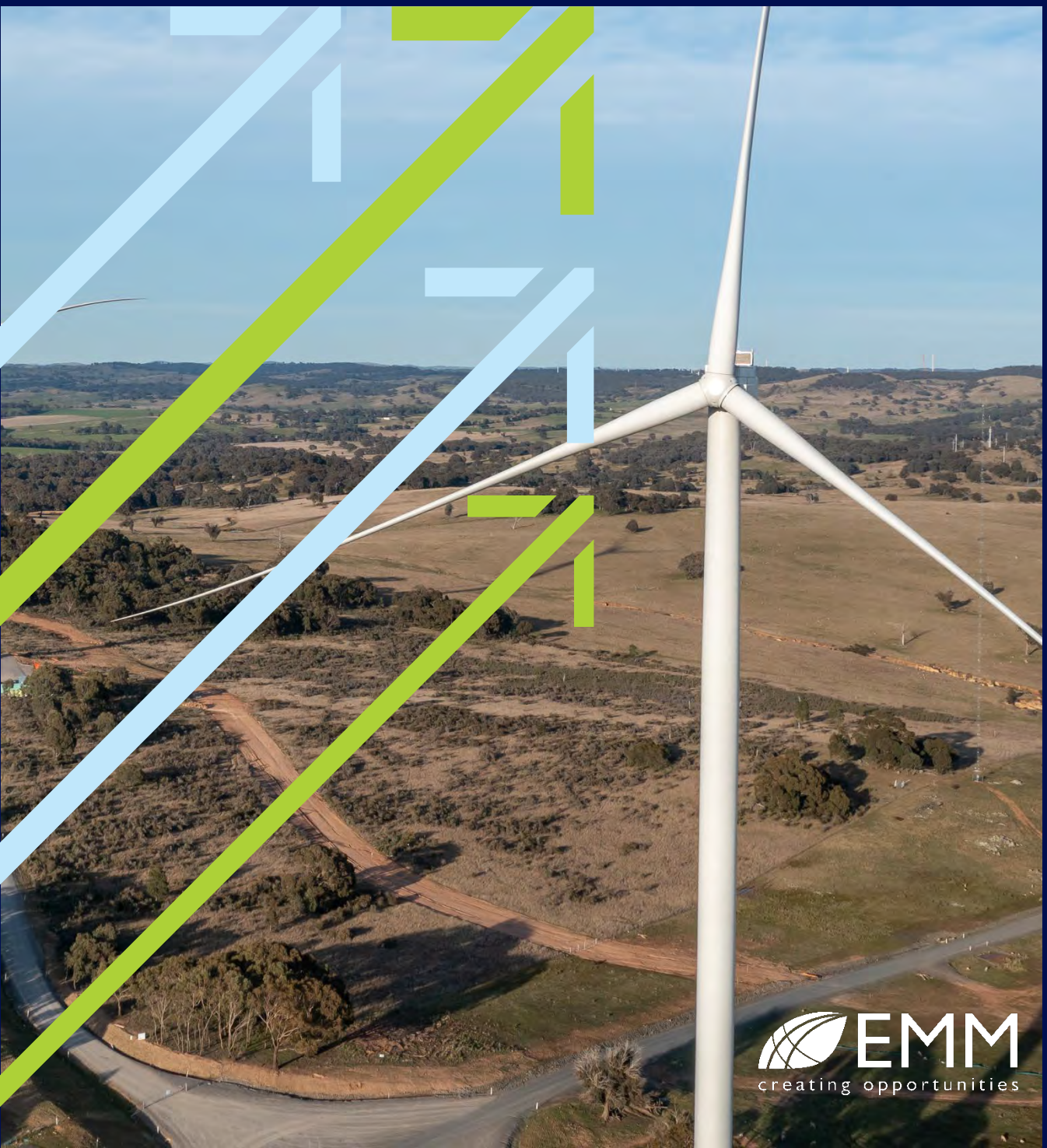
SQUADRON ENERGY

Koorakee Energy Park

Scoping Report

May 2024



Koorakee Energy Park
Scoping Report

Prepared for Squadron Energy

May 2024

Koorakee Energy Park

Scoping Report

Squadron Energy

E230637 RP#02

May 2024

Version	Date	Prepared by	Approved by	Comments
1	19 April 2024	Nadia Eisenlohr / Mark Trudgett	Christopher Holloway	Complete document issued to client
2	1 May 2024	Mark Trudgett	Christopher Holloway	Final for lodgement
3	15 May 2024	Mark Trudgett	Christopher Holloway	Updated to reflect use of 2016 VA Bulletin for Wind

Approved by

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15 May 2024

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Executive Summary

Koorakee Energy Park Pty Ltd, 'the Applicant', proposes to develop the Koorakee Energy Park (KEP), a large-scale wind and solar generation facility and battery energy storage system (BESS), supported by associated infrastructure (the project). The project is approximately 70 kilometres (km) south east of Mildura, and 12 km north of Euston in the Balranald Local Government Area (LGA) in the Riverina region of New South Wales (NSW). The project investigation area is also located directly south of the Willandra Lakes World Heritage Area.

The project will have an installed capacity of up to 2 GW, comprising up to 1 GW of wind generation capacity from approximately 167 wind turbine generators (WTGs) and up to 1 GW of solar generation capacity from approximately 3,100 ha of solar photovoltaic (PV) panels. The BESS will have a capacity of up to 1 GW and will have provision for up to 12 hours of storage (12 GWh).

The project investigation area is approximately 58,000 hectares (ha), although a proposed development corridor of approximately 13,700 ha has been presented in the scoping report. This corridor will be subject to ongoing design refinement and the final development corridor will be presented in the Environmental Impact Statement (EIS).

The project is within the South West Renewable Energy Zone (REZ) and will connect to the existing 220kV Buronga/Balranald Transgrid transmission line, which traverses the southern section of the project. The project is located within the Western Division of NSW and the land is Crown land within the Western Lands Division, where landholders hold Western Lands Lease leases with Crown Lands. Consultation has commenced with all landholders, Crown Lands and potentially impacted stakeholders.

The project is consistent with NSW government policy for development of electricity infrastructure. It will assist in meeting NSWs energy generation and storage requirements, as well as the NSW and Australian Government emissions reduction targets. It is expected that the intended generation capacity of the project could power up to one third of the households in NSW.

The project is State significant development (SSD) pursuant to Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP), being electricity generating works with a capital investment value of more than $30 million. Accordingly, approval for the project is required under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

This scoping report supports a request to the NSW Department of Planning, Housing and Infrastructure (DPHI), for Secretary's Environmental Assessment Requirements (SEARs) for the project. This scoping report provides a high-level description of the project, including the site and its surroundings, the environmental planning pathway for approval and identifies key environmental issues potentially associated with the project. This scoping report has been prepared in accordance with *State Significant Development Guidelines – Preparing a Scoping Report* (DPIE 2022a).

The aspects identified as requiring detailed assessment in the EIS include biodiversity - terrestrial, heritage, amenity – visual, noise and vibration, social and access. Aspects requiring standard assessment include land, water, air, hazards and risks, biodiversity – aquatic, economic and built environment.

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1 Introduction

1.1 Background

Koorakee Energy Park Pty Ltd, 'the Applicant', proposes to develop the Koorakee Energy Park (KEP) (the project) approximately 70 kilometres (km) south east of Mildura in the Riverina region of New South Wales. The proposed project will be developed on Crowns Land managed under the Western Lands Lease and is predominantly leased for agricultural activities.

The project will include energy generation through both wind turbine generators (WTGs) and solar photovoltaic (PV) panels, as well as battery storage, transmission, ancillary and temporary infrastructure. The project will have an installed capacity of up to approximately 2 gigawatts (GW), comprising approximately 1 GW of installed capacity from each of the wind and solar components. The Battery Energy Storage System (BESS) is proposed to have a capacity of up to approximately 1 GW and will have provision for up to 12 hours of storage (12 gigawatts hours (GWh)).

1.2 Project objective

The project is within the South West Renewable Energy Zone (South West REZ), which was formally declared by the NSW Minister for Energy under Section 19(1) of the *NSW Electricity Infrastructure Investment Act 2020* and published in the NSW Gazette on Friday 4 November 2022, and an updated NSW Gazette published on 12 April 2024. The NSW Government intends that the South West REZ will have a network capacity of 3.98 GW.

It is expected that the intended capacity of the project could power up to one third of the households in NSW. The project will contribute to meeting these government objectives and carries additional benefits including:

- job creation during the construction and operational phases
- financial gain to landholders, or leaseholders through a special purpose lease mechanism, where the project is located
- indirect economic benefits to the local community throughout the life of the project
- a community benefit fund, including community sponsorship opportunities.

The project is consistent with NSW government policy for development of electricity infrastructure. It will assist in meeting NSWs energy generation and storage requirements, as well as the NSW and Australian Government emissions reduction targets.

1.3 Project overview

The key components of the project are:

- approximately 167 WTGs with a total height (tip height) of approximately 270 metres (m), with an installed generating capacity of up to 1 GW
- approximately 3,100 ha of PV panels with a generation capacity of up to 1 GW
- a network of underground and overhead powerlines will be installed across the development corridor and will connect WTGs and the solar PV panels to up to five on-site collector substations and transmission connections to connect the project to a hub or transmission line
- battery storage with a capacity of up to 1 GW and provision for up to 12 hours of storage (12 GWh)

- infrastructure including private access roads and tracks, operations and maintenance buildings
- temporary facilities such as 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.

The project investigation area is about 20 km from north to south and about 25 km from east to west, with an overall area of approximately 58,000 ha, and contains the entirety of the land holdings that overlap with the proposed development corridor. The project investigation area (labelled as 'Koorakee Energy Park' on all figures) and regional context is shown in Figure 1.1.

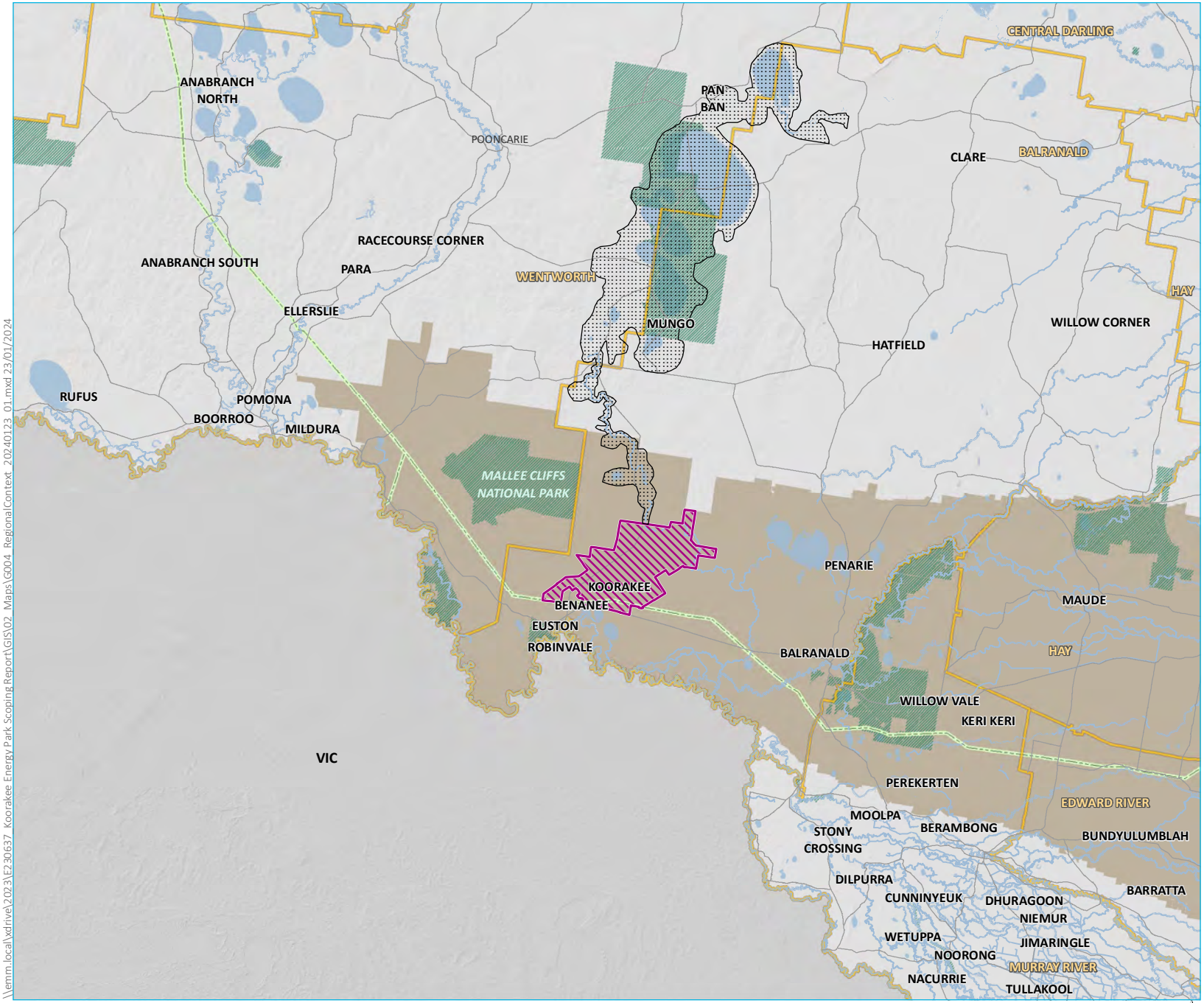
The proposed development corridor is approximately 13,700 ha. This corridor will be subject to ongoing design refinement and the final development corridor will be presented in the Environmental Impact Statement (EIS). It is noted that the proposed development corridor is a conservative area for early assessment purposes and the proposed disturbance area will likely be significantly smaller. The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of community and stakeholder engagement, engineering assessments and detailed design of project infrastructure.

The existing 220kV Buronga/Balranald Transgrid transmission line traverses the southern section of the project and the proposed Project EnergyConnect 330kV transmission line will be constructed within the existing Buronga/Balranald 220kV easement. The positioning of the project adjacent to this important piece of planned energy infrastructure will reduce the need for extensive new transmission infrastructure.

A description of the project is provided in Chapter 3. Project layout with indicative locations of project components are shown in Figure 3.1.

The project is being developed through a comprehensive process that incorporates community and stakeholder feedback to maximise positive social, economic and environmental outcomes, while minimising adverse impacts. To date, Squadron Energy has engaged with landowners and leaseholders, neighbours, First Nations stakeholders, the wider local community, Balranald Shire Council, selected government agencies, the Willandra Lakes World Heritage Committee and other stakeholders (see Chapter 5). Engagement will continue through the project planning and assessment process.

The name Koorakee (pronounced Ker-acky) was chosen based on historical investigations undertaken as part of the project development process. Koorakee was one of a number of railway stations proposed to be established along the Robinvale to Lette railway, which was part of a government scheme intended to foster settlement of the Riverina district in NSW in the 1920's. The railway line was only ever partially constructed and the remnants of the railway and the Koorakee station platform are located in the southern part of the project investigation area.



KEY

- Koorakee Energy Park
- South West renewable energy zone
- Willandra Lakes World Heritage Area
- Project Energy Connect

Existing environment

- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest
- LGA boundary

Source: EMM (2024); ABS (2021); DCSSS (2023); GA (2009); EnergyCo (2022); DPIE (2019)

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Regional context

Koorakee Energy Park
Scoping Report
Figure 1.1

EMM
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1.4 The Applicant

Koorakee Energy Park Pty Ltd is the applicant for the development application and is part of the Squadron Energy group of companies (SQE). For ease of reference, the proponent will be referred to as SQE or Squadron Energy. Squadron Energy develops, operates and owns renewables energy assets in Australia. Squadron Energy is an experienced solar and wind farm developer and operator, with a portfolio of projects in Australia:

- Sapphire Wind Farm – operating
- Crudine Ridge Wind Farm – operating
- Bango Wind Farm – operating
- Murra Wurra I and II - operating
- Sapphire Solar Farm – approved under the EP&A Act
- Uungula Wind Farm (including BESS) – approved under the EP&A Act and under construction
- Clarke Creek Solar Farm – approved under the EP&A Act and under construction
- Jeremiah Wind Farm – Scoping Report submitted in July 2021 and an EIS is being prepared
- Spicers Creek – EIS exhibited in August 2023 and Submissions Report lodged in December 2023.

Currently Squadron Energy generates enough renewable energy to power 1.35 million homes, has avoided 6 million tonnes (t) of emissions, has created over 1,900 direct jobs and provided $200 million in regional investment.

Squadron Energy continues to use its unique extensive experience in developing projects, from inception through to operations and works closely with local communities to ensure that their projects provide significant community benefits, jobs and investment to the local and regional economy.

Applicant details are provided in Table 1.1.

Table 1.1 Summary of Applicant details

Requirement	Details
Applicant name	Koorakee Energy Park Pty Ltd
Postal address	PO Box 1708, Newcastle NSW 2300
ABN	83 670 812 110

1.5 Purpose of this report

The project is State significant development (SSD) pursuant to Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP), being electricity generating works with a capital investment value of more than $30 million. Accordingly, approval for the project is required under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

An SSD application needs to be accompanied by an Environmental Impact Statement (EIS), that addresses the requirements of Part 8, Division 5, Section 190 and 192 of the NSW *Environmental Planning and Assessment*

Regulation 2021 (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) for the project.

