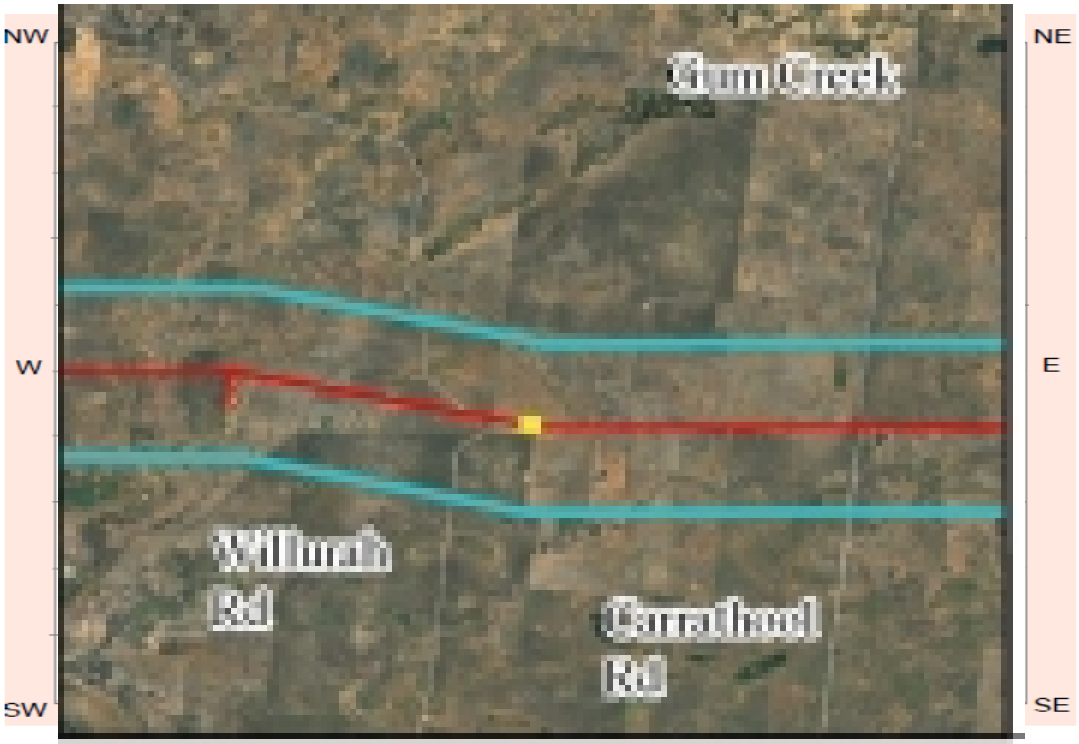
Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
5.							

Description:

Other Site Info:

Site plan



Site photographs

Description: Artefact

Description:

Description:

Description:

Site restrictions

Do you want to Restrict this site?:

Restriction type: Gender General Location

Why is this site restricted?:

Further information contact

Title **Surname** **First name**

Organisation:

Address:

Phone: **E-mail:**

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville 2220 NSW

AHIMS site ID: 48-6-0161 **Date recorded:** 01-12-2021

Site Location Information

Site name: PEC-E-39

Easting: 338916 **Northing:** 6142038 **Coordinates must be in GDA (MGA)**

Horizontal Accuracy (m): 5

Zone: 55 **Location method:** Non-Differential GPS

Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
Mrs.	Scorsini	Elisa

Organisation: Navin Officer Heritage Consultants

Address: 44 French Street, Hackett, 2602

Phone: 0492490126 **E-mail:** escorsini@nohc.com.au

Site Context Information

Land Form Pattern: Plain **Land Use:** Farming Low Intensity

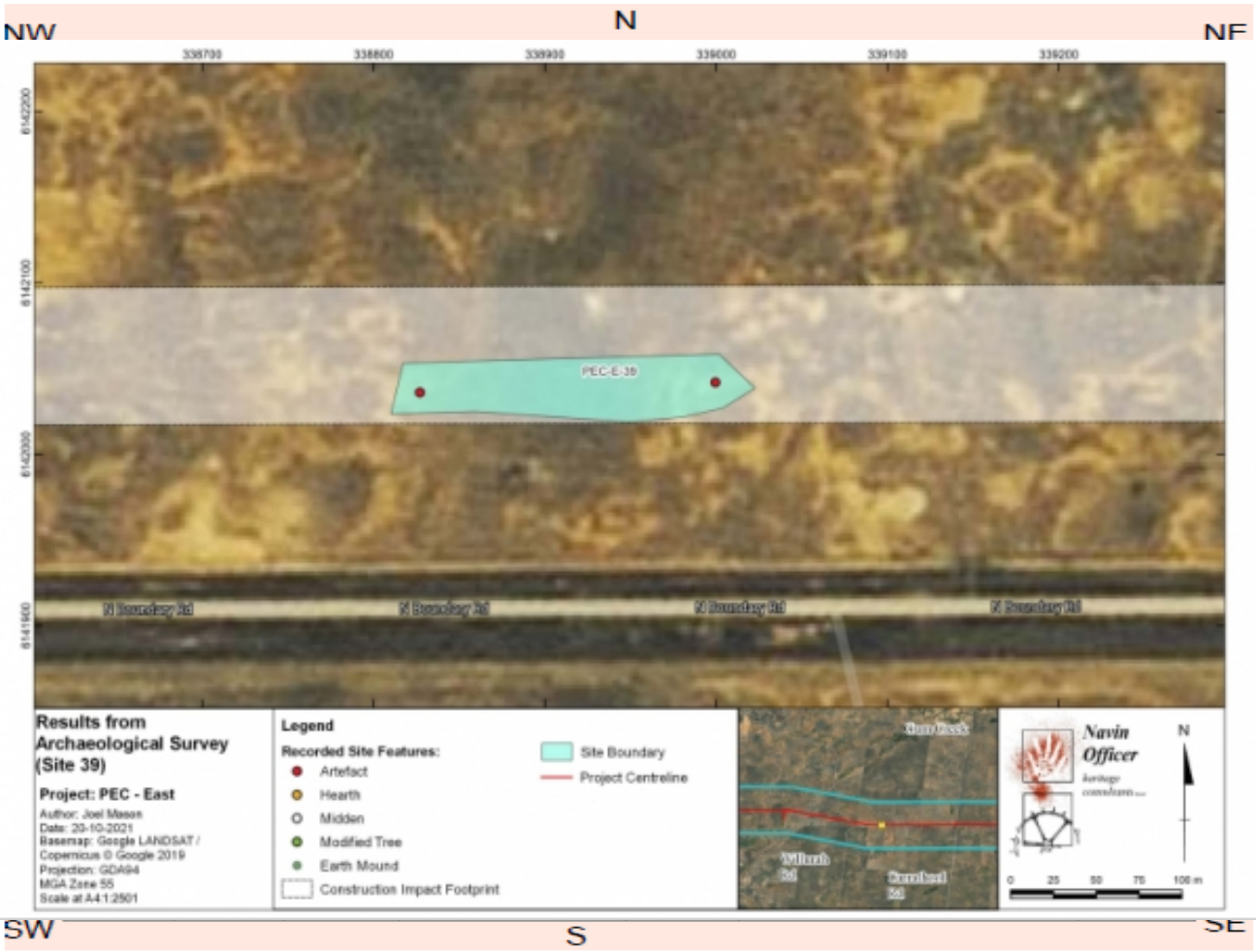
Land Form Unit: Flat **Vegetation:** Scrub

Distance to Water (m): 2420 **Primary Report:** EnergyConnect Eastern Section NSW

How to get to the site: The site is located 120 metres north of North Boundary Road

Other site information:

Site location map



Site contents information

open/closed site: Open

Site condition: Erosion

Features:	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
1. Artefact	30	200	100				

Description:

Artefact types were flakes, retouched flakes, flaked pieces and cores with material types including quartz, quartzite and silcrete.

Features:	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
2.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
3.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
4.							

Description:

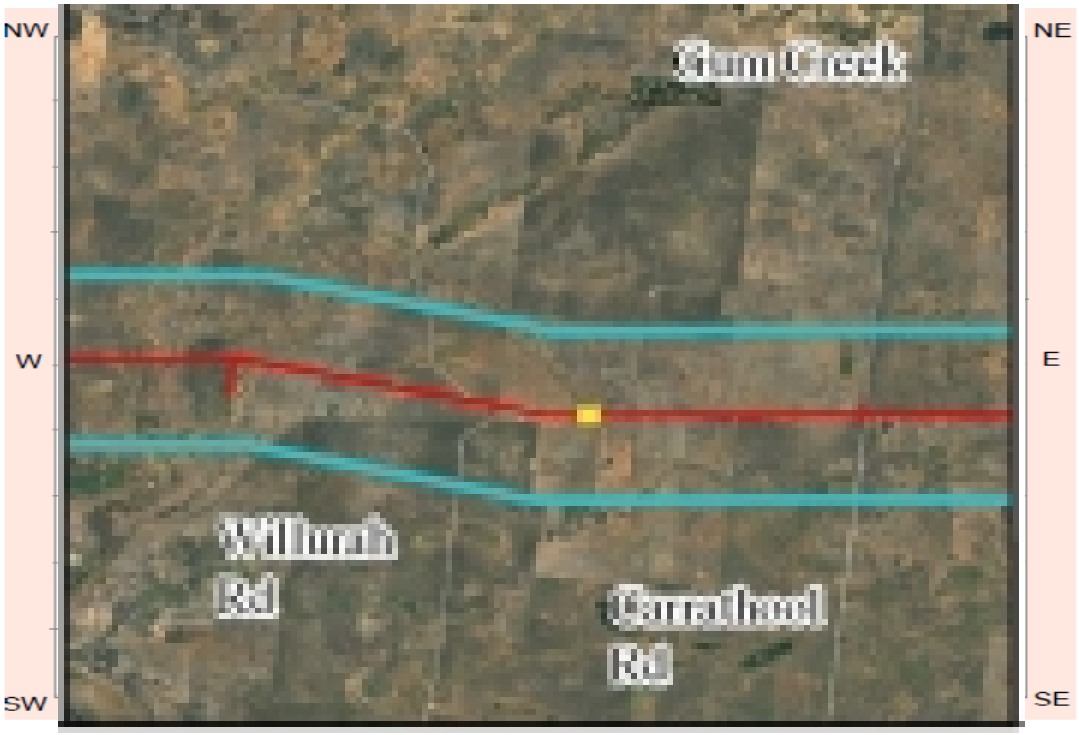
Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
5.							

Description:

Other Site Info:

Site plan



Site photographs

Description: aRTEFACT

Description:

Description:

Description:

Site restrictions

Do you want to Restrict this site?:

Restriction type: Gender General Location

Why is this site restricted?:

Further information contact

Title **Surname** **First name**

Organisation:

Address:

Phone: **E-mail:**

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville 2220 NSW

AHIMS site ID: 48-6-0162 **Date recorded:** 01-12-2021

Site Location Information

Site name: PEC-E-40

Easting: 347789 **Northing:** 6142051 **Coordinates must be in GDA (MGA)**

Horizontal Accuracy (m): 5

Zone: 55 **Location method:** Non-Differential GPS

Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
Mrs.	Scorsini	Elisa

Organisation: Navin Officer Heritage Consultants

Address: 44 French Street, Hackett, 2602

Phone: 0492490126 **E-mail:** escorsini@nohc.com.au

Site Context Information

Land Form Pattern: Plain **Land Use:** Farming Low Intensity

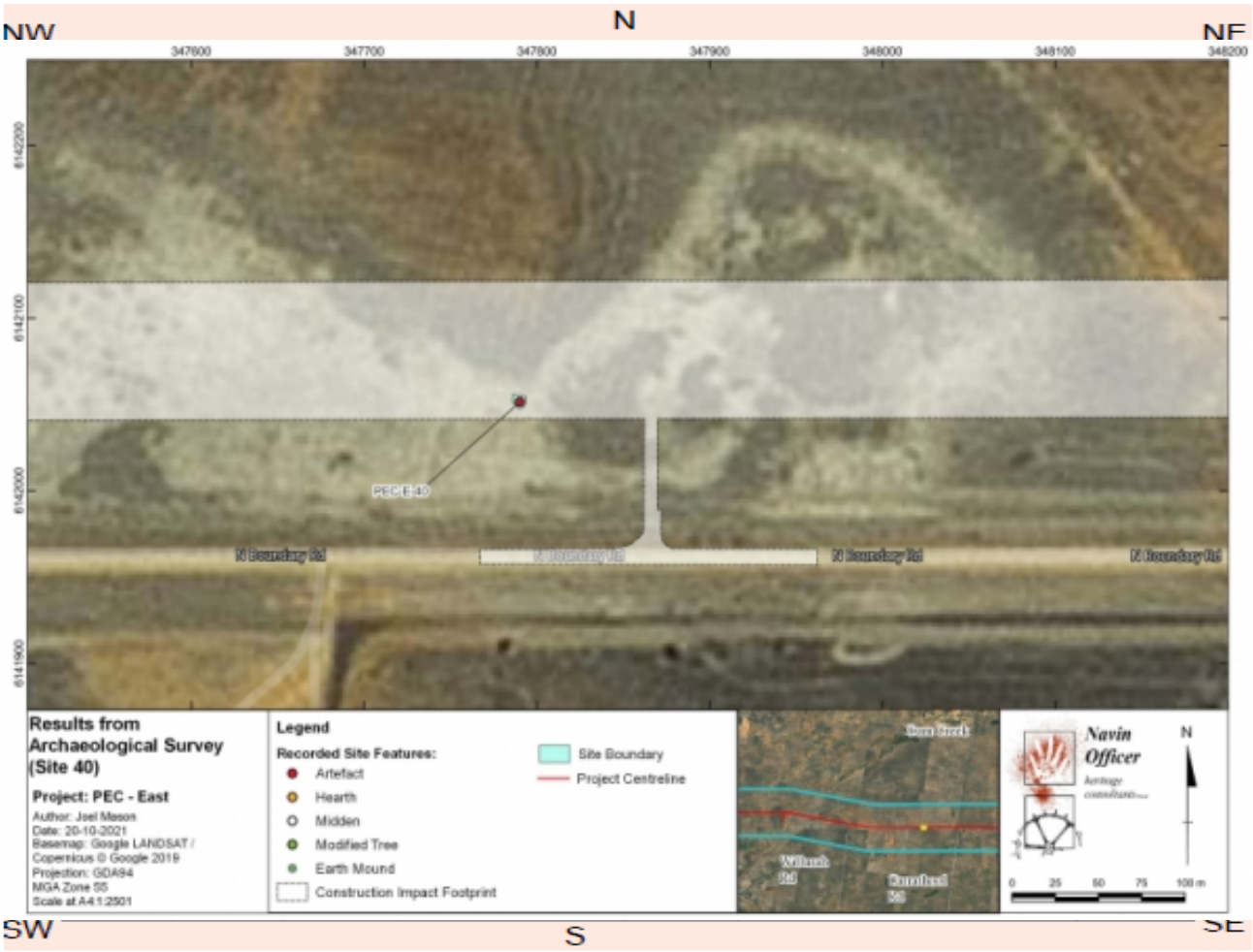
Land Form Unit: Flat **Vegetation:** Scrub

Distance to Water (m): 359 **Primary Report:** EnergyConnect Eastern Section NSW

How to get to the site: The site is located 90 metres north of Four Corners Road

Other site information:

Site location map



Site contents information

open/closed site: Open

Site condition: Erosion

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
1. Artefact	1	1	1				

Description:

This site consists of a single quartz flake

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
2.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
3.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
4.							

Description:

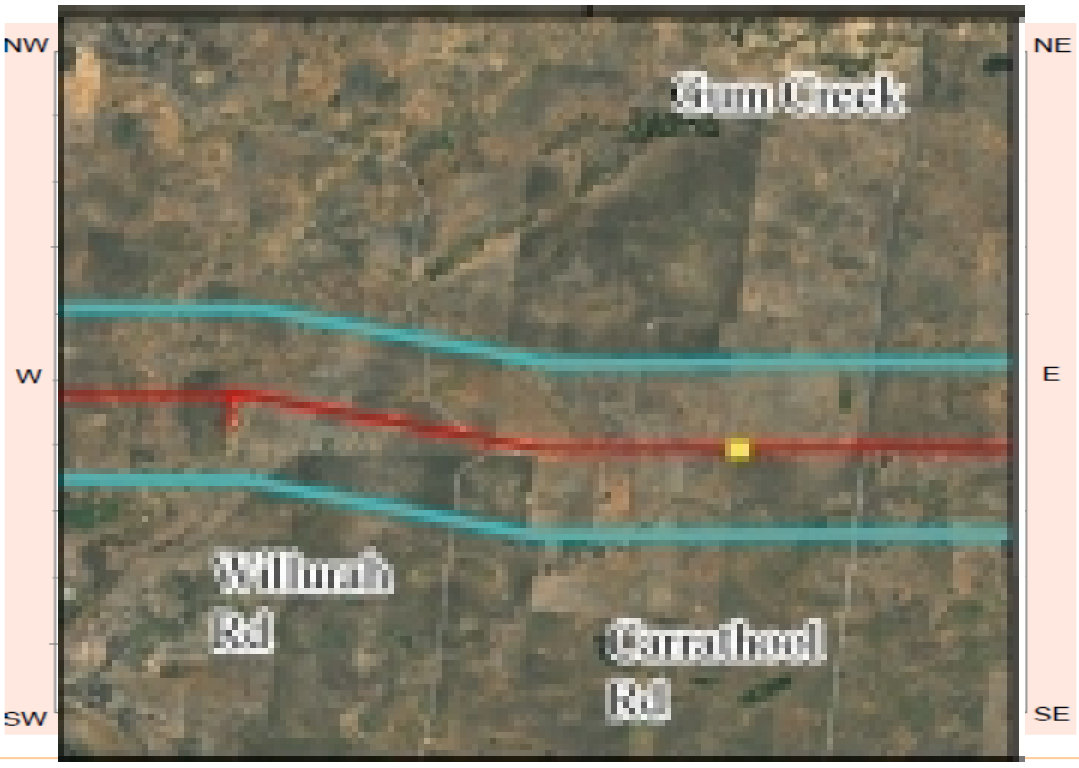
Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
5.							