This scoping report supports a request to the NSW Department of Planning, Housing and Infrastructure (DPHI), formerly Department of Planning and Environment (DPE), for SEARs for the project. The SEARs will identify the matters to be assessed in the EIS and the level of assessment required.

This scoping report provides a high-level description of the project, including the site and its surroundings, the environmental planning pathway for approval and identifies key environmental issues potentially associated with the project.

It has been prepared by EMM Consulting Pty Limited (EMM) on behalf of Squadron Energy in accordance with the following guidelines:

- *State significant development guidelines - preparing a scoping report: Appendix A to the state significant development guidelines* (DPIE 2022a) (Scoping Report Guidelines)
- *Social Impact Assessment Guideline* (DPE 2023a)
- *Undertaking Engagement Guidelines for State Significant Projects* (DPIE 2022b) (Engagement Guidelines)
- *Cumulative Impact Assessment Guideline for State Significant Projects* (DPIE 2022c)
- *Wind Energy Guideline for State significant wind energy development* (DPE 2016a)
- *Large-scale Solar Energy Guideline for State Significant Development (DPIE 2022d).*

The project outlined in this scoping report will be refined during the preparation of the EIS, including in response to the findings of detailed environmental investigations and feedback from community and stakeholder engagement.

1.6 Related development

There is no existing or approved development within the project investigation area that would be incorporated into the project or operated in conjunction with the project under a separate development consent or approval.

The project will ultimately connect to either the existing 220kV Buronga/Balranald Transgrid transmission line that traverses the southern section of the project or the proposed Project EnergyConnect 330kV transmission line that will be constructed within the existing Buronga/Balranald 220kV easement. The final connection proposal would depend on the final capacity of the development and would be detailed in the EIS.

2 Strategic context

2.1 Regional context

The project investigation area is within the Balranald Shire Council Local Government Area (LGA), approximately 700 km west of Sydney and 400 km north of Melbourne. The Sturt Highway, directly south of the project investigation area, connects the region to major population centres in NSW, Victoria and South Australia. The Balranald Shire Council LGA encompass an area of approximately 21,693 square kilometres (km^2) and forms part of the NSW Riverina region. The Riverina region is one of the most productive farming regions in Australia producing rice, citrus, grapes and wool. The regional context of the project is shown on Figure 1.1

The Project is located within the South West Renewable Energy Zone (South West REZ). The existing 220kV Buronga/Balranald Transgrid transmission line traverses the southern section of the project and the proposed Project EnergyConnect 330kV transmission line will be constructed within the existing Buronga/Balranald 220kV easement.

There are also a number of other SSD and SSD modification projects within the South West REZ, the Balranald LGA and the neighbouring Wentworth LGA. Of note, the Euston Wind Farm (SSD-62466963), currently preparing an EIS, is located immediately to the west of the proposed project. These are detailed further in Section 2.2.3 and Figure 2.4.

2.1.1 Towns and population centres

The project is located about 70 km south-east from Mildura, a Victorian regional centre with a population of about 34,000. A range of services to the region are located in Mildura including an airport, a hospital and other health services and a university.

There are also small townships in the vicinity of the project. Euston is approximately 12 km south west of the project and has a population of around 800 people. Robinvale (approximately 10 km south-west) is located in Victoria, east of Euston and just south of the Murray River and has a population of approximately 3,700 people. Development in and around the project is largely related to cropping and grazing and includes rural residences.

2.2 Project investigation area and surrounds

The majority of the land within the project investigation area is currently used for grazing or cropping, with scattered rural residences and agricultural structures. The project investigation area predominately consists of pasture with scattered paddock trees, with sections of intact native vegetation in the north, north-east and south-west corners of the site.

The project investigation area is directly south of the Willandra Lakes World Heritage Area (WHA), which contains important natural and cultural features.

Site access will be from the Sturt Highway via Euston Prungle Road and Benanee Road to the south of the project (Figure 2.1). Euston Prungle Road is primarily a sealed road, while Benanee Road is primarily unsealed. Internal access tracks will also be established to connect key infrastructure elements back to the Euston Prungle Road, Benanee Road and ultimately the Sturt Highway.

The project location is sparsely populated, with 13 residences within the project investigation area. Outside of the project investigation area, the population density increases towards the township of Euston and Robinvale to the south.

There are two mineral titles (Exploration Lease (EL) 5664 and EL6001) that intersect with the project investigation area in the north east, both held by Peregrine Mineral Sands Pty Ltd under the *Mining Act* 1992.

A summary of the key features of the project investigation area and surrounds is provided in Table 2.1.

Table 2.1 Key features of the project investigation area and surrounds

Aspect	Description
LGA	The project investigation area is within the Balranald Shire Council LGA.
Land zoning	The project investigation area is zoned RU1 Primary Production under the *Balranald Local Environment Plan 2010* (Balranald LEP).
Nearby townships	Nearby townships and populations include: • Euston – approximately 12km south-west (population of approximately 822 (ABS 2021)) • Robinvale – approximately 15 km south-west (population of approximately 3,740 (ABS 2021))
Landscape	The landscape within the project investigation area is mostly cleared and flat expanses used for grazing or cropping. Arumpo Creek runs through the north of the project investigation area and a number of other unnamed tributaries run throughout the site
Land use	Land use within the project investigation area includes agricultural operations (livestock grazing as well as discrete areas for cropping). There are also scattered rural residential properties.
Land ownership	The land within the project investigation area is Crown land within the Western Lands Division where landholders hold perpetual leases under the *Crown Land Management Act* 2016. Squadron Energy holds 7 licences with landholders for further investigations and is working with landholders and Crown Lands on licensing and land tenure arrangements. There is a small number of road reserves and other forms of Crown land within the project investigation area which will be identified as part of the preparation of the EIS.
Residences	There are 13 residences within the project investigation area
Nearby natural features	• Arumpo Creek • Various unnamed waterways • Willandra Lakes World Heritage Area • Mallee Cliffs National Park • Dry Lake, Lake Benanee and Lake Caringay and associated wetlands area
Nearby infrastructure	State Roads: Sturt Highway (A20) Local Roads: Benanee Road; Euston Prungle Road Energy infrastructure: 220kV Buronga/Balranald transmission line
Surrounding development	The project investigation area is within the South-West REZ. Other renewable energy and transmission developments within close proximity to the project include: • Euston Wind Farm (adjacent to the project investigation area) • Project EnergyConnect (traverses the project investigation area) Where relevant, cumulative impacts from the project and surrounding developments will be assessed in accordance with the *Cumulative Impact Assessment Guidelines for Significant Projects* (DPIE 2022c). Cumulative impacts are discussed in Section 6.3.5.

KEY

- Koorakee Energy Park
- Willandra Lakes World Heritage Area
- Project Energy Connect

Sensitive receiver

- Associated residence
- Non- associated residence

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve
- LGA boundary

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024); DCCEEW (2024)

0 5 10 km

GDA 1994 MGA Zone 54

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Local context

Koorakee Energy Park
Scoping Report
Figure 2.1

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2.2.1 Crown lands and leaseholders

The project is located within the Western Division of NSW. The land is Crown Lands within the Western Lands Division where landholders hold perpetual leases with Crown Lands under the *Crown Land Management Act* 2016.

The project investigation area includes 89 lots which total approximately 58,000 ha. The majority of the lots are leased from Crown Lands by seven leaseholders, with the remainder remaining as Crown road reserves and other smaller unleased land parcels. These leaseholders undertake agricultural operations and have private residences located within the project investigation area. The lots and leaseholders within the project investigation area and within the development corridor are detailed in Figure 2.2 and Appendix A.

There are several road reserves and other forms of Crown land within the project investigation area which will be identified and assessed as part of the preparation of the EIS.

Squadron Energy has commenced consultation with Crown Lands and leaseholders within the project investigation area. Conversations have progressed with Crown Lands and leaseholders about the conversion of leaseholds to freehold land tenure. In general, both parties have shown interest in pursuing this tenure mechanism. If freehold conversion cannot be achieved, benefit sharing mechanisms, including special purpose leases (SPLs), have also been discussed which would still allow benefit sharing with all parties hosting project elements.

2.2.2 Set aside areas

The project investigation area contains land registered as "set aside" areas under Part 5A of the *Local Land Services Act 2013* (NSW) (LLS Act) and *Land Management (Native Vegetation) Code 2018* (the Code). These areas are managed for conservation and have specific management actions which are carried out by the leaseholders.

Set aside areas are listed on a public register and must be actively managed to promote vegetation integrity in perpetuity. Once registered on the public register, the landowner/leaseholder must comply with the obligations in the Code and the mandatory code compliance certificate issued by the Local Land Services. Set-aside certificates may include details such as the type of vegetation contained in the set-aside areas. Landholders are required to undertake reasonable efforts to promote vegetation integrity in the set-aside area.

Schedule 5A of the LLS Act permits clearing of set aside areas with approval or authority under another Act.

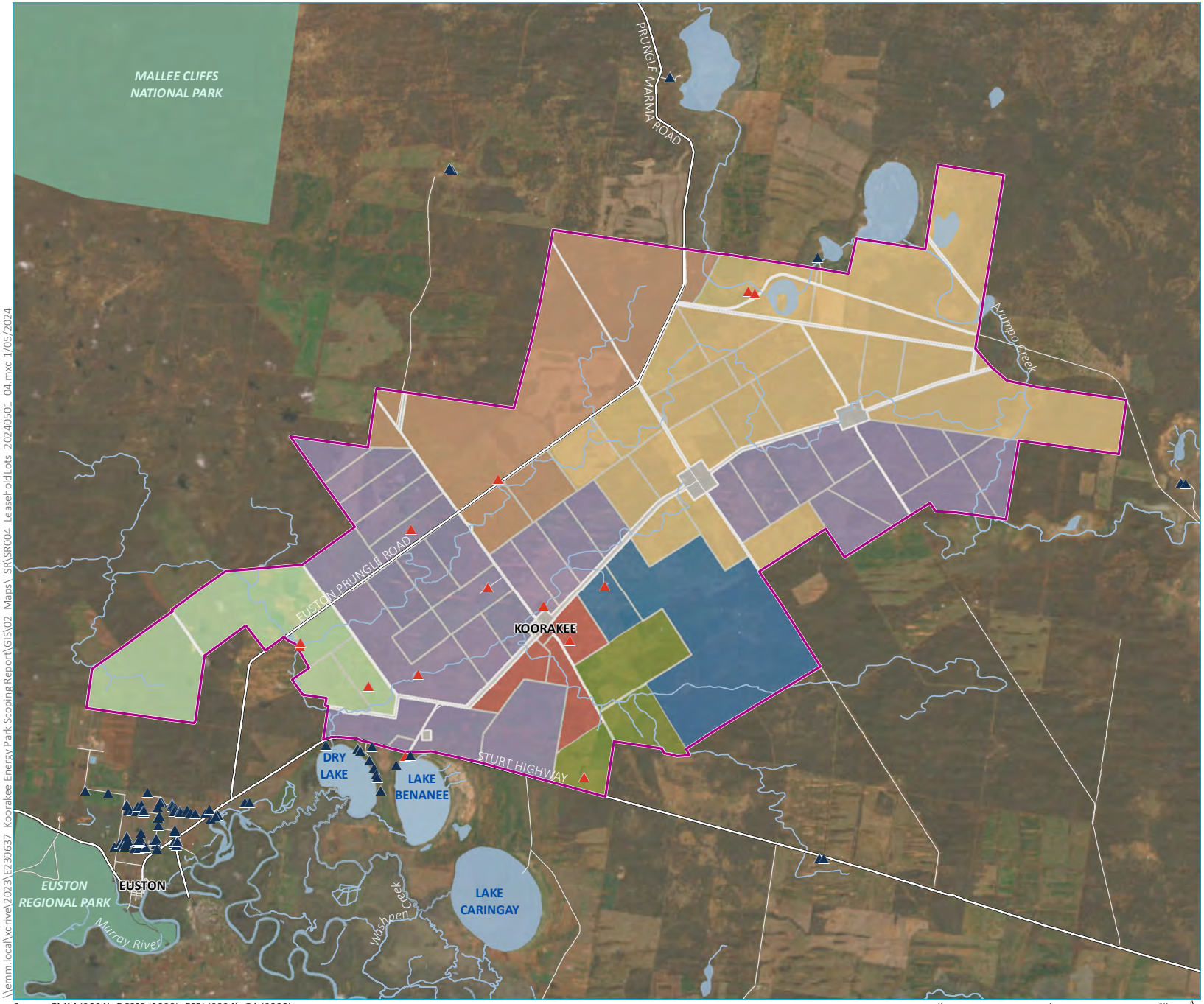
The preliminary development corridor has been designed to minimise impacts to these areas and further refinement will occur throughout EIS development to ensure impacts are avoided. Set aside areas within the project investigation area are listed in Table 2.2 and shown in Figure 2.3.

Table 2.2 Set aside areas in the project investigation area

Local Land Services Region	Certificate Number	Set Aside Area (ha)	Lot/DP
Western	LMC00167	644.77	6525/769341
Western	LMC00168	46.49	6527/769343
Western	LMC01125	587.81	6527/769343
Western	LMC00698	226.15	1/1123678
Western	LMC00259	1034.62	1/756083, 2/756083, 4/756108, 5/756108
Western	LMC02259	849.17	1/756104, 2/756104, 3/756104, 6/756104

Table 2.2 Set aside areas in the project investigation area

Local Land Services Region	Certificate Number	Set Aside Area (ha)	Lot/DP
Western	LMC02310	749.81	6520/769336
Western	LMC02434	11.54	6520/769336



KEY

- Koorakee Energy Park
- Road reserve and other Crown land

Sensitive receiver

- Associated residence
- Non- associated residence

Leaseholder

- Leaseholder 1
- Leaseholder 2
- Leaseholder 3
- Leaseholder 4
- Leaseholder 5
- Leaseholder 6
- Leaseholder 7

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Source: EMM (2024); DCSSS (2023); ESRI (2024); GA (2009)

0 5 10 km

GDA 1994 MGA Zone 54

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Leasehold lots

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Figure 2.2

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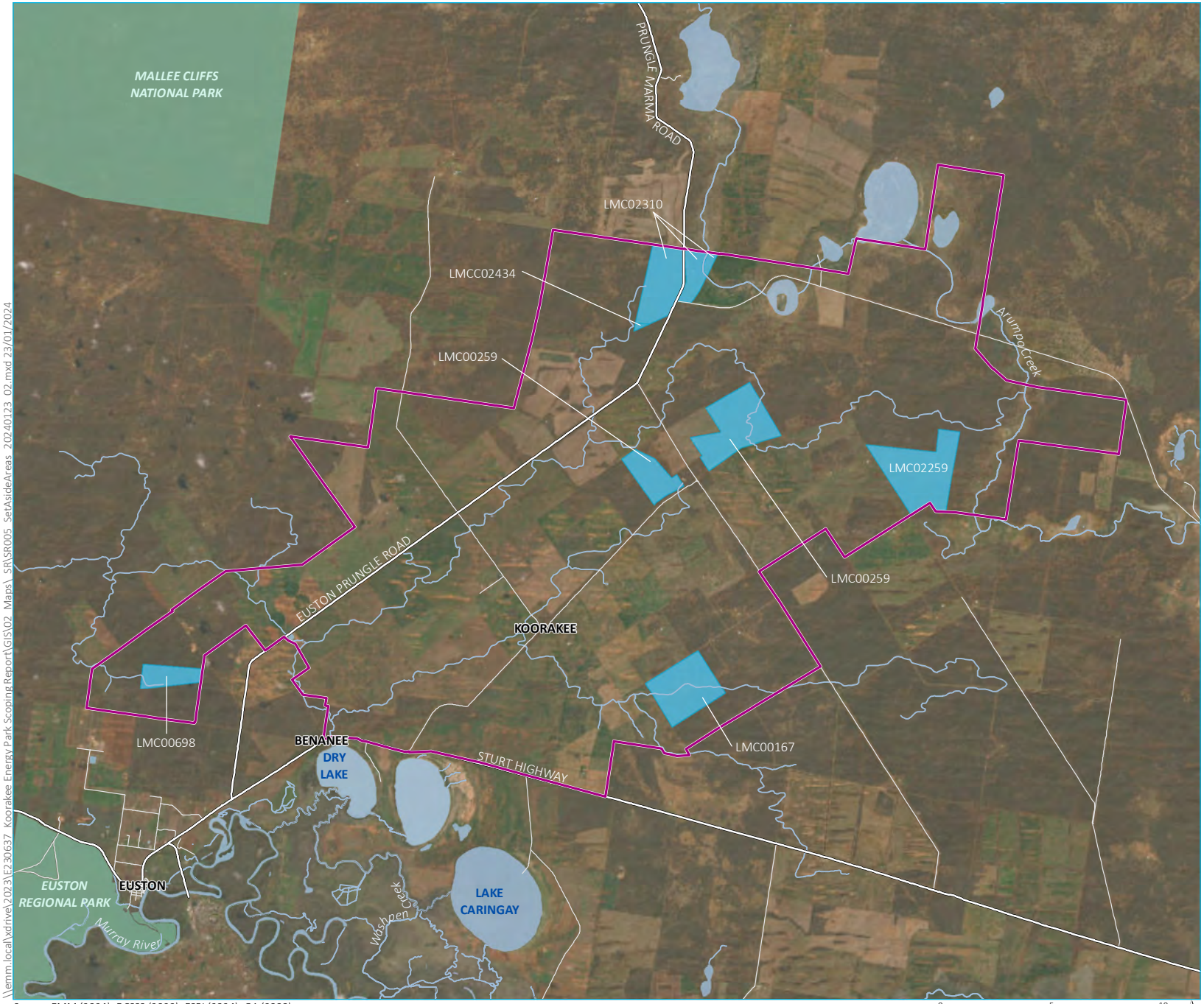

KEY

- Koorakee Energy Park
- Set aside area

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Named waterbody
- NPWS reserve

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Source: EMM (2024); DCSSS (2023); ESRI (2024); GA (2009)

0 5 10 km

GDA 1994 MGA Zone 54

N

Set aside areas

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Figure 2.3

EMM creating opportunities

2.2.3 Other sensitive areas

In addition to the set aside areas, consultation with NSW Biodiversity Conservation Trust in March 2024 identified a number of additional sensitive land parcels within the project investigation area. These areas are part of the Southern Mallee Reserve (SMR). The locations of these parcels of SMR will be determined throughout the EIS development phase and considered in future project layouts.

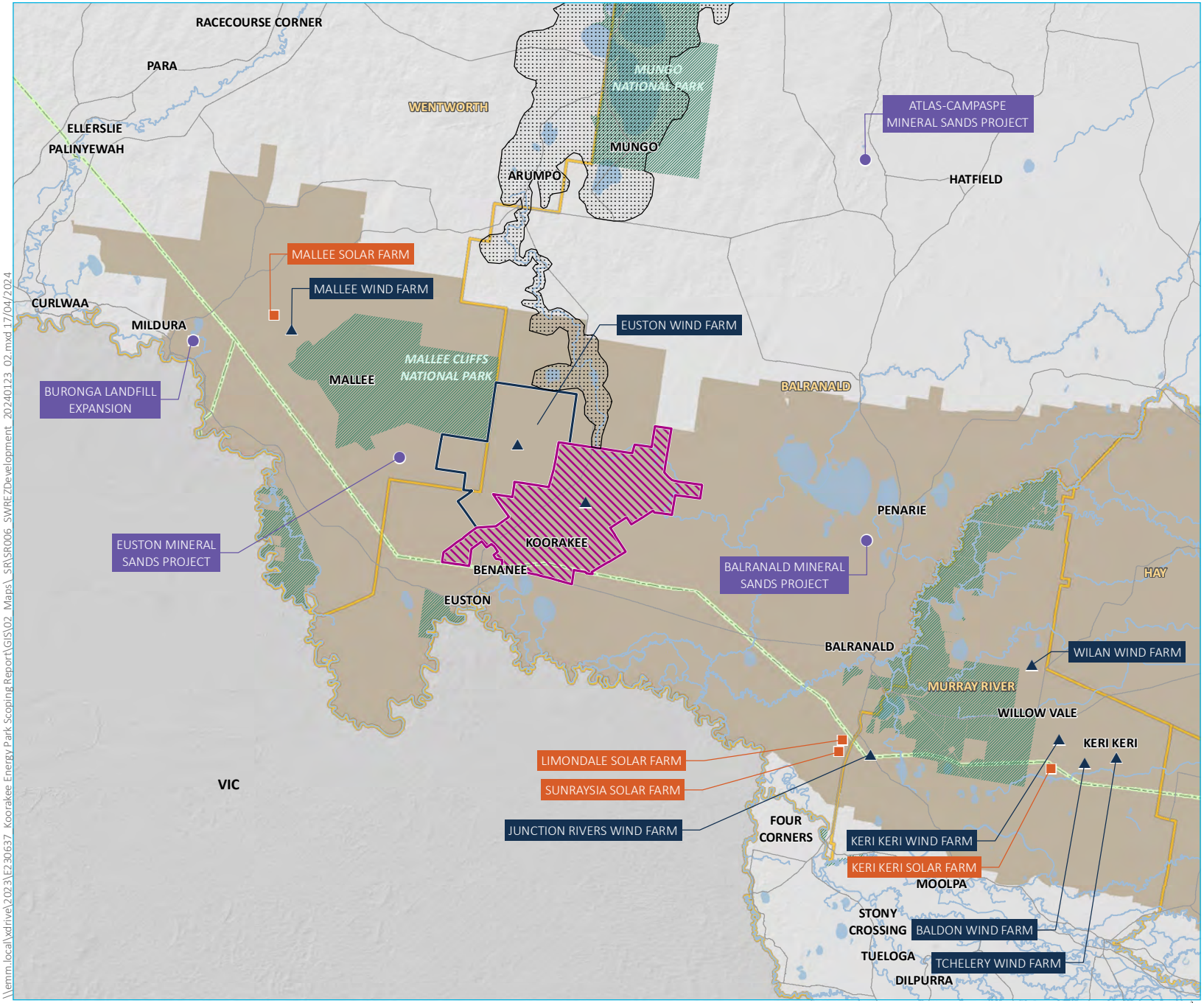
2.2.4 Renewable energy and other developments

The project is within the South West REZ, which has an intended network capacity of 3.98 GW, and has been identified as a key location in NSW for the delivery of renewable energy infrastructure. There are several operating, approved and proposed renewable energy developments in the vicinity of the project, as well as other infrastructure and mining projects. These are summarised in Table 2.3 and shown in Figure 2.4.

Table 2.3 Nearby renewable developments and major projects

Project	Development type	Status
Project EnergyConnect	Electricity transmission	Approved – under construction
Euston Wind Farm	Wind farm	Proposed – EIS in preparation
Mallee Wind Farm	Wind farm	Proposed – EIS in preparation
Malle Solar Farm	Solar Farm	Proposed – EIS in preparation
Junction Rivers Wind Farm (formerly Burrawong Wind Farm)	Wind farm	Proposed – EIS in preparation
Limondale Solar Farm	Solar farm	Operational
Sunraysia Solar Farm	Solar farm	Operational
Keri Keri Wind Farm	Wind farm	Proposed – EIS in preparation
Keri Keri Solar Farm	Solar farm	Proposed – EIS in preparation
Baldon Wind Farm	Wind farm	Proposed – EIS in preparation
Tchelery Wind Farm	Wind farm	Proposed – EIS in preparation
Wilan Wind Farm	Wind farm	Proposed – EIS in preparation
Bullawah Wind Farm	Wind farm	Proposed – EIS in preparation
Euston Mineral Sands mine	Mineral sands mine	Operational
Balranald Mineral Sands mine	Mineral sands mine	Operational
Atlas-Campaspe Mineral Sands mine	Mineral sands mine	Operational

Source: https://www.planningportal.nsw.gov.au/major-projects



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Source: EMM (2024); ABS (2021); DCSSS (2023); GA (2009); EnergyCo (2022)

Other developments in the South West REZ

Koorakee Energy Park
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Figure 2.4

EMM creating opportunities

2.3 Planning framework

An overview of relevant key policies, plans and strategies, and how the project aligns with these, is provided in Table 2.4.

Table 2.4 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
International context		
The Paris Agreement	The Paris Agreement is a legally binding international treaty on climate change adopted by 196 parties in 2015. As a signatory to the agreement, the Australian Government has committed to reduce greenhouse gas emissions by 26–28% on 2005 levels by 2030.	The project will contribute to meeting Australia's commitments under the Paris Agreement by reducing the National Electricity Market's (NEMs) annual greenhouse gas (GHG) emissions.
National context		
Climate Change Act 2022	The *Climate Change Act 2022* provides a policy framework for the implementation of Australia's net-zero commitments and outlines Australia's net 2030 and 2050 greenhouse gas emission reduction targets under the Paris Agreement.	The project will contribute to meeting Australia's net 2030 and 2050 commitments by reducing the NEMs annual GHG emissions.
Large-scale Renewable Energy Target (Clean Energy Regulator 2021)	The Australian Government Clean Energy Regulator administers the large-scale renewable energy target which incentivises investment in renewable energy power stations such as wind and solar farms. The large-scale renewable energy target of 33,000 GWh of additional renewable electricity generation was met at the end of January 2021 (Clean Energy Regulator 2021). The annual target will remain at 33,000 GWh until the scheme ends in 2030.	It is noted that the annual target has been met and will remain at 33,000 GWh until the scheme ends in 2030. Once operational, the project will contribute towards meeting the large-scale renewable energy target. The incorporation of battery storage into the project will enable the storage of renewable energy to increase market efficiency and permit greater penetration of renewables in the electricity grid.
Integrated System Plan 2022 (AEMO 2022)	The Australia Energy Market Operator's *Integrated Systems Plan* (ISP) *2022* (AEMO 2022)) is an "Actionable roadmap for eastern Australia's power system to optimise consumer benefits through a transition period of great complexity and uncertainty". Renewable energy zones (REZs) are identified in the ISP as "high-quality resource areas where clusters of large-scale renewable energy projects can be developed using economies of scale". The ISP identifies that significant investment in the NEM requiring a nine-fold increase in utility-scale variable renewable energy (VRE) and that "much of this resource will be built in REZs that coordinate network and renewable investment, and foster a more holistic approach to regional employment, economic opportunity and community participation".	The project will contribute to the development of the South West REZ.
Draft Integrated System Plan 2024	The ISP is published every two years and shows where new transmission, generation and storage is needed across the National Electricity Market (NEM). The *Draft Integrated System Plan 2024* (Draft ISP) is currently up for public comment until 16 February	The Draft ISP highlights the urgent need for investment in new renewable energy generation, transmission, and storage projects to meet the NEM renewable electricity generation targets and deliver secure, reliable, and affordable energy.

Table 2.4 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
	2024 before its finalisation and publication circa June 2024.	The Draft ISP recognises that renewable generation, focused in identified REZ's is an optimal development path for reliability and affordability within the NEM. As a renewable energy project connected by transmission and firmed with storage, the project strategically aligns with the objectives of the Draft ISP.
Australia's Long-Term Emissions Reduction Plan (DCCEEW 2022)	The Australian Government's *Long Term Emissions Reduction Plan* (Australian Government 2021) is to achieve net zero emissions by 2050. The Plan aims at reaching a net zero economy through a technology-based approach, whilst protecting relevant industries, regions and jobs. It is part of an overarching strategy for emission reduction, based on a technology-led approach which includes a technology investment roadmap and its low emissions technology statements.	The project will reduce GHG emissions associated with energy generation over its operational life.
State context		
Net Zero Plan Stage 1 2020–2030 (DPIE 2020a)	The *Net Zero Plan Stage 1 2020–2030* (DPIE 2020a) outlines the NSW Government's plan to grow the economy and create jobs while helping the state to deliver a 35% cut in emissions compared to 2005 levels.	The project contributes to Priority 1 of the Net Zero Plan: "drive uptake of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living." The project will fall within the South-West REZ. The region has been identified as an ideal location to play a key role in a renewable energy future for NSW due to its good renewable energy resources and opportunity to utilise electricity network infrastructure. The project will utilise these benefits to contribute to the NSW Net Zero Plan.
The Climate Change (Net Zero Future) Act 2023	*The Climate Change (Net Zero Future) Act 2023* enshrines whole-of-government climate action to delivery net zero by 2050 and legislates the NSW governments approach to addressing climate change. The Act legislates: • guiding principles for action to address climate change • emissions reduction targets • an objective for NSW to be climate resilient • establishment of an independent Neto Zero Commission expert.	The project is within the South-West REZ and is ideally placed to assist in meeting the emissions reduction targets for NSW.

Table 2.4 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
NSW Electricity Infrastructure Investment Roadmap (DPIE 2020b)	The *Electricity Infrastructure Roadmap* coordinates investment in transmission, generation, storage and firming infrastructure as ageing coal-fired generation plants retire. The roadmap includes actions that will deliver 'whole-of system' benefits. The roadmap sets out a plan to deliver the State's first five REZs in the Central-West Orana, New England, South-West, Hunter-Central Coast, and Illawarra regions.	The project is within the South West REZ and is ideally placed to contribute to the success of the roadmap.
Wind Energy Guideline (DPE 2016a)	The *Wind Energy Guideline* provides the community, industry and regulators with guidance on the planning framework for the assessment of large-scale wind energy development proposals that are SSD and identifies the key planning considerations relevant to wind energy development in NSW. The Guideline provides the overarching planning framework for assessing SSD wind energy projects and is supported by additional assessment bulletins, including the V*isual Assessment Bulletin (DPE 2016b) and the Wind Noise Assessment Bulletin (DPE 2016c).*	Site selection and impact assessment considerations detailed in the guideline have been, and will continue to be, used to inform the project and will be considered in the EIS.
Large-Scale Solar Energy Guideline (DPE 2022d)	The *Large-Scale Solar Energy Guideline* (DPE 2022d) provides the community, industry, applicants and regulators with guidance on the planning framework for the assessment of large-scale solar projects and identifies the key planning considerations relevant to solar energy development in NSW.	Site selection and impact assessment considerations detailed in the guideline have been and will continue to be used to inform the project and will be considered in the EIS.

Table 2.4 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
Draft Energy Policy Framework	The NSW DPHI recently put a *Draft Energy Policy Framework (*Draft Framework) out for public consultation until 29 January 2024. The framework is proposed to support faster and more consistent decision making and provide greater certainty communities and energy industries.	The Draft Framework includes updates and additional guidelines that detail how impacts of renewable energy and transmission projects will be assessed and managed. These updates include minor amendments to the *Large-Scale Solar Energy Guideline* including updates to the considerations and methodologies of landscape and visual impact assessment and requiring details regarding decommissioning costs. The *Wind Energy Guideline* updates also contain revised guidance for onshore wind energy projects including updated technical supplements for visual and noise impact assessment. The preliminary VIA in this scoping report has been undertaken in accordance with the VA Bulletin (DPE 2016b) and not the draft guideline, however the EIS VIA will consider either the VA Bulletin or other updated guideline, as detailed in the SEARs. The *Benefit-Sharing Guideline* contains guidance for benefit sharing with communities and planning agreements for wind and solar energy development. Impact assessment and project description considerations will be considered within the EIS at the adoption of the amended guidelines.
NSW Electricity Strategy 2019 (DPIE 2019)	The *NSW Electricity Strategy* is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy. Four of NSWs five remaining coal-fired generators are scheduled to close by 2035, starting with Liddell Power Station in 2023 (DPIE 2019). The strategy outlines a reliable energy system which meets NSWs energy requirements and emission reduction targets. The strategy and its enabling legislation, the *Electricity Infrastructure Investment Act 2020*, supports the rolling out of REZs and the establishment of the Energy Corporation of NSW (Energy Co) with the objectives of bringing together investors, conducting early planning and maximising benefits to local communities.	The project will contribute to the development of the South West REZ of NSW, will assist in meeting NSWs energy generation and storage requirements, and in meeting the NSW Government's emissions GHG emissions reduction targets.
Local and regional context		

Table 2.4 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
Balranald Local Environmental Plan (LEP) 2010	The Balranald LEP 2010 provides the framework that guides land use and development within the Balranald Shire Council local government area through zoning and development standards. The LEP also sets out objectives for each land use zone.	The project is located on landed zoned RU1 under the Balranald LEP 2010. The project is considered to be consistent with the objectives of the RU1 zone.
Far West Regional Plan 2036	The *Far West Regional Plan 2036* (DPIE 2017) guides land use planning priorities and decision making in the Far West region for the next two decades. The vision identifies the Far West region as a leader for sustainable and cost-effective electricity production, as well as looking to support the agricultural industry and expand the food processing sector.	The plan highlights the objectives of leading renewable energy technology and investment and leveraging new and upgraded infrastructure. The project is aligned with key objectives within the plan as it will take advantage of existing infrastructure to provide more electricity capacity for new renewable energy projects.
Balranald Shire Community Strategic Plan 2032	The *Balranald Shire Community Strategic Plan 2032* outlines the aspirations and long-term vision of the Balranald LGA community. Chapter 3 of the Strategic Plan reviews current issues for the economy of Balranald Shire and provides future directions for improving economic development.	The project contributes to Chapter 3 of the *Balranald Shire Community Strategic Plan 2032*, particularly future direction 3.2 related to nurturing local businesses.
Balranald Local Strategic Planning Statement	The *Balranald Local Strategic Planning Statement* sets the land use framework for Balranald Shire Council's economic, social and environmental land use needs over the next 20 years. It addresses the planning and development issues of strategic significance to the Council through planning priorities and actions, spatial land use direction and guidance.	The project will contribute towards achieving key planning priorities of the *Balranald Local Strategic Planning Statement* including: • Economy - Developments in renewable energy projects in the Shire provide opportunities to bolster the economies of Balranald townships. • Society – Recent emergence of large-scale solar farms has caused a rise in local full-time employment.

2.4 Agreements

Consultation has commenced with Crown Lands, leaseholders and Balranald Shire Council regarding the project and benefit sharing mechanisms.

Both Crown Lands and leaseholders have shown interest in pursuing a freehold land tenure mechanism, which would streamline a direct benefit sharing arrangement with future private landowners. If freehold conversion cannot be achieved, benefit sharing mechanisms, including special purpose leases (SPLs), have been discussed which would still allow benefit sharing with all parties hosting project elements.

Lease agreements with Crown Lands and leaseholders are not finalised and would be formalised following further design development and during the preparation of the EIS.

If the project receives approval, Squadron Energy would also enter into a voluntary planning agreement (VPA) with Balranald Shire Council. Details of the VPA would be refined throughout the EIS and post approval phase.