Description:

Other Site Info:

Site plan



Site photographs

Description: Artefact

Description:

Description:

Description:

Site restrictions

Do you want to Restrict this site?:

Restriction type: Gender General Location

Why is this site restricted?:

Further information contact

Title **Surname** **First name**

Organisation:

Address:

Phone: **E-mail:**

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville 2220 NSW

AHIMS site ID: 48-6-0163 **Date recorded:** 01-12-2021

Site Location Information

Site name: PEC-E-41

Easting: 349973 **Northing:** 6142084 **Coordinates must be in GDA (MGA)**

Horizontal Accuracy (m): 5

Zone: 55 **Location method:** Non-Differential GPS

Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
Mrs.	Scorsini	Elisa

Organisation: Navin Officer Heritage Consultants

Address: 44 French Street, Hackett, 2602

Phone: 0492490126 **E-mail:** escorsini@nohc.com.au

Site Context Information

Land Form Pattern: Plain **Land Use:** Farming Low Intensity

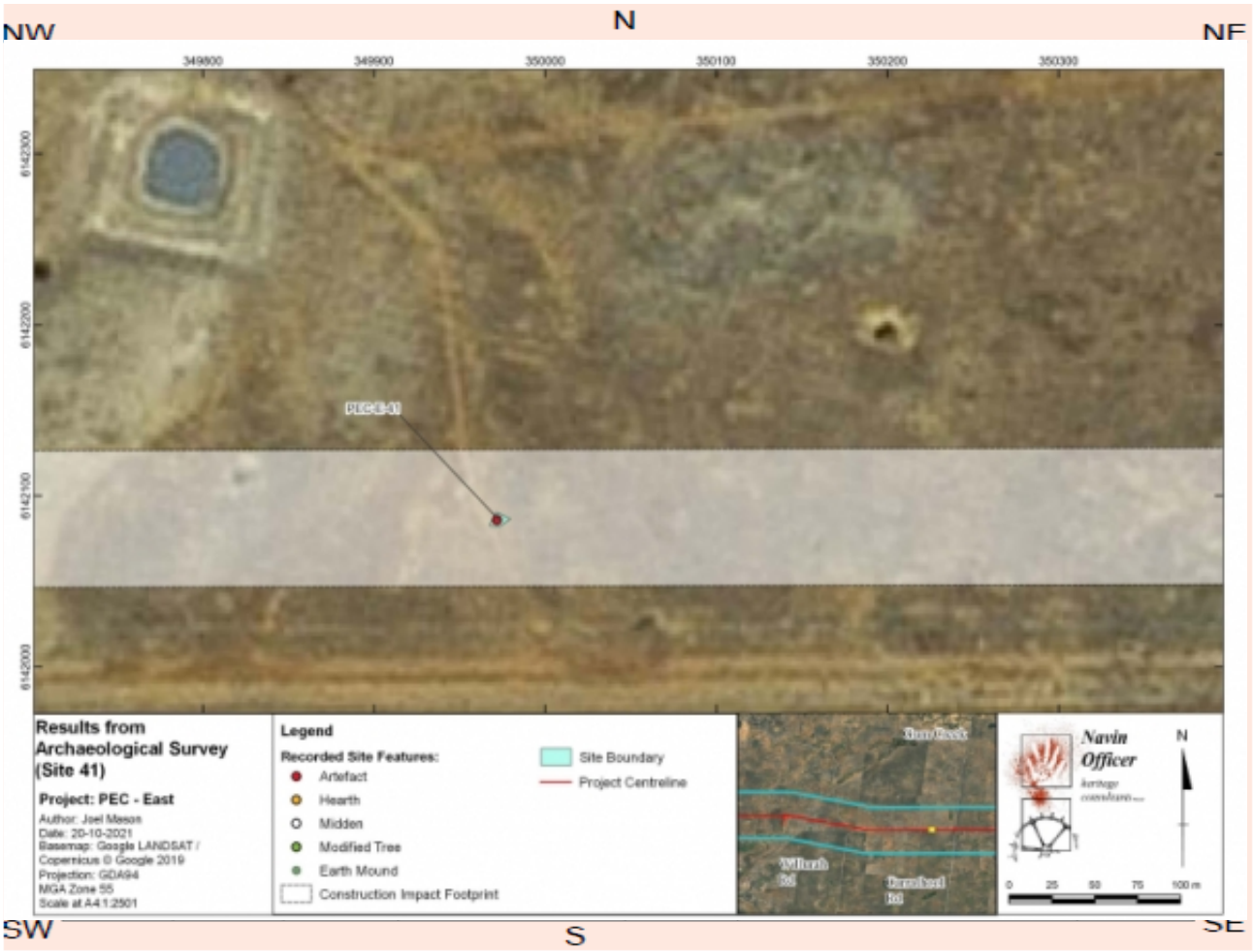
Land Form Unit: Flat **Vegetation:** Grasslands