2.5 Project justification

The State's four existing coal fired power stations that currently provide around three quarters of NSW's electricity supply are closing progressively. The development of renewable energy projects aligns with State and

federal government commitments to both increase renewable energy generation to replace fossil fuels that are currently meeting Australian energy needs and to reduce carbon emissions.

The proposed location of this project is within the South West REZ, one of the five REZs established by the NSW Government to encourage investment in renewable energy developments in these locations. It is expected that the intended capacity of the KEP project, being up to 2 GW, with up to 12 GWH of storage capacity, could power up to one third of the households in NSW.

2.5.1 Project benefits

The project will contribute to meeting these government objectives and carries additional benefits including:

- contributes to the development of the South West REZ
- job creation during the construction and operational phases
- financial gain to landholders, or leaseholders through a special purpose lease mechanism, where the project is located
- indirect economic benefits to the local community throughout the life of the project
- a community benefit fund, including community sponsorship opportunities
- supports Australia's transition towards clean and renewable sources of energy.

2.5.2 Site suitability

Key considerations for Squadron Energy's selection of the project investigation area are:

- availability of a suitable wind and solar resource
- landholder and leaseholder appetite for hosting wind and/or solar farm
- large distances to populated areas to minimise visual and amenity impacts
- proximity to current and future transmission lines.

The proposed location for this project is adjacent to the existing 220kV Buronga/Balranald Transgrid transmission line, which traverses the southern section of the project. The proposed Project EnergyConnect 330kV transmission line will be constructed within this existing easement. Project EnergyConnect includes the construction and operation of a new high voltage (HV) interconnector between NSW and South Australia, with an additional connection to north-west Victoria. Project EnergyConnect aims to reduce the cost of providing secure and reliable electricity transmission between NSW and South Australia in the near term, while facilitating the longer-term transition of the energy sector across the National Electricity Market (NEM) to low emission energy sources. The positioning of the project adjacent to this important piece of planned energy infrastructure will reduce the need for extensive new transmission infrastructure. This has the following benefits:

- reduced transmission losses between the project and transmission lines
- more efficient integration of the project to the energy grid
- avoiding the need to build extensive new transmission infrastructure will reduce the overall timeline of the project.

3 Project description

3.1 Overview

The project includes the installation, operation and maintenance and decommissioning of approximately 167 WTGs, a large-scale solar PV generation facility, as well as a BESS and associated infrastructure (Figure 3.1).The project will have an installed capacity of up to 2 GW, comprising up to 1 GW of generation capacity from each of the wind and solar components. The BESS will have a capacity of up to 1 GW and will have provision for up to 12 hours of storage (12 GWh).

Project infrastructure will be contained within the development corridor, the area within which infrastructure including WTGs and PV generation equipment will be placed, providing the necessary flexibility for further detailed design (i.e. micro-siting) whilst also allowing a detailed environmental assessment process to be completed.

The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of community and stakeholder engagement, engineering assessments and design of project infrastructure. It is noted that the proposed development corridor 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. The development corridor is likely to be refined during the EIS phase.

A summary of the project elements is provided in Table 3.1 and detailed in Figure 3.1, with further details provided in Sections 3.2 to 3.4.

Table 3.1 Indicative project summary

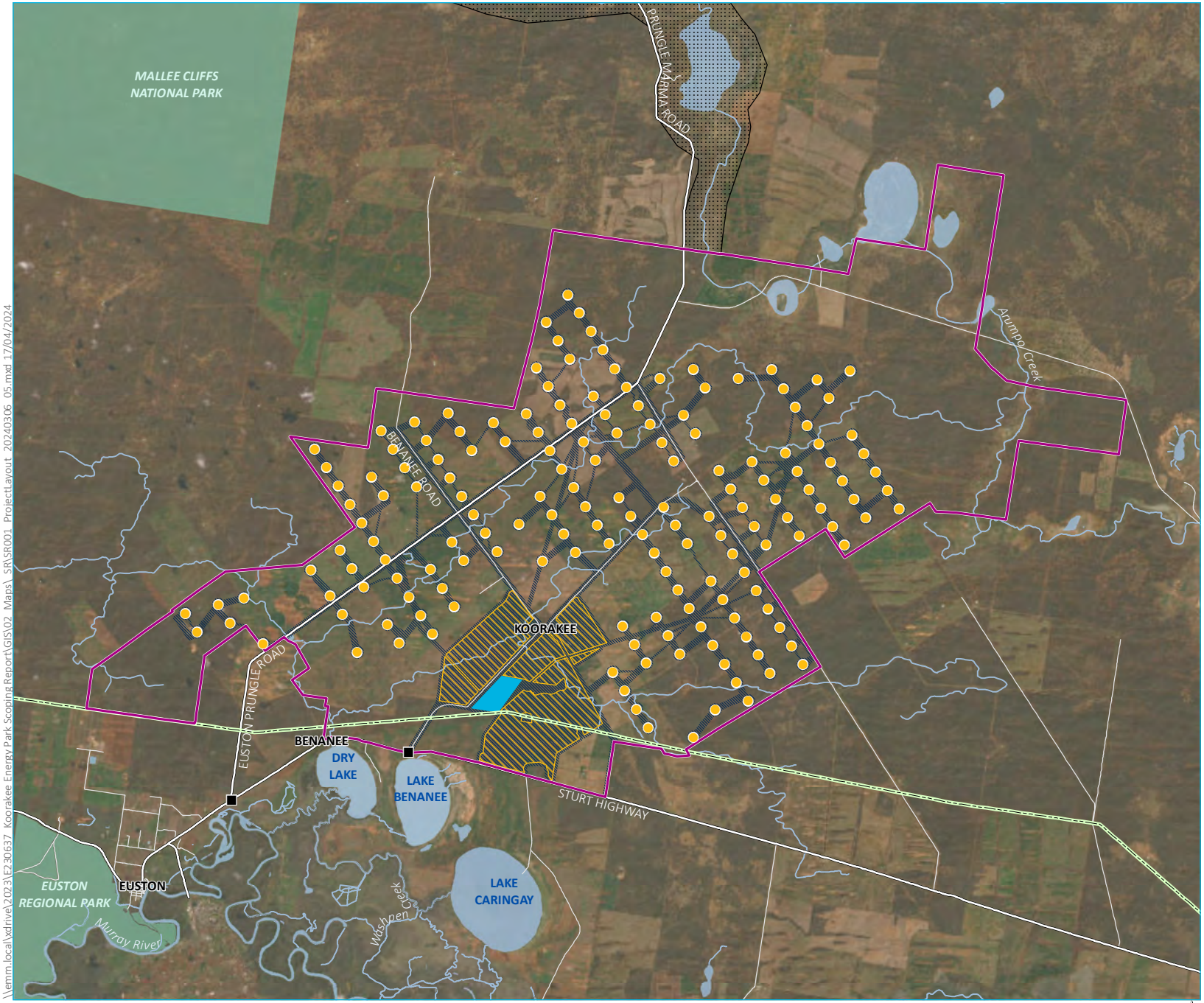
Project element	Details
Overview	
Project investigation area	Approximately 58,000 ha
Development corridor	Approximately 13,700 ha (subject to further design refinement as the project progresses)
Land tenure	The land is Crown Lands within the Western Lands region where landholders hold perpetual leases with Crown Lands. Squadron Energy holds 7 licences with landholders for further investigations and is working with landholders and Crown Lands on licensing and land tenure arrangements.
Project capacity	Up to 2 GW (up to 1 GW wind and 1 GW solar)
Wind	
WTGs	Up to 167 WTGS. 3 blade system
WTG height	Approximately 270 m
Rotor diameter	Approximately 185 m
Lowermost blade tip height above ground	30–60 m
Tower (hub) height	110–180 m
WTG foundations (excavation size)	Approximately 35 m diameter
Solar PV	
Solar PV generation area	Approximately 3,100 ha

Table 3.1 Indicative project summary

Project element	Details
Number of PV modules	Approximately 2.2 million
Battery storage	
Battery storage	Up to 1 GW for 12 hours (12 GWh)
Battery storage compound	Up to 1.1 km x 1.1 km
Ancillary Infrastructure	
Hardstands adjacent to each WTG (including blade laydown and component storage areas)	Up to 167 220 m x 14 m
Substations	Up to 5 locations. Approximately 250 m x 250 m
Operations and maintenance compounds	Up to 8 locations. Approximately 150 m x 150 m
Underground transmission cables (medium to low voltage)	Approximately 290 km length of underground medium to low voltage transmission cables linking WTGs to substations with an approximately 3 m wide corridor
Overhead transmission cables (high voltage)	Approximately 50 km length of high-voltage transmission lines, with an easement width of approximately 45–60 m, linking substations to the grid connection.
Grid connection	In the southern part of the site, the project will connect to the existing 220 kV transmission line or the future 330 kV Project EnergyConnect transmission line.
Meteorological masts	Up to 4 locations. Approximately 160 m tall
Internal roads and drainage	Approximately 5.5 m wide unsealed private roads (excluding batters)
Temporary construction facilities	
Ancillary sites	Up to 5 locations. Approximately 500 m x 500 m
Concrete (or asphalt) batching plants and crushing facilities	Up to 5 locations. Approximately 50 m x 100 m
Stockpiles and materials storage compounds/laydowns	Subject to construction requirements
Roads	
Site access	Access will be primarily from the Sturt Highway to the south of the project. From the Sturt Highway, both Euston Prungle Road and Benanee Road would be used to access the project.
External road Intersection upgrades	Upgrades may be required for over size over mass (OSOM) access at Euston Prungle Road and Benanee Road and will be determined in the EIS. OSOM upgrades along State roads from NSW ports to the South West REZ are assumed to be managed by EnergyCo and TfNSW, as per the 'Port to REZ' Memorandum of Understanding (MOU) finalised in September 2023. Any upgrades to roads or intersections outside of NSW would be subject to relevant State based approvals
Construction	
Construction period	Approximately 24 to 36 months

Table 3.1 Indicative project summary

Project element	Details
Sources	WTG and infrastructure components will be transported from ports either within NSW, Victoria or South Australia Construction materials will be sourced regionally and locally.
Construction hours	Construction activities will generally be undertaken during standard day time construction hours (ie 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday) however, due to the designed sequencing of component lifts for WTGs, certain stages or elements need to be completed in a specified order which may require out of hours works.
Construction workforce	Between 300 – 400 full-time equivalent (FTE)
Workforce accommodation	Nearest towns, including Euston, Robinvale, Balranald, Mildura and others (within approximately 100 km of the site), however it is likely that local accommodation will not be sufficient and other options will be required that will be detailed in the EIS. The EIS will consider an accommodation facility for project personnel.
Operations	
Operations hours	24 hours per day/7 days per week
Operations on-site workforce	Approximately 10-15 FTE
Project lifespan	Approximately 30 years



KEY

- Koorakee Energy Park
- Development corridor
- BESS and grid connection
- Photovoltaic (PV) layout
- Willandra Lakes World Heritage Area
- Project Energy Connect
- Site access
- Wind turbine generator

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Waterbody
- NPWS reserve

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Source: EMM (2024); DCSSS (2023); ESRI (2024); GA (2009); Squadron Energy (2024)

0 5 10 km

GDA 1994 MGA Zone 54

N

Project layout

Koorakee Energy Park
Scoping Report
Figure 3.1

EMM
creating opportunities

3.2 Physical layout and design

3.2.1 Wind turbine generators

A wind farm is proposed with a generation capacity of up to 1 GW. The project will include the installation of approximately 167 WTGs positioned to maximise the use of the available wind resource, whilst avoiding key constraints and responding to stakeholder inputs and environmental constraints within the development corridor.

The indicative dimensions for the WTG components are detailed in Table 3.1. The WTGs will have three blades with the rotor and nacelle mounted on a tower with an internal ladder or lift.

The final number and proposed placement of WTGs will be determined as part of the final layout to be assessed in the EIS. WTGs will be installed at final locations within the development corridor and in accordance with the micro-siting restrictions identified in the EIS and will depend on a range of factors including WTG technology, available grid capacity, economies of scale, grid connection and environmental constraints.

3.2.2 Photovoltaic panels

A solar farm with PV panels is proposed with a generation capacity of up to 1 GW. The project will include the installation of PV modules mounted on single-axis tracking systems that will be configured in rows positioned to maximise the use of the available solar resource. PV modules will be fixed to and supported by ground-mounted framing.

The PV modules will be up to 2.5 m from the ground when in the horizontal position, while the lower edge of each PV module will be no less than 0.3 m from the ground or above the flood depth level at the maximum tilt angle. The maximum height of the modules to the higher edge from ground level at the maximum tilt angle is expected to be approximately 4.7 m, which is assuming a '2 in portrait' (2P) configuration (ie worst case assumption for visual impact assessment).

As shown in Figure 3.1, is anticipated that PV modules will be installed in the southern section of the project, adjacent to the proposed grid connection location. The PV modules will be installed in parallel rows within each section, with an indicative spacing of approximately 5–10 m between each row. The rows of PV modules will be aligned in a north-south direction, allowing the modules to rotate from east to west during the day, tracking the sun's movement.

Initial investigations indicate approximately 2.2 million PV modules can be installed for the project; however, the final design will depend on a range of factors including module technology, available grid capacity, economies of scale, grid connection and environmental constraints.

DC cables will be strung underneath the PV modules, housed in cable trays, or be passed through the tracker tubes before being connected to the power conversion units (PCUs). The PCUs convert the DC electricity generated by the PV modules into AC form, which is compatible with the electricity grid. The exact dimensions and configuration of the PCUs will be determined during detailed design.

3.2.3 Electrical collection system and substations

A network of underground and overhead powerlines will be installed across the development corridor and will connect WTGs and the solar PV panels to up to five on-site collector substations. The final configuration of the cabling may be underground or aboveground depending on geotechnical conditions, but generally the high voltage cabling will be aboveground and the medium to low voltage cabling underground.

The on-site collector substations will be constructed within the development corridor to convert the on-site AC reticulated electricity to 220 kV for export to the existing grid, or 330 kV to the future grid following Project EnergyConnect completion. Electricity generated by the project will then be exported to the grid via a high voltage

overhead line network connection and grid connection switch, located adjacent to the existing high voltage powerline at the south of the of the project.

The alignments for the cabling and substation infrastructure are assumed to be included in the preliminary development corridor shown in Figure 3.1.

3.2.4 Battery energy storage system

Renewable energy generation is intermittent in nature and subject to fluctuations in solar and wind availability. Batteries mitigate these natural fluctuations through their ability to store and discharge electricity when required.

A BESS is proposed that will have a capacity of up to 1 GW and provision for up to 12 hours of storage (12 GWh). The BESS will provide both storage as well as firming capacity to the National Electricity Market (NEM) and may assist in grid stability by providing frequency control ancillary services. The BESS will allow for the storage and export of renewable energy within the network, as agreed with the network operator.

A range of technologies are being considered, including lithium-ion, lead acid, sodium sulphur, sodium or nickel 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 various technology types noted above will be assessed as part of the EIS.

3.2.5 Supporting infrastructure

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.

Supporting infrastructure will be required for operations and will include:

- substations
- switching stations
- permanent offices and site compounds
- underground and overhead electricity transmission lines
- wind monitoring masts
- communication cables (includes control cables and earthing)
- water storage tanks and supply points
- hardstands
- internal roads.

Indicative details of construction and operational ancillary facilities are included in Table 3.1.

3.2.6 Site access

Site access will be from the Sturt Highway via Euston Prungle Road and Benanee Road to the south of the project (Figure 3.1). Euston Prungle Road is primarily a sealed road, while Benanee Road is primarily unsealed.

Internal access tracks will also be established to connect the WTGs and other key infrastructure elements back to Euston Prungle Road, Benanee Road and ultimately the Sturt Highway.

The transport route to the development corridor will be confirmed through the EIS but is expected to comprise vehicle movements primarily originating from the Sturt Highway at the southern extent of the project.

Over-size, over-mass (OSOM) vehicles will require access to the development corridor and the preferred route is the subject of ongoing route analysis. It is expected that the Energy Corporation of NSW (EnergyCo), through its Memorandum of Understanding (MOU) with Transport for NSW (TfNSW) will be coordinating and facilitating necessary upgrades to State road infrastructure from NSW ports to REZs, where TfNSW is the roads authority.

If further construction planning identifies a preferred origination port for OSOM vehicles that is not within NSW, consultation on routes will be undertaken with the relevant State based roads authorities, and planning authorities as required.

3.3 Activities and uses

3.3.1 Construction

i Overview

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

Earthworks will be required for the preparation of construction, including turbine foundation excavation, hardstand and access track formation and drainage works. Where required, additional or improved drainage channels, sediment control ponds and dust control measures will be implemented.

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

ii Construction hours and schedule

Construction of the project is expected to fit into standard construction hours (ie 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday). However, due to the designed sequencing of component lifts for WTGs, certain stages or elements need to be completed in a specified order, or under specific wind conditions, which may require out of hours works. The justification and specifics for out of hours works will be detailed in the EIS.

For example, when erecting the tower, once the top of the tower is attached, the nacelle must go on without delay due to the risk of tower self-oscillation. Unfavourable weather can cause delays in mounting the nacelle. Continuing this work outside of standard construction hours will ensure that risk to people, property, and the surrounding environment is mitigated. The project investigation area is naturally a high wind area and as such Sunday work may be needed to make up for high wind days during the week. Further details would be presented in the EIS.

The construction phase of the project is expected to take approximately 24 to 36 months.

iii Workforce

A workforce of approximately 300 – 400 full time equivalent (FTE) personnel will be required on-site during peak construction. The construction workforce will be sourced from the local area as far as practicable, noting the remote nature of the project and distance to key populated centres. There would likely be the requirement for non-local construction staff.

Balranald Shire Council, surrounding councils and local business owners will be consulted throughout the development and assessment of the project regarding managing potential impacts and opportunities for accommodation of the project's construction workforce.

Accommodation for non-local construction staff is expected to be a key challenge for the project. A strategy will be presented in the EIS to address workforce accommodation, including the use of available rental, motel and other accommodation in surrounding townships and regional centres and the consideration of alternative options, including temporary facilities. Potential cumulative impacts on accommodation, infrastructure, and services will be considered in the EIS as part of the social and economic impact assessment.

3.3.2 Operation

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

Key activities during operations will be energy generation and energy storage, with the WTGs proposed to operate on a 24 hour a day and 365 days a year basis, and the solar component 365 days a year but limited to the daylight hours of the solar resource.

During operation, the project will require up to 10 – 15 full-time on-site employees, with project operations to be supported by contractor roles for selected maintenance activities.

Regular maintenance will be required throughout operations, including for internal roads, drainage, fencing and vegetation as well as service, repair or replacement of WTGs, PV modules, inverters, transformers or components of the BESS, substations, or switchyard. Grazing may also occur on-site throughout operations.

Light vehicle access will be required throughout operations and occasional heavy vehicle movements may also be required for minor and major maintenance works.

Where feasible, agricultural activities will continue throughout operations, with many renewable developments underpinned by co-existence.

3.3.3 Decommissioning

Once the project reaches the end of its operational life, a decision will be made to either decommission or re-power the facility, subject to approval requirements. If the project is decommissioned, all aboveground structures built as part of the project will be removed and the site rehabilitated generally to its pre-existing land use, as far as practicable. Exceptions to decommissioning would be any road, power of other infrastructure that the leaseholder / Crown Lands wish to retain. If re-powering is proposed, an appropriate stakeholder consultation process will be undertaken, and all necessary approvals will be sought.

3.4 Timing

The Proponent intends to finalise the EIS by Q2 2025 and project construction is expected to commence in late 2025, subject to relevant approvals and project financing, procurement and contracting. Construction is expected to take approximately 24 – 36 months to complete, depending on scheduling of the construction works. It is anticipated that the project will be constructed in stages, with further information on staging to be presented in the EIS.

The project is expected to be commissioned during 2028-29 and will have an operational life in excess of 25–30 years.

3.5 Alternatives considered

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

3.5.1 Alternative locations

The project investigation area is highly suitable for a wind farm, solar farm and BESS project, with the key selection factors for the site including:

- positioning within the South West REZ
- a reliable wind source
- flat topography and large land area available to position infrastructure and avoid constraints
- proximity adjacent to existing transmission and the approved Project EnergyConnect infrastructure
- distance from sensitive receivers
- proximity to the Sturt Highway
- leaseholder interest to be involved in the project.

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

3.5.2 Alternative project layouts

Environmental and social constraints have, and will continue to be, a key consideration during the refinement of the development corridor within the project investigation area. The preliminary development corridor and indicative project layout detailed in Figure 3.1 have been the subject of an iterative design process that has been informed by proximity to future grid connection points, leaseholder consultation and telecommunication infrastructure.

In addition, the Proponent has considered preliminary environmental constraints in the refinement of the project layout throughout the scoping phase. Avoidance of constraints and minimisation of environmental and visual impacts has so far included the relocation of WTGs to:

- remove the need to cross Arumpo Creek and avoid associated potential impacts to EPBC Act-listed fish species
- avoid direct impacts on known individuals of Thyme Rice-flower, a species listed as a candidate entity for SAII under the BC Act
- avoid direct impacts to set-aside areas

- minimise direct impacts to native vegetation which is likely to represent the EPBC Act-listed Mallee Bird Community Threatened Ecological Community (TEC) and habitat for several threatened species
- minimise visual impacts and other indirect impacts to the Willandra Lakes World Heritage Area.

The final development corridor (including WTG placement, PV layout, grid connection and site access) will be refined as part of the preparation of the EIS and will be informed by the outcomes of the key EIS technical assessments and outcomes of engagement with community and regulatory stakeholders.

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

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

3.5.3 Do nothing

The ‘do nothing’ scenario would allow for the continued use of the land for agricultural production; however, it would also forego the project benefits listed in Section 2.5.1, which include contributions to the development of the South-West REZ and supporting Australia’s transition towards clean and renewable sources of energy. In addition, the local area and broader region would not realise the economic benefits to local and regional communities provided by direct employment opportunities, benefit sharing opportunities and flow-on effects.

4 Statutory context

The key relevant statutory requirements for the project, having regard to the EP&A Act, other NSW and Commonwealth legislation, and environmental planning instruments are summarised in Table 4.1. This table has been set out in accordance with the Scoping Report Guidelines and *State Significant Development - Preparing an Environmental Impact Statement Appendix B to the State Significant Development Guidelines* (DPIE 2022e) (EIS Guidelines), to cover the following:

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

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

Table 4.1 Statutory context

Approval	Requirement
Power to grant approval	
EP&A Act and SEPP (Planning Systems) 2021	Section 4.36(2) of the EP&A Act states that a: *...State environmental planning policy may declare any development, or any class or description of development, to be State significant development.* Clause 2.6 of the Planning Systems SEPP states: *(1) Development is declared to be State significant development for the purposes of the Act if:* *(a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and* *(b) the development is specified in Schedule 1 and 2.* Schedule 1. clause 20 of the Planning Systems SEPP defines the following as SSD: *Electricity generating works and heat or co-generation* *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, waste, hydro, wave, solar or wind power) that:* *(a) has a capital investment value of more than $30 million.* The Project is development for the purpose of electricity generation and will have a capital investment value of more than $30 million, so it is SSD. Under Section 4.5 of the EP&A Act the consent authority for SSD is the Minister for Planning. The Minister for Planning has issued a general delegation of the consent authority function for SSD projects to the Independent Planning Commission in instances where more than 50 public objections are received on the application, the applicant has made a reportable political donations disclosure and/or the local Council objects to the project.

Table 4.1 Statutory context

Approval	Requirement
Permissibility	
State Environmental Planning Policy (Transport and Infrastructure) 2021	Under section 2.36 (1) of *State Environmental Planning Policy (Transport and Infrastructure) 2021*, development for the purpose of electricity generating works, such as the project, may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. The project is within a rural land use zone, RU1 Primary Production. Development for the purpose of electricity generating works is therefore permissible with consent.
Electricity Infrastructure Investment Act 2020	The project investigation area is within a declared REZ under section 23 of the *Electricity Infrastructure Investment Act 2020.*
Consistent approvals	
Overview	Section 4.42 of the EP&A Act outlines that the approvals listed below cannot be refused if necessary for carrying out an approved SSD and are to be consistent with the terms of the development consent for the SSD.
An environment protection licence under Part 3 of the NSW *Protection of the Environment Operations Act 1997*	Section 48 of the *Protection of the Environment Operations Act 1997* (POEO Act) requires an environment protection licence to undertake scheduled activities at any premises. Scheduled activities in schedule 1 Clause 17 of the POEO Act and include 'general electricity works' with 'capacity to generate more than 30 megawatts of electrical power'. Accordingly, the project will require an environment protection licence.
An approval under Section 138 of the NSW *Roads Act 1993*	Under Section 138 or Part 9, Division 3 of the *Roads Act 1993*, a person must not undertake any works that impact on a road, including connecting a road (whether public or private) to a classified road, without approval of the relevant authority, being either Transport for NSW or local council, depending upon the classification of the road. Road and/or intersection upgrades will be required as part of the project and approval(s) will be sought from the relevant authority.
Commonwealth approvals	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act aims to protect matters of national environmental significance (MNES). If an action will, or is likely to, have a significant impact on any MNES, it is deemed to be a 'controlled action' and requires approval from the Commonwealth Environment Minister or the Minister's delegate. The project has been referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) under the EPBC Act to determine whether the Project requires formal assessment and approval under the EPBC Act as a controlled action or not. If the Project is determined to be a controlled action, it is proposed that the Project would be assessed under the bilateral agreement between the NSW and Commonwealth Government.
Native Title Act 1993	The Commonwealth *Native Title Act 1993* recognises and protects native title rights in Australia. There are no current native title claims relevant to the project development corridor.
Civil Aviation Safety Regulation 1988 (CASR)	Part 139, subpart 139E 'obstacles and hazards' of the CASR require that the Civil Aviation Safety Authority (CASA) be informed of proposals to build a structure greater than 110 m above ground level. A detailed aviation assessment will be prepared as part of the EIS. This will include engagement with CASA, Airservices Australia (ASA), Aerial Agricultural Association of Australia (AAAA), the Royal Flying Doctors Service (RFDS), and NSW Rural Fire Service.

Table 4.1 Statutory context

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

Table 4.1 Statutory context

Approval	Requirement
	e) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage), *f) to promote good design and amenity of the built environment,* *g) to provide increased opportunity for community participation in environmental planning and assessment.* The above will be considered in the EIS.
Section 4.15 of the EP&A Act	Pursuant to Section 4.15 of the EP&A Act, the consent authority must consider the following relevant matters for consideration: • relevant environmental planning instruments for the project including: – *State Environmental Planning Policy (Biodiversity and Conservation) 2021*; – *State Environmental Planning Policy (Resilience and Hazards) 2021*; – *State Environmental Planning Policy (Transport and Infrastructure) 2021*; and – other local environmental planning instruments; • relevant development control plans; • the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality; • the suitability of the site for the development; and • the public interest. The above will be considered in the EIS (other than relevant development control plans).
Mandatory consideration – Considerations under other legislation	
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. A BDAR will be prepared as part of the EIS.
NSW Roads Act 1993 (Roads Act)	Relevant to the project, consent under section 138 of the Roads Act may be required for any site access intersection improvements (ie to connect the project to the local road network), as well as any works within designated road corridors (eg proposed transmission line or road upgrades). Should the project obtain development consent, approval under the Roads Act cannot be refused and will be consistent with conditions of approval.
Local Land Services Act 2013 (LLS Act) *The Land Management (Native Vegetation) Code 2018* (the Code)	The Code supports landholders undertaking productive and sustainable farming practices, while managing environmental risk. The project investigation area includes set aside areas managed under the Code for the purposes of conservation (managed to promote vegetation integrity).
Mandatory considerations – Environmental planning instruments	
State Environmental Planning Policy (Resilience and Hazards) 2021 – Section 3.7	The EIS will consider the following relevant departmental guidelines: • *Applying State Environmental Planning Policy No. 33 Hazardous and Offensive Development*; • Hazardous Industry Planning Advisory Papers (HIPAP) No. 3 – Risk Assessment; and • HIPAP No. 12 – Hazards.
State Environmental Planning Policy (Resilience and Hazards) 2021 – Section 4.6	The EIS will consider the potential for the project to impact on contaminated land.

Table 4.1 Statutory context

Approval	Requirement
State Environmental Planning Policy (Transport and Infrastructure) 2021	The existing 220kV Buronga/Balranald Transgrid transmission line traverses the southern section of the project and the proposed Project EnergyConnect 330kV transmission line will be constructed within the existing Buronga/Balranald 220kV easement. As such, the EIS will consider the potential for the project to affect an electricity transmission or distribution network with reference to Clause 2.48 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*.
Balranald Local Environmental Plan (LEP) 2010	The EIS will consider the relevant objectives and land uses for RU1 zone as well as other relevant provisions under the Balranald LEP.
Mandatory considerations Development control plans	
In accordance with Section 2.10 of the Planning Systems SEPP, development control plans do not apply to SSD and are not a relevant consideration for the project.	

5 Engagement

5.1 Community and stakeholder engagement objectives

Squadron Energy works closely with the local community and supports initiatives that make a positive and long-lasting contribution. As a developer of the project, Squadron Energy's objective is to partner with local stakeholders to deliver long-term benefits for the local, regional and NSW community. Squadron Energy has extensive engagement experience through project inception, assessment, construction and operations and has deep-founded respect for people, communities and the environment.

5.2 Community and stakeholder engagement

Squadron Energy has a high-level framework for the delivery of communication and engagement throughout the planning and assessment process for each stage of the project, which is dynamic and evolves based on stakeholder and community feedback. Squadron Energy has commenced and will continue to carry out engagement that is meaningful, proportionate and tailored to the needs of the community, stakeholders, councils and government agencies.

Since 2021, Squadron Energy has been engaging with a range of project stakeholders including leaseholders, Crown Lands, First Nations stakeholders, local and state government and specific interest groups. Squadron Energy has developed a Stakeholder Engagement Plan that is available on the project website https://www.squadronenergy.com/our-projects/koorakee-energy-park.

5.2.1 Interactions and issues

Engagement for KEP has included:

- face-to-face meetings and briefings
- letterbox drops, phone calls and emails
- community newsletter distribution
- community information session
- a community values survey
- media releases
- project website
- advertisements in local news media and social media channels.

Figure 5.1 provides an overview of the stakeholder interactions undertaken for the project to date, including the stakeholder type, interaction type and number of interactions. Further details are provided in the SIA Scoping Report in Appendix G.

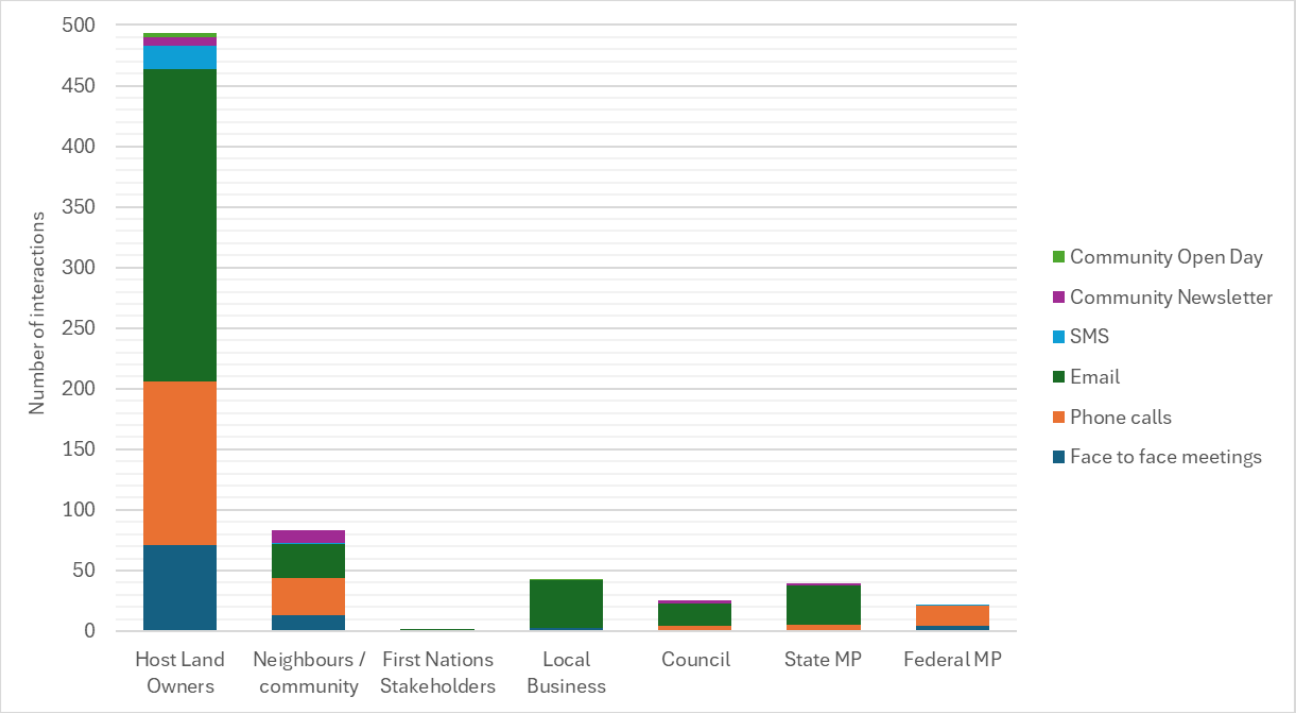


Figure 5.1 Stakeholder interactions (to April 2024)

Feedback received from the community through the interactions found that visual amenity was raised as a key theme/issue, particularly in relation to the visual impact of the wind turbines. Concerns were also raised regarding potential impacts to the environment and native flora and fauna in the region. This was in relation to the Willandra Lakes World Heritage Area as well as endangered species such as the Regent Parrot and Mallee Fowl.

Stakeholders also identified potential livelihood benefits in terms of the project helping diversify the local economy, as well as providing procurement and employment opportunities, including for First Nations stakeholders.

A summary of the issues raised, and by which stakeholders, is provided in Figure 5.2.