Distance to Water (m): 41 **Primary Report:** EnergyConnect Eastern Section NSW

How to get to the site: The site is located 90 metres North of Four Corners Road

Other site information:

Site location map



Site contents information

open/closed site: Open

Site condition: Erosion

Features:

	Features:	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
1.	Artefact	1	1	1				

Description:

This site consists of a single fine grained silcrete, complete tool, Thumbnail scraper (quad 3), plain platform, trimmed exterior platform, scars from all quads (5), 14 x 13 x 2 millimetres with, 12.5x2 millimetre platform.

Features:

	Features:	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
2.								

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
3.							

Description:

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
4.							

Description:

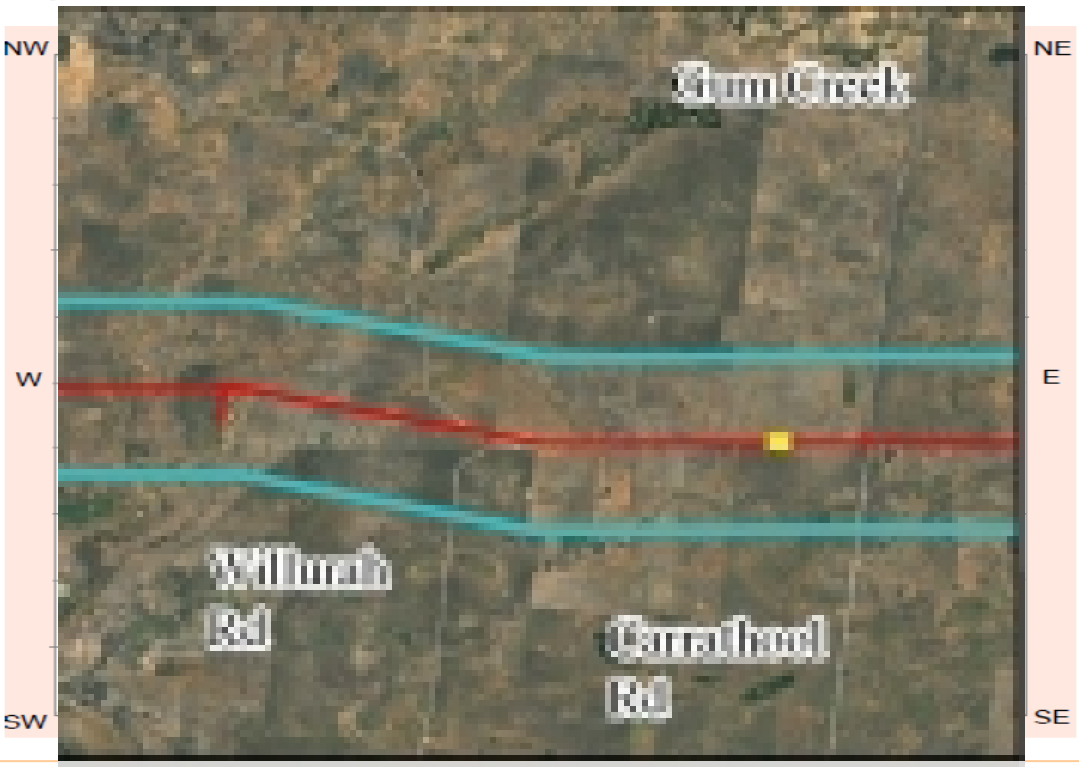
Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
5.							