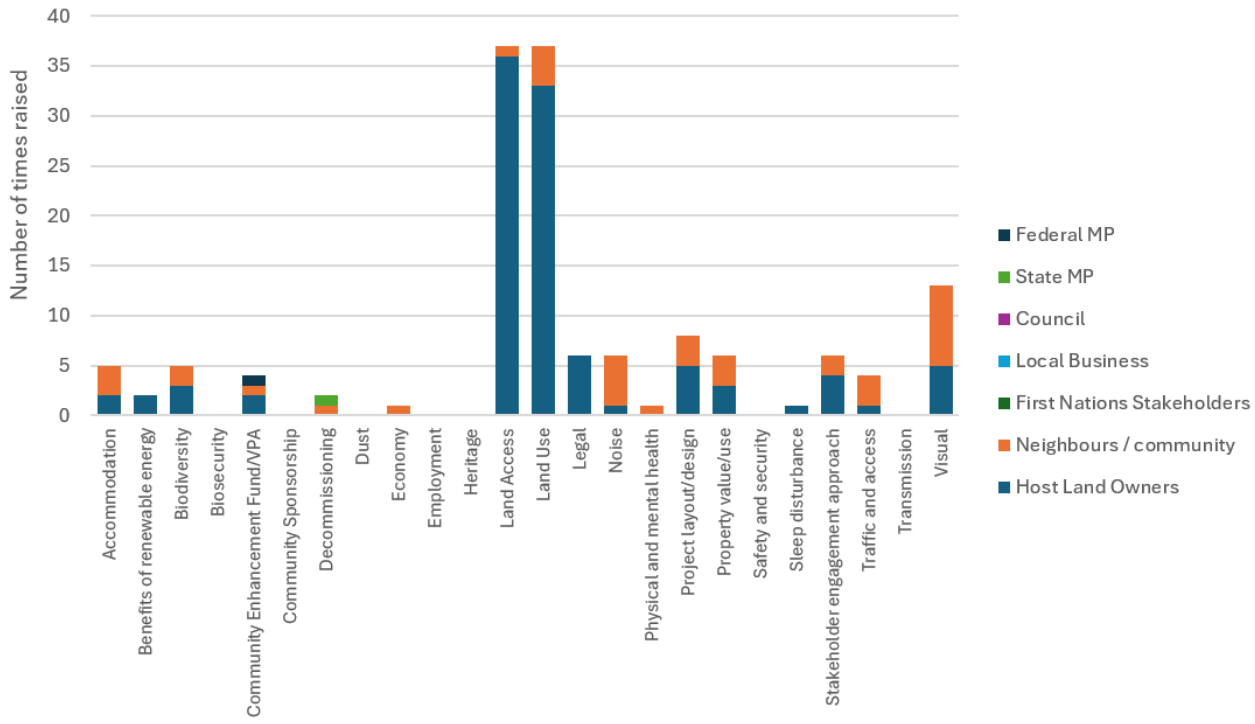


Figure 5.2 Issues raised (number and stakeholder)

5.2.2 Community open day

Squadron Energy delivered a Community Open Day at the Robinvale Community Arts Centre on 30 November 2023 from 12 pm to 7 pm. During this event, more than 20 visitors participated, comprising 3 nearby neighbours, 2 host leaseholders and local community members. The event was promoted via a flyer in the local newspaper and a letter box drop to all Post Office boxes in Euston/Robinvale. Attendees mainly included Robinvale local residents.

The feedback received during this event was mostly positive and supportive. Emphasis was placed on the economic opportunity for the towns, and the valuable contribution the project would make in transitioning to renewable energy. Visitors appreciated being informed about the project. One neighbour expressed concerns regarding visual changes to landscape but was open to discussion and further analysis of the impact at their property. Local businesses were happy to assist the project and interested in knowing more.

Further details of the open day and issues raised are provided in Appendix G.

5.2.3 Community survey

A community survey was developed and distributed in hard copy during the Community Open Day as well as digitally via the project website. The survey consisted of 12 questions and the purpose was to gain an understanding from the broader community of the potential social impacts and benefits of the project. The survey was available from 22 November 2023 to 3 January 2024.

A total of 4 responses were received, being from one community member located within the local area (Benanee) and three community members located within Robinvale. Sentiment relating to the project was mainly positive, with three responses stating “go for it” due to the need for renewable energy generation and associated benefits. One response was neutral, citing a desire not to change the landscape characteristic with additional built form due to the value that the (current) isolation represents.

Further details of the community survey responses are provided in Appendix G.

5.2.4 Government and regulatory stakeholders

Squadron Energy has commenced engagement with Balranald Shire Council on the project and will seek further meetings through the Scoping and EIS process to keep them informed of the project. A meeting was held on 9 January 2024 and the general sentiment of the Council was positive, with key interest points being potential benefit sharing, community benefits/impacts and workforce accommodation.

Squadron Energy has also met with NSW Biodiversity, Conservation and Science Division (BCD) representatives on site on 15-November 2023 to discuss the project. The site visit was collaborative, and BCD were enthusiastic about working with Squadron Energy to ensure impacts from the project were minimised or mitigated. Specific feedback from BCD included:

- critical habitat along road corridors
- bird strike, particularly for the Regent Parrot
- contaminated soil being spread by construction activities
- dust and runoff impacting waterways.

Squadron Energy will consult with all relevant government agencies during the preparation of the EIS.

Squadron Energy has also commenced consultation with the Willandra Lakes World Heritage Committee that manages the Willandra Lakes World Heritage Area (WHA), that is adjacent to the northern boundary of the proposed project investigation area. Squadron Energy presented to the committee on 4 October 2023, and will continue consultation as the project develops. The Committee was primarily interested in visual impacts from the project on viewpoints in the World Heritage Area.

5.3 EIS phase consultation

During the preparation of the EIS, Squadron Energy will continue to consult with relevant local, State and Commonwealth Government authorities, infrastructure and service providers, community groups, First Nations communities, neighbours and affected landowners/leaseholders. Squadron Energy is committed to genuine and consistent engagement with the local community and stakeholders to support the building of strong relationships with stakeholders, foster existing connections, and establishing a socially sustainable project. EIS phase consultation will be undertaken in accordance with *Undertaking Engagement Guidelines for State Significant Projects* (DPIE 2022b).

First Nations stakeholders will be identified and consulted with during the preparation of the EIS in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010a).

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

Consultation during the development of the EIS will aim to:

- proactively inform, consult and involve stakeholders using clear and consistent key messages
- continue to collaborate with key stakeholders to identify potential issues, impacts, opportunities and benefits
- communicate the progress of the project and key findings or outcomes of assessments
- enable stakeholders to have input into the preparation of the EIS, project planning, investigate opportunities for visual treatment and identify opportunities for benefit sharing

- implement response and feedback strategies to address stakeholder concerns and use these to inform the evolution of the project.

A range of tools and methods will be used to communicate and engage with the community and other stakeholders during preparation of the EIS, with examples provided in Table 5.1. Issues raised during engagement will be documented by the project team to inform the project design, environmental assessment and the preparation of the EIS.

Table 5.1 Engagement tools and methods during preparation of the EIS

Engagement methods	Detail
Advertising	Advertising in local media to advise of upcoming consultation opportunities and provide project updates.
Briefings	Formal letters or meetings with key stakeholders including landowners, MPs, Councillors and council staff to provide updates on the project.
Community contact cards	Business-size card provided to specialists and contractors to give to community stakeholders if approached.
Door-knocking	Project representatives go door to door to speak with impacted landowners and neighbours and/or provide them with project briefings and information.
Drop-in sessions	Time periods when stakeholders can drop in to speak to the project team, view documents and plans and ask questions.
Email inbox	A dedicated project inbox info@koorakeeenergypark.com.au for managing community and stakeholder correspondence.
Letterbox drops or unaddressed mail	General information about the project delivered by the project team or Australia Post.
Letters	Addressed mail containing information, clarification, responses or requests to a particular household, business or individual.
Media releases/statements	Proactive or responsive media statements or announcements provided to the media and other key stakeholders to provide updates, address concerns and clarify information.
Meetings	One-on-one or small group meetings to discuss project issues and concerns in more detail.
Newsletters	Regular project information distributed by email or in hard copy to registered stakeholders.
Phone line	A dedicated number for stakeholders to contact Squadron Energy. The number is 1800 208 944.
Photography	Photos, composites, concept and artist imagery can help illustrate processes and make technical information more accessible.
Presentations	Presentations about the project delivered to a group of interested persons, club or committee on request or by invitation.
Surveys	Online or offline surveys to obtain input and feedback on project decision-making.
Social media	Online social connection platforms used to share project information and interact with stakeholders.
Website	Updates to the existing website including descriptions of the project, company information, frequently asked questions, plans, maps, media releases and contact information. The project website is https://www.squadronenergy.com/our-projects/koorakee-energy-park
Workshops	A structured method working with groups of stakeholders to identify and suggest solutions for project issues and concerns.

6 Proposed assessment of impacts

6.1 Level of assessment required in the EIS

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

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

The following sections of this chapter present the identified matters requiring further assessment and the proposed approach to the respective assessments. In addition to the preliminary environmental assessment presented herein, preliminary technical studies have been carried out for the key issues of:

- biodiversity (Appendix C)
- visual impact from both wind and solar generation (Appendix D and Appendix E)
- noise (Appendix F)
- social impact (Appendix G).

These preliminary technical studies have been undertaken to ensure that the values of the project development corridor and surrounds are taken into consideration early in the planning and design of the project. Measures implemented through the scoping phase to avoid and minimise impacts are also described.

Matters have been considered as per the categories identified in the *Scoping Report Guidelines*. A scoping summary table is included in Appendix B and the level of assessment identified for each matter is presented in Table 6.1.

Table 6.1 Level of assessment required in EIS

Level of assessment	Aspect
Detailed	Biodiversity – Terrestrial flora and fauna, conservation areas
	Heritage
	Amenity – Visual, Noise and Vibration
	Social
	Access
Standard	Land
	Water
	Air
	Hazards and risk

Table 6.1 Level of assessment required in EIS

Level of assessment	Aspect
	Biodiversity – Aquatic flora and fauna
	Economic
	Built environment

6.2 Detailed assessment

The *Scoping Report Guidelines* state that detailed assessment is required where the project may result in significant impacts on the matter, including cumulative impacts. The matters identified as requiring detailed assessment are described in Sections 6.2.1 to 6.2.7, including details around the existing environment, potential impacts and the proposed assessment approach for the EIS.

6.2.1 Terrestrial biodiversity

A preliminary biodiversity assessment (PBA) (Appendix C) has been undertaken to inform the development of the project. As detailed in Section 3.5.2, potential biodiversity constraints and development opportunities have been identified to assist Squadron Energy with preliminary project design, and DPHI in developing biodiversity related SEARs. The PBA has relied upon information from existing spatial data for the project investigation area and a desktop review. Detailed field survey will be required to validate this assessment to inform the future Biodiversity Development Assessment Report (BDAR) as part of the EIS.

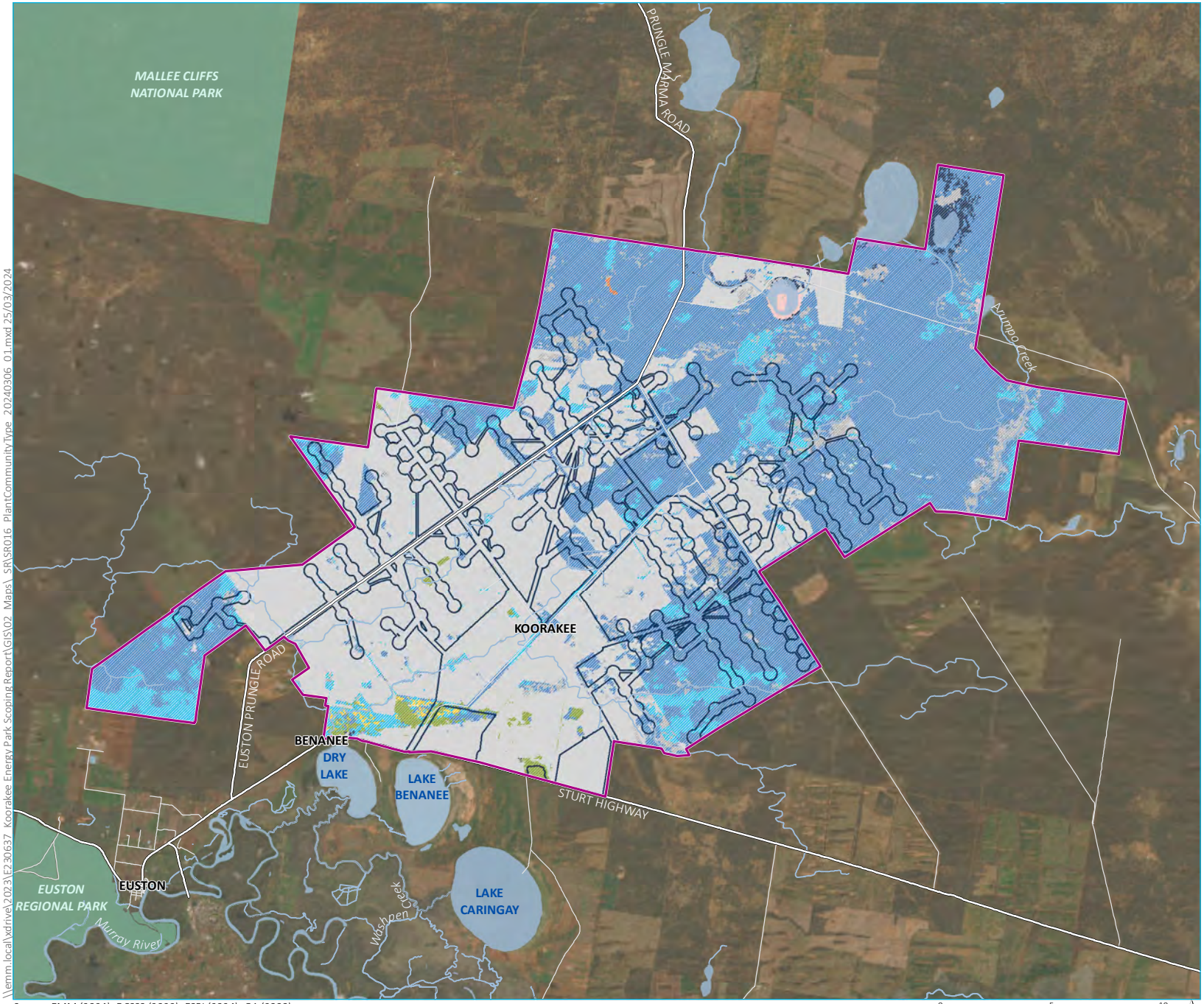
i Existing environment

The project is located within the Murray Darling Depression Interim Biogeographic Regionalisation of Australia (IBRA) region and South Olary Plain IBRA subregion. It is situated north of the Murray River and several significant waterbodies, including Lake Benanee, Dry Lake and Lake Caringay. The project investigation area is 10km south-east of Mallee Cliffs National Park and adjacent to the southern extent of the Willandra Lakes World Heritage Area.

Much of the project investigation area has been previously cleared for agricultural use, although substantial tracts of remnant vegetation occur in the north, north-east and south-west corners of the project investigation area. The project investigation area is intersected by Arumpo Creek in the north-east, which is mapped as 'Biodiverse Riparian Land' according to the NSW Government Biodiversity Values Map, however the development corridor avoids impacts to Arumpo Creek.

a Native vegetation

A total of 14 Plant Community Types (PCTs) are mapped within the project investigation area by the NSW State Vegetation Type Map (SVTM). These include a range of wetland, open woodland, shrubland and mallee communities. Review of the scoping report for the adjacent Euston Wind Farm Project, for which biodiversity field surveys were undertaken, revealed that six of these PCTs (13, 57, 58, 170, 171 and 172) were confirmed to occur on adjoining lands. Given the proximity of the project to the Euston Wind Farm Project (directly south-east), it is likely that these six PCTs will be present in the project boundary. The location of the PCTs within the project investigation area are presented in Figure 6.1.



KEY

- Koorakee Energy Park
- Development corridor

Plant Community Type ID

- 0
- 11
- 12
- 13
- 24
- 159
- 163

Potential TEC

- 28
- 57
- 58
- 143
- 153
- 170
- 171
- 172

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Source: EMM (2024); DCSSS (2023); ESRI (2024); GA (2009)

0 5 10 km

GDA 1994 MGA Zone 54

N

\\emm.local\xdrive\2023\E230637 Koorakee Energy Park Scoping Report\GIS\02 Maps\ SR\SR016 PlantCommunityType 20240306 01.mxd 25/03/2024

Plant community types

Koorakee Energy Park
Scoping Report
Figure 6.1

EMM
creating opportunities

b Threatened ecological communities

Eight threatened ecological communities (TECs) listed under the BC or EPBC Act were identified with the potential to occur within the project investigation area. Of these, four are considered with a moderate to high likelihood of occurring. The likelihood of these TECs being present within the project investigation area are summarised in Table 6.2.

Table 6.2 Threatened Ecological Communities – Likelihood of Occurrence

Threatened Ecological Community	BC Act	EPBC Act	Associated PCTs	Likelihood of occurrence
Acacia loderi shrublands	E	-	57, 58, 143, 153, 170	**Moderate**
Acacia melvillei shrublands in the Riverina and Murray-Darling Depression bioregions	E	-	28, 58, 170	**Moderate**
Artesian Springs Ecological Community in the Great Artesian Basin	CE	-	24, 163	**Nil**
Mallee Bird Community of the Murray Darling Depression Bioregion	-	E	170, 171, 172	**High**
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions[1]	E	E	159	**Low**
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	-	E	-	**Low**
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	-	CE	170, 173	**Low**
Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion	CE	-	172	**Low**
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E	-	28	**Moderate**

E = Endangered, CE = Critically Endangered

[1] This community is listed under the EPBC Act as the *Weeping Myall Woodlands Ecological Community*

c Threatened and migratory species

In total, 158 threatened and migratory species listed under the BC or EPBC Act were identified with potential to occur in the study area. Of these species, 2 flora and 17 fauna species are known to occur on or nearby the project investigation area according to NSW Bionet Atlas database records and preliminary surveys conducted for the Euston Wind Farm Scoping Report (NGH Consultling and DP Energy, 2023), and therefore have a higher likelihood of occurring in the project investigation area. During recent consultation, the south-west region of the Biodiversity and Conservation Division (BCD) advised that a further 13 fauna species are likely to occur in the region.

The 30 species known to occur in the project locality are listed in Table 6.3.

Table 6.3 Threatened species known to occur in the project locality

Species	Conservation status (BC Act)	Conservation status (EPBC Act)
Bitter Quandong (*Santalum murrayanum*)	Endangered	Not listed

Table 6.3 Threatened species known to occur in the project locality

Species	Conservation status (BC Act)	Conservation status (EPBC Act)
Black Falcon (*Falco subniger*)	Vulnerable	Not listed
Black-breasted Buzzard (*Hamirostra melanosternon*)	Vulnerable	Not listed
Blue-winged Parrot (*Neophema chrysostoma*)	Vulnerable	Vulnerable
Bolam's Mouse (*Pseudomys bolami*)	Endangered	Not listed
Brown Treecreeper (*Climacteris picumnus victoriae*)	Vulnerable	Vulnerable
Chestnut Quail-thrush (*Cinclosoma castanotum*)	Vulnerable	Not listed
Corben's Long-eared Bat (*Nyctophilus corbeni*)	Vulnerable	Vulnerable
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	Vulnerable	Not listed
Hooded Robin (*Melanodryas cucullata cucullata*)	Vulnerable	Endangered
Inland Forest Bat (*Vespadelus baverstocki*)	Vulnerable	Not listed
Gilbert's Whistler (*Pacycephala inornata*)	Vulnerable	Not listed
Little Eagle (*Hieraeetus morphnoides*)	Vulnerable	Not listed
Little Pied Bat (*Chalinolobus picatus*)	Vulnerable	Not listed
Major Mitchell's Cockatoo (*Cacatua leadbeateri*)	Vulnerable	Endangered
Mallee Worm Lizard (*Aprasia inaurita*)	Endangered	Not listed
Malleefowl (*Leipoa ocellata*)	Endangered	Vulnerable
Marble-faced Delma (*Delma australis*)	Endangered	Not listed
Pied Honeyeater (*Certhionyx variegatus*)	Vulnerable	Not listed
Regent Parrot (*Polytelis antopeplus monarchoides*)	Endangered	Vulnerable
Shy Heathwren (*Hylacaula cautus*)	Vulnerable	Not listed
Southern Ningaui (*Ningaui yvonneae*)	Vulnerable	Not listed
Southern Scrub-robin (*Dryomodes brunneopygia*)	Vulnerable	Not listed
Southern Whiteface (*Aphelocephala leucopsis*)	Vulnerable	Vulnerable
Spotted Harrier (*Circus assimilis*)	Vulnerable	Not listed
Square-tailed Kite (*Lophoictinia isura*)	Vulnerable	Not listed
Thyme Rice Flower (*Pimelea serpyllifolia*)	Endangered, SAII (see Section 6.2.1d)	Not listed
Varied Sitella (*Daphoenositta chrysoptera*)	Vulnerable	Not listed
Western Blue-tongued Lizard (*Tiliqua occipitalis*)	Vulnerable	Not listed
Western Pygmy Possum (*Cercartetus concinnus*)	Endangered	Not listed
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	Vulnerable	Marine
White-fronted Chat (*Epthianura albifrons*)	Vulnerable	Not listed

ii Potential impacts

Throughout the scoping phase, Squadron Energy have considered preliminary environmental constraints in the refinement of the project layout. As detailed in Appendix C, this has so far resulted in an overall reduction in the development corridor size by approximately 9,100 ha, which has resulted in a reduction in proposed native vegetation impact.

Impacts on native vegetation, potentially including TECs listed under both the BC Act and EPBC Act, are likely to occur as a result of the project. The construction of project infrastructure, access roads and associated facilities will result in the direct loss of vegetation. Potential impacts on TECs to be assessed as part of the EIS include:

- loss of hollow-bearing and mature trees
- loss of breeding, hunting and foraging habitat
- habitat fragmentation
- waterway bed and bank impacts.

Potential operational impacts are primarily associated with the risk of turbine collision and barrier effects to threatened and protected bird and bat species. To assess potential wind turbine strike impacts upon threatened and migratory birds and bat species, a preliminary site characterisation was undertaken and is presented in Appendix C.

The preliminary site characterisation identified that if present in the project investigation area, several species represent a possible collision risk, including Dusky Woodswallow (*Artamus cyanopterus cyanopterus*), Inland Forest Bat (*Vespadelus baverstocki*), Little Eagle (*Hieraeetus morphnoides*), Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Pied Honeyeater (*Cerhionyx variegatus*), Regent Parrot (*Polytelis antopeplus monarchoides*), Spotted Harrier (*Circus assimilis*), Square-tailed Kite (*Lophoictinia isura*), Varied Sitella (*Daphoenositta chrysoptera*), White-bellied Sea-eagle (*Haliaeetus leucogaster*).

a Candidate entities for serious and irreversible impacts

One candidate entity for serious and irreversible impacts (SAII) under the BC Act has been recorded within the locality and one has potential to occur in the project investigation area. A description of these and their potential habitat in the project investigation area is provided in Table 6.4.

Table 6.4 Potential SAII in project investigation area

Candidate entity	Likelihood of occurrence in project investigation area
Thyme Rice-Flower (*Pimelea serpyllifolia subsp. serpyllifolia*)	**Recorded.** This species has been previously recorded in the south-west corner of the project investigation area and has been recorded within mallee woodland habitats in the broader Euston district. It has been excluded from the development corridor. Mallee communities are mapped within the project investigation area and may present suitable habitat for the species outside known records.
Swamp She-oak (*Casuarina obesa*)	**Moderate.** Species is known to occur along the shores of Lake Benanee, just south of the project investigation area. The species could occur along the shorelines of permanent, ephemeral or relict lakes if present within the project investigation area.

b Impact on MNES

The potential MNES impacts to be assessed in detail as part of the EIS is detailed in Table 6.5.

Table 6.5 Potential MNES impacts

MNES	Threatened biodiversity
Threatened ecological communities	Mallee Bird Community of the Murray Darling Depression Bioregion
Threatened plants	A spear-grass (*Austrostipa metatoris*), Chariot Wheels (*Maireana cheelii*), Menindee Nightshade (*Solanum karsense*), Slender Darling Pea (*Swainsona murrayana*), Yellow Swainson-pea (*Swainsona pyrophila*)
Threatened birds	Blue-winged Parrot (*Neophema chrysostoma*), Regent Parrot (*Polytelis antopeplus monarchoides*), Hooded Robin (*Melanodryas cucullata cucullata*), Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Malleefowl (*Leipoa ocellata*), Murray Mallee Striated Grasswren (*Amytornis striatus howei*), Southern Whiteface (*Aphelocephala leucopsis*)
Threatened microbats	Corben's Long-eared Bat (*Nyctophilus corbeni*)
Threatened fish	Flathead Galaxias (*Galaxias rostratus*), Murray Hardhead (*Caterocephals fluviatilis*), Murray Cod (*Maccullochella peelii*)

iii Assessment approach

As the project will be assessed under Part 4 Division 4.7 of the EP&A Act, an assessment in accordance with the Biodiversity Assessment Method (BAM) (DPIE 2020c) and the preparation of a BDAR is required. The following key tasks should be completed during the BDAR:

- validate and refine the State Vegetation Type Map, and delineate into vegetation zones
- conduct vegetation integrity plots
- conduct field-based threatened species habitat assessment
- generate a list of candidate species for further assessment, and conduct targeted surveys for those candidate 'species credit' species, where a habitat constraint and or suitable microhabitats are present
- conduct targeted surveys for required MNES
- conduct BAM calculations and prepare BDAR for lodgement.

Given the potential for impacts on threatened bird and bat species, a Bird and Bat Utilisation Study (BBUS) and monitoring program will be required. The Biodiversity and Conservation Division (BCD) of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW, NSW) have advised that they require a 24 -month monitoring dataset, with multiple surveys per season. BCD have recently provided guidance documents to proponents working in the south-west renewable energy zone, comprising:

- Draft Turbine Risk Assessment and Avoidance Guideline
- Suggested BBUS Method
- Draft Bird and Bat Adaptive Management Program (BBAMP) Framework 2023.

In 2023, the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW, Commonwealth) also finalised the Onshore Wind Farm Guidance. The aforementioned guidelines would be considered when developing the monitoring program and when assessing prescribed impacts during the BDAR.

6.2.2 Aboriginal heritage

i Existing environment

A desktop review was undertaken of the existing environment in the region that may provide context to the environment within the project development corridor. The landscape is characterised by extensive undulating dunefields and sandplains of brown calcareous soils. The Darling and Murray Rivers are the major hydrological systems in the bioregion. Lakes and lunettes are a major surface feature of the region and are routinely shown to contain Aboriginal cultural materials.

The project investigation area is adjacent to the Willandra Lakes World Heritage Area, within which nationally significant cultural and ancestral remains have been recovered from lunette features approximately 40 km north of the development corridor. Previous archaeological research in the region has been research-driven following the discovery of some of the earliest ancestral remains in the world at Lake Mungo.

Specifically, within the project investigation area, the landscape is predominantly characterised by the Mallee Cliffs Sandplains Mitchell Landscape (Mcs) with small portions of the southern (Mld) and northern (Mcx) soil profiles are also present. These undulating sandplains are formed of Quaternary aeolian sands with east-west trending dunes that commonly form into lunettes (Eco Logical Australia 2008; Mitchell unpublished).

Much of the project investigation area has been previously cleared and converted into farmland, however substantial tracts of remnant vegetation occur in the north, north-east and south-west corners. The project is located north of the Murray River with Arumpo Creek flowing throughout the northern part of the investigation area, but outside of the development corridor.

A search of previously documented cultural materials within the Aboriginal Heritage Information Management System (AHIMS) database (16 November 2023; Client Service ID: 840311) revealed 75 Aboriginal sites within a 30 km^2 search area centred on the project investigation area. This search area extended beyond the project investigation area to ensure that the types and numbers of the previously identified AHIMS sites were understood, to inform what may be expected to be found within the investigation area and development corridor. The numbers and types of sites identified are detailed in Table 6.6 and Figure 6.2.

These identified AHIMS sites are primarily located around the local waterways and lake systems, and are dominated by stone cultural deposits and hearths, reflective of the domestic use of these lake systems in the past.

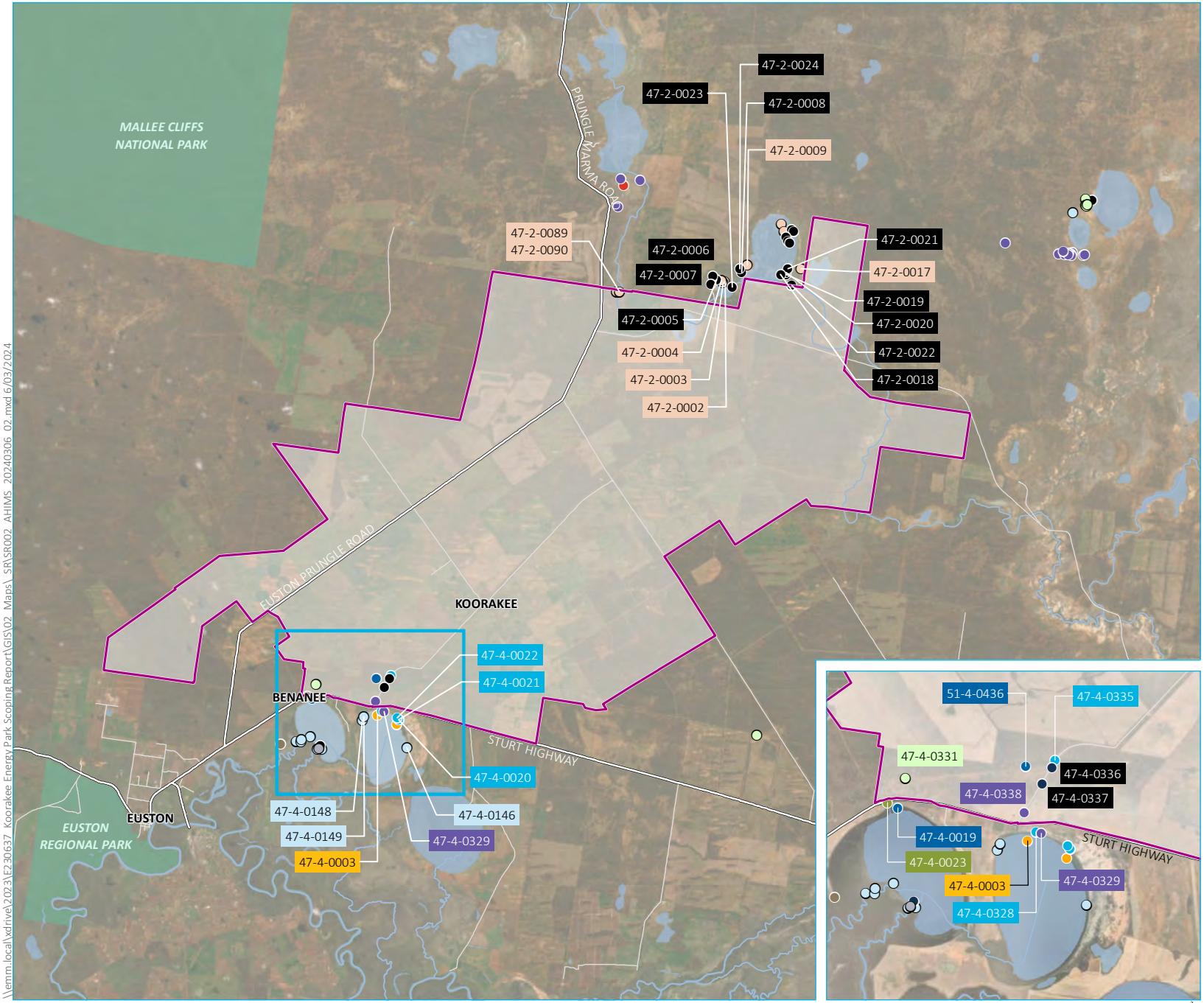
There are four AHIMS sites located within the development corridor (#47-4-0335, #47-4-0336, #47-4-0337 and #47-4-0338), which includes a burial site #47-4-0335. Future design will include the careful consideration of identified ancestral remains, and the potential for further such sites to be present.

Table 6.6 Summary of AHIMS sites in the locality

Site type	Number of sites
Artefact	22
Burial	5
Burial with hearth and artefact	1
Burial with non-human bone and/or organic material and artefact	1
Burial with shell midden, modified tree and artefact	1
Ceremonial ring (stone or earth)	1
Conflict	1
Hearth	22

Table 6.6 Summary of AHIMS sites in the locality

Site type	Number of sites
Heart with artefact	9
Hearth with modified tree and artefact	1
Modified tree (carved or scarred)	4
Modified tree with artefacts	1
Shell midden	2
Shell midden with artefact and PAD	1
Shell midden with hearth and artefacts	2
Shell midden with modified tree and artefact	1
Total	**75**



KEY

Koorakee Energy Park

AHIMS (Site type)

- Burial
- Burial, culturally modified tree
- Burial/s
- Ceremonial site
- Culturally modified tree
- Frontier violence site
- Hearth
- Isolated Aboriginal object
- Midden
- Undefined artefact site
- Undefined artefact site and deposit
- Undefined artefact site and hearth

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve

AHIMS sites

Koorakee Energy Park
Scoping Report
Figure 6.2

Source: EMM (2024); DCSSS (2023); ESRI (2024); OEH (2024)

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EMM creating opportunities

ii Potential impacts

The project is situated within a significant cultural landscape within which cultural remains of significance are well documented. Available data suggests that such cultural materials are present within the project investigation area and/or found in close proximity.

Construction of the project has the potential to impact known and currently unidentified Aboriginal heritage sites through ground disturbance for the construction all project elements, including WTGs, solar and BESS infrastructure and ancillary facilities.

In addition to the potential direct impact to tangible cultural remains, indirect impacts – predominantly visual – to important cultural places and landscapes may also result from the project. Consultation has commenced with the Willandra Lakes World Heritage Committee and the potential for visual impacts presented. Further consultation and impact assessment will continue throughout the EIS.

Squadron Energy will seek to avoid impacts to Aboriginal heritage sites wherever possible. Due to the nature of wind and solar farm infrastructure, impacts to Aboriginal heritage sites can often be avoided with careful consideration of project design post archaeological investigations (e.g. predictive modelling and survey, this will be further considered as part of the EIS assessment.

iii Assessment approach

The development corridor requires further investigation to characterise and assess potential cultural materials and provide suitable management and mitigation. This includes more detailed field survey, test excavation, and consultation with the local Aboriginal community.