Description:

Other Site Info:

Site plan



Site photographs

Description: Artefact

Description:

Description:

Description:

Site restrictions

Do you want to Restrict this site?:

Restriction type: Gender General Location

Why is this site restricted?:

Further information contact

Title **Surname** **First name**

Organisation:

Address:

Phone: **E-mail:**

Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville 2220 NSW

AHIMS site ID: 48-6-0166 **Date recorded:** 01-12-2021

Site Location Information

Site name: PEC-E-37

Easting: 321210 **Northing:** 6144879 **Coordinates must be in GDA (MGA)**

Horizontal Accuracy (m): 5

Zone: 55 **Location method:** Non-Differential GPS

Recorder Information

(The person responsible for the completion and submission of this form)

Title	Surname	First name
Mrs.	Scorsini	Elisa

Organisation: Navin Officer Heritage Consultants

Address: 44 French Street, Hackett, 2602

Phone: 0492490126 **E-mail:** escorsini@nohc.com.au

Site Context Information

Land Form Pattern: Floodplain **Land Use:** Pastoral/Grazing

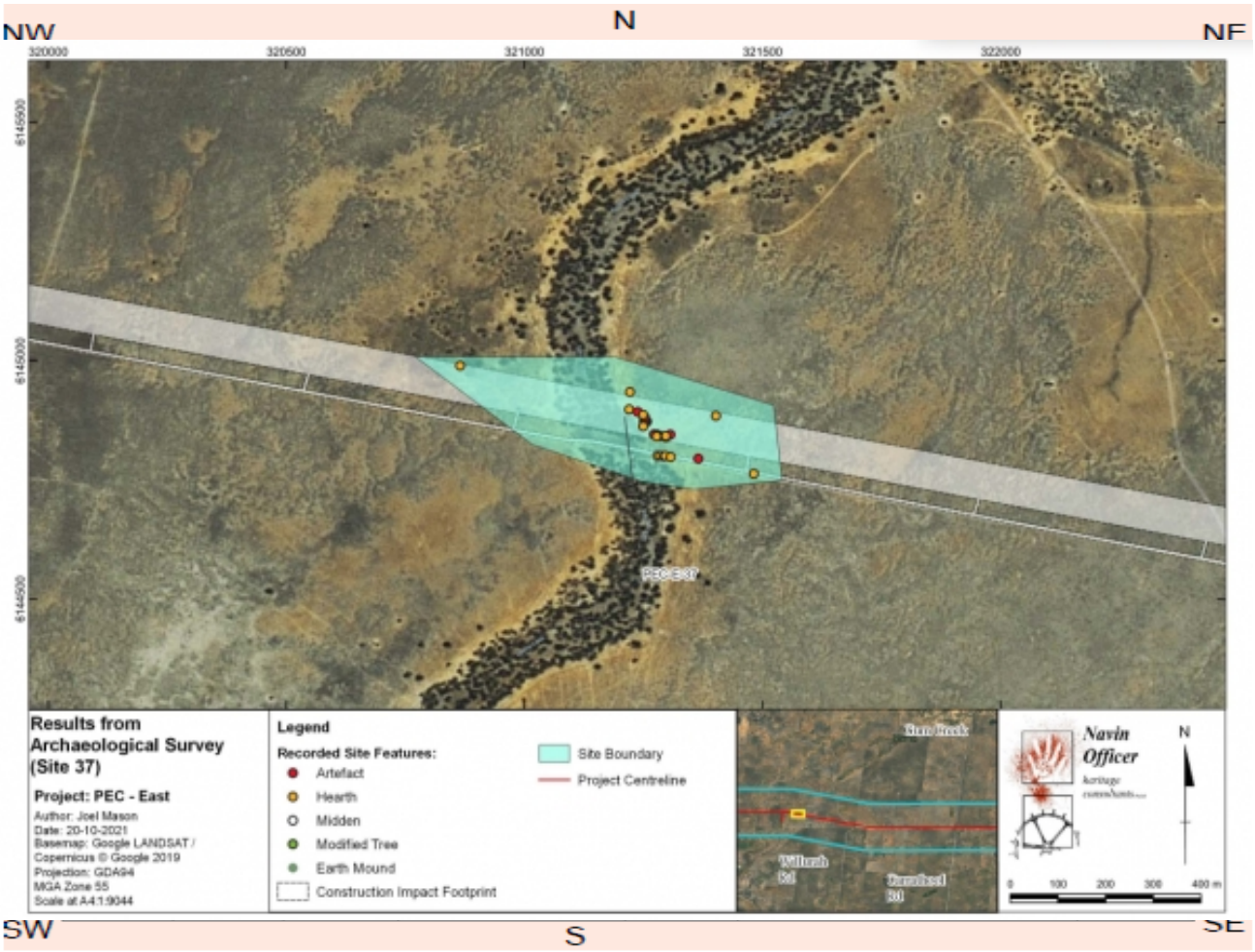
Land Form Unit: Flat **Vegetation:** Grasslands

Distance to Water (m): 102 **Primary Report:** EnergyConnect Eastern Section NSW

How to get to the site: The site is 3.9 kilometres northwest of W Burrabogie Road

Other site information:

Site location map



Site contents information

open/closed site: Open

Site condition: Erosion

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
1. Artefact	12	700	500				

Description:

. Artefact types were flakes and flaked pieces with material types being quartz, quartzite and silcrete.

Features:

	Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Regrowth (cm)	Scar shape	Tree Species
2. Hearth	10	700	500				

Description:

Hearths located within the site were comprised of clay heat retainers and varied in size and disturbance. Typically the hearths were disturbed and consisted of moderately concentrated in situ clay heat retainers with scatters of heat retainers spread across a broader area.

Features:

		Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
3.								

Description:

Features:

		Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
4.								

Description:

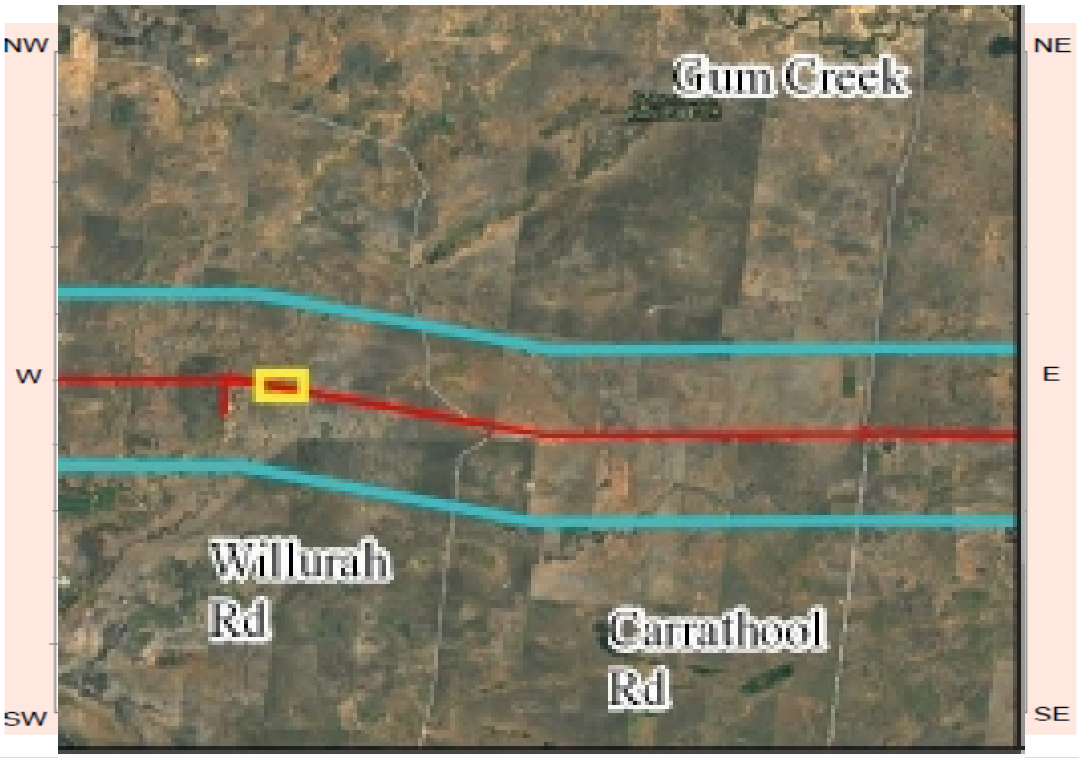
Features:

		Number of features	Length of feature(s) extent (m)	Width of feature (s) extent (m)	Scarred Trees: Scar Depth (cm)	Scarred Trees: Regrowth (cm)	Scarred Trees: Scar shape	Scarred Trees: Tree Species
5.								

Description:

Other Site Info:

Site plan



Site photographs

Description: Artefact

Description:

Description:

Description:

Site restrictions

Do you want to Restrict this site?:

Restriction type: Gender General Location

Why is this site restricted?:

Further information contact

Title **Surname** **First name**

Organisation:

Address:

Phone: **E-mail:**

BayWa r.e.

umwelt
Environmental & Social Consultants

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T| 1300 793 267 E| info@umwelt.com.au www.umwelt.com.au