As such, in accordance with Heritage NSW guidelines, further assessment would comprise of an Aboriginal cultural heritage assessment (ACHA). The ACHA will be prepared with general consideration to the following guidelines:

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

Several additional tasks will also be implemented to address specific circumstances of the project. These include:

- suitable assessment, consideration and management of any potential impacts to the Willandra Lakes Region World Heritage Area
- a detailed historical review and if required, specialised on-site investigations to ensure the suitable assessment, characterisation and management of identified sensitive areas, including known ancestral remains that are documented within the project investigation area.

6.2.3 Amenity - Visual impact

Two Preliminary Visual Impact Assessments (PVIAs) have been prepared for the project, for impacts from both wind energy infrastructure (Appendix D) and solar energy infrastructure (Appendix E). These assessments are referred to as the PVIA-Wind and PVIA-Solar.

Separate assessments have been prepared due to the different assessment methodologies for wind and solar. Visual impacts from solar and BESS components are assessed using the *Large-Scale Solar Energy Guideline* (2022) and visual impacts from wind energy projects are assessed using the *Wind Energy: Visual Assessment Bulletin (VA Bulletin, DPE 2016)*. The two guidelines require different assessment methodology and criteria, and therefore a separate approach.

i Existing environment

a Landscape character

The landscape within the project investigation area is comprised of clear and flat expanses used for grazing or cropping and some vegetated areas. Elevation across the project investigation area is fairly constant, ranging from approximately 55 m to 70 m AHD. Arumpo Creek runs through the northern portion of the project investigation area and a number of other unnamed tributaries run throughout the project investigation area .

The landscape of the project investigation area and its surrounds can be characterised into three broad categories, with one additional category that is specific only to the wind elements in the north of the project investigation area. These categories are defined by the vegetation, land form, land use and presence of water, and described in Table 6.7.

Table 6.7 Landscape character

Category	Characteristics
Murray River corridor	The Murray River is a significant feature in the landscape as it winds its way from east to west, south of the project investigation area. The river influences wide swathes of the landscape on either side of the waterway. These lands are subject to flooding and contain lakes and smaller waterways that connect the water bodies. The river is controlled by a series of locks/weirs and used for irrigation for the surrounding agricultural lands. The river is also used for recreational boating and fishing.
Agricultural pastures	The agricultural pastures make up the majority of the landscape across the project investigation area. The woodland has been cleared to provide pastures for grazing and fields for dry cropping and irrigated crops. The topography is fairly flat with low rises divided by water courses. There are occasional corridors of remnant woodland along watercourses, roads, and property boundaries. Visually, the pastures are vast, flat fields of crops that are punctuated by remnant trees.
Mallee woodlands and shrublands	The Mallee woodlands and shrublands occur in semi-arid landscapes within and around the project investigation area. It is dominated by low, multi-stemmed eucalyptus (Mallee) that rarely grow taller than six metres. The understorey can be made up of shrubs or grasses, depending on the local rainfall, soil and fire history. Visually, the Mallee woodlands and shrublands creates a uniform landscape with sculptural multi-stemmed trees of similar size. This is in sharp contrasted with adjacent cleared paddocks and roadways that cut through the woodlands.
Arumpo Creek corridor (relevant to project investigation area north of wind farm)	Arumpo Creek runs northwest to southeast in the northern part of the project investigation area. It connects a series of lakes as it meanders through the landscape. The corridor along the creek is devoid of most trees (there are occasional trees) and the soil has formed a crusty surface that is different in colour and texture from the surrounding woodlands. The distinct character of the corridor makes it a distinctive visual feature in the landscape.

b Sensitive receivers and viewpoints

Sensitive receivers refer to people who have potential views of the project, and are represented and assessed using the locations of dwellings that surround the project. Viewpoints refer to publicly accessible areas that may have views of the project infrastructure. Given the different assessment methodologies for wind and solar, sensitive receivers and viewpoints for each element are defined using different methods.

Wind

The PVIA-Wind identifies two types of viewpoints, public viewpoints and private viewpoints. The study area for public and private viewpoints extends 8km from the outer perimeter of the proposed WTGs.

The preliminary assessment tools detailed in the VA bulletin require the analysis of two critical visual parameters, being visual magnitude and viewing of multiple wind turbines, detailed further in the PVIA (Appendix D).

Using the Visual Magnitude Tool, and based on a WTG tip height of 270 m:

- the black line distance for the project (the line within which detail consideration of visual impacts must be further considered in the EIS) is 3.6 km from the WTGs
- the blue line distance for the project (the line within further consideration may be need in the EIS based on factors such as topography and landscape features) is 5.3 km from the WTGs.

The sensitive receivers and viewpoints within the 8 km wind study area, the black and blue lines are shown on Figure 6.3.

The multiple wind turbine tool provides a preliminary indication of the potential cumulative impacts from the proposed project. To do this, views from each dwelling or viewpoint are mapped into 60° sectors (6 sectors to cover 360° views). Where WTGs are located in three or more sectors, detailed consideration needs to be given to the potential cumulative visual impacts.

A summary of the preliminary assessment of the sensitive receivers and viewpoints using the visual magnitude and multiple turbine tools, as well as a summary of those that required further assessment in the EIS, are detailed in Table 6.8.

Table 6.8 Wind - Sensitive receivers and viewpoints

Viewpoint reference	Viewpoint type	Location	Below black line	Below blue line	Number of sectors	Requires further assessment
SH041	Private	50541 Sturt Highway, Euston	No	Yes	3	Yes
SH035	Private	50557 Sturt Highway, Euston	No	No	3	Yes
SH055	Private	50577 Sturt Highway, Euston	No	Yes	3	Yes
DLR001	Private	50777 Sturt Highway, Euston	No	Yes	3	Yes
DLR004	Private	50775 Sturt Highway, Euston	No	Yes	3	Yes
DLR014	Private	96 Dry Lake Road, Euston	No	Yes	3	Yes
DLR007	Private	134 Dry Lake Road, Euston	No	Yes	3	Yes
DLR009	Private	164 Dry Lake Road, Euston	No	No	3	Yes
DLR012	Private	188 Dry Lake Road, Euston	No	No	3	Yes
DLR011	Private	228 Dry Lake Road, Euston	No	No	3	Yes
SH032	Private	50985 Sturt Highway, Euston	No	Yes	3	Yes
SH027	Private	51425 Sturt Highway, Euston	No	No	2	No
SH029	Private	Sturt Highway, Euston	No	No	2	No
LD24	Private	Leslie Drive, Euston	No	No	2	No

Table 6.8 Wind - Sensitive receivers and viewpoints

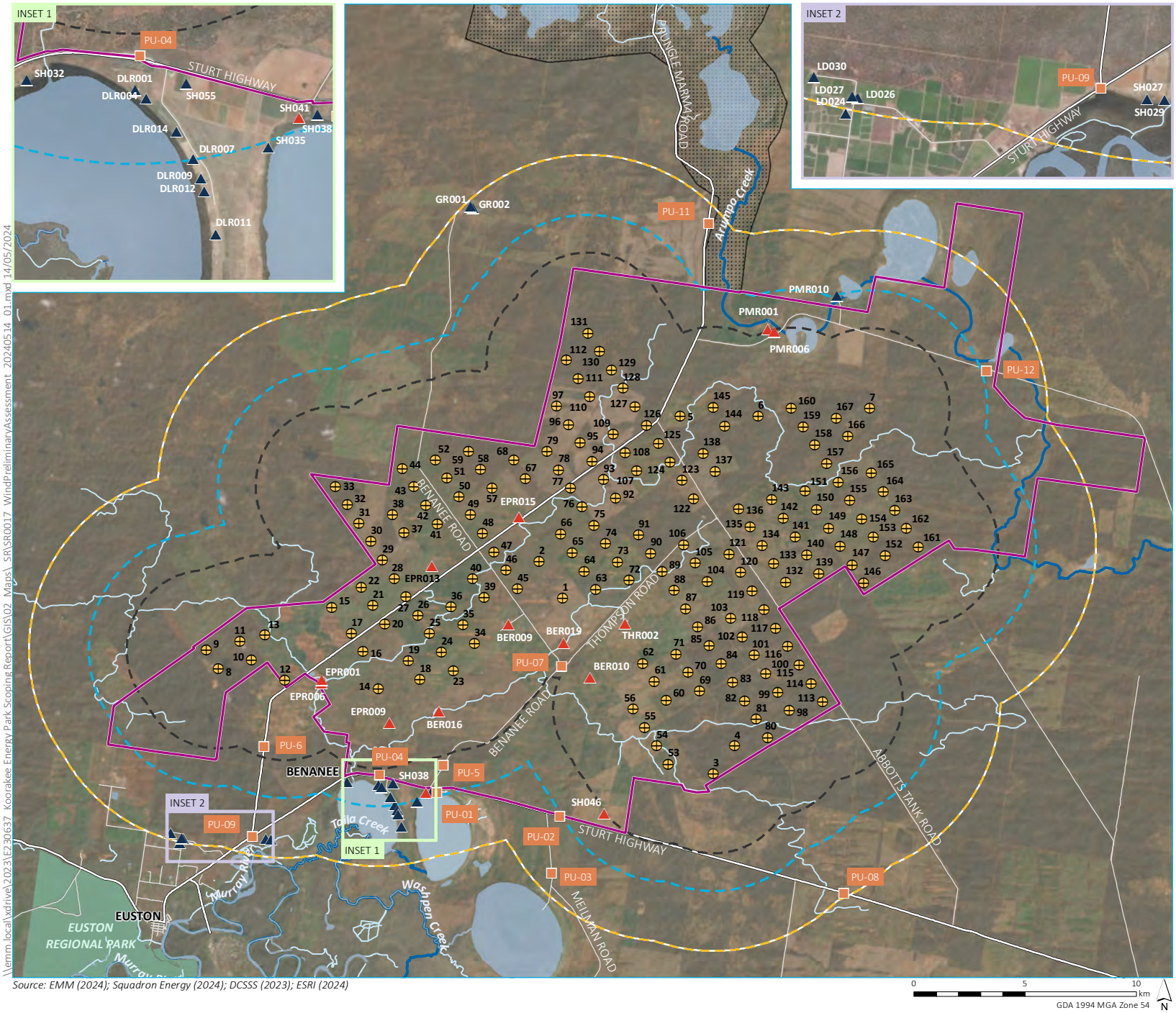
Viewpoint reference	Viewpoint type	Location	Below black line	Below blue line	Number of sectors	Requires further assessment
LD26	Private	Leslie Drive, Euston	No	No	2	No
LD027	Private	Leslie Drive, Euston	No	No	2	No
LD030	Private	285 Leslie Drive, Euston	No	No	2	No
GR001	Private	1667 Gulthul Road, Euston	No	No	2	No
GR002	Private	Gulthul Road, Euston	No	No	2	No
PMR010	Private	4747 Prungle Mail Road, Euston	No	Yes	2	Yes
PU-01	Public	Sturt Highway, Euston	No	Yes	3	Yes
PU-02	Public	Sturt Highway, Euston	No	Yes	3	Yes
PU-03	Public	Meilman Road, Euston	No	No	2	No
PU-04	Public	Sturt Highway, Euston	No	Yes	3	Yes
PU-05	Public	Benanee Road, Euston	No	Yes	3	Yes
PU-06	Public	Euston Prungle Road, Euston	No	Yes	3	Yes
PU-07	Public	Benanee Road at Thompson Road	Yes	Yes	4	Yes
PU-08	Public	48615 Sturt Highway, Balranald	No	No	2	No
PU-09	Public	Sturt Highway at Euston Prungle Road	No	No	2	No
PU-10	Public	Prungle Marma Road, Euston	No	No	2	No
PU-11	Public	Prungle Mail Road, Euston	No	No	2	No

Solar

The PVIA-Solar identifies three types of viewpoints, comprising:

- Private viewpoints – locations that are not accessible to the public (mainly residences) and have views to the solar infrastructure. These views are limited to a 4 km distance from the development.
- Public viewpoints – locations that are publicly accessible (parks, trails, shopping areas) and offer views to the solar infrastructure. These views are limited to a 2.5 km distance from the development
- Roads and rail viewpoints – locations along roads and rail lines that have views to the solar infrastructure. *The Large Scale Solar Energy Guideline (2022): Technical Supplement – Landscape and Visual Impact Assessment* (DPE 2022) limits these viewpoints to within 2.5 km of the development.

There are three non-associated residences within 4 km of the solar infrastructure, with the closest being approximately 2.75 km. Six representative public or road/rail viewpoints have been identified within 2.5 km. These are shown in Figure 6.4.



Sensitive receivers - wind

Koorakee Energy Park
Scoping Report
Figure 6.3

EMM
creating opportunities

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

Sensitive receivers – solar

Koorakee Energy Park
Scoping Report
Figure 6.4

EMM
creating opportunities

ii Potential impacts

Both the wind and solar PVIAs identify locations surrounding the development corridor from which the relevant project infrastructure can be seen and that have the potential for visual impacts. Each PVIA has presented zones of visual influence (ZVIs) within the relevant study areas. The ZVI for wind elements is presented in Figure 6.5 and the ZVI for the solar elements is presented in Figure 6.6.

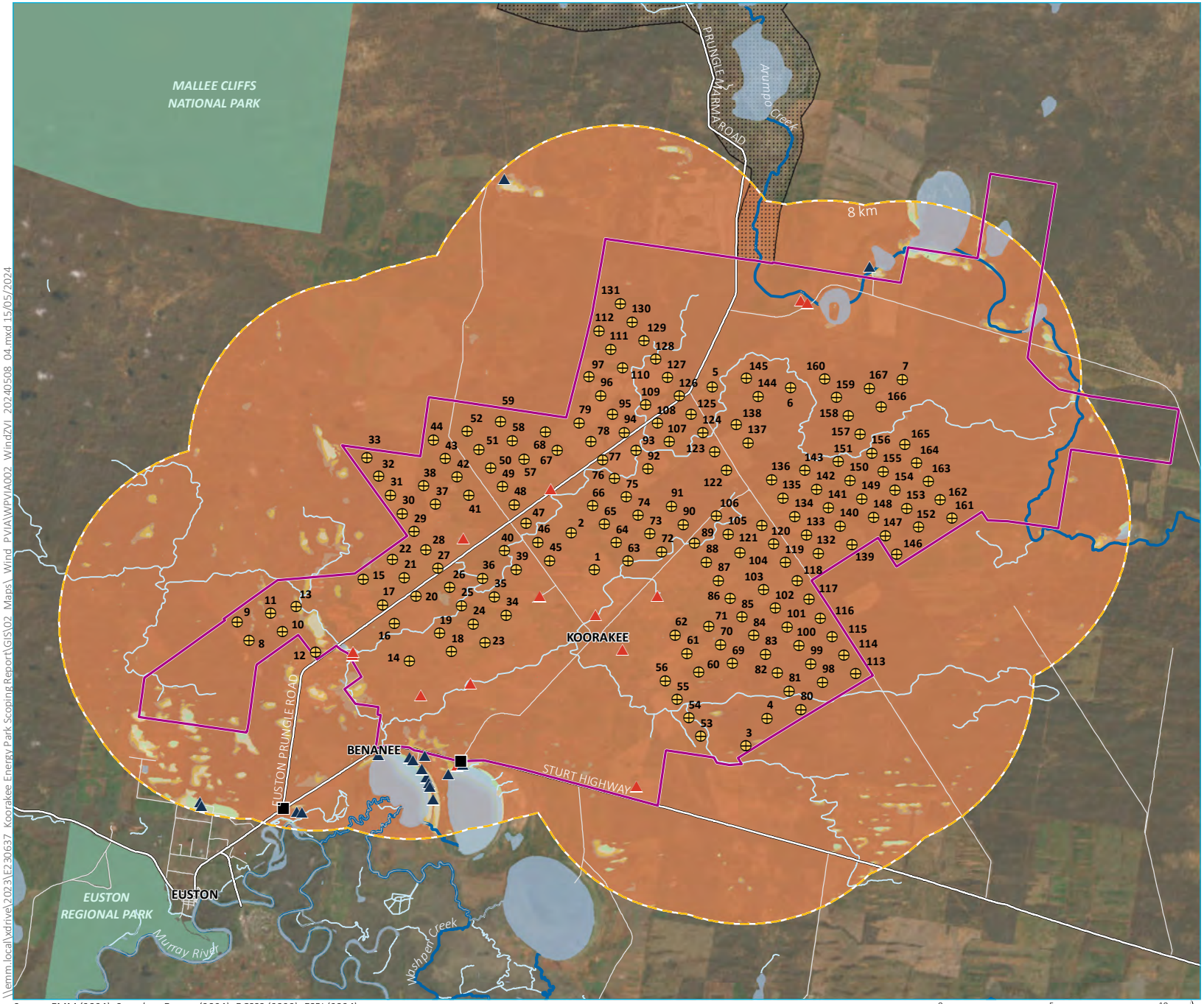
Both ZVIs indicate that the flat topography of the region does little to limit views into the project area, although it is noted that the ZVI does not account for any vegetation (trees), or structures (eg rural dwellings, farm sheds and agricultural infrastructure) that may screen views into the project. The ZVI also indicates that the residences around Lake Benanee have visibility into the project area and the residences in the northern portions of Euston township have visibility of the WTGs.

Each PVIA then assessed, using the guidance methodologies applicable to scoping solar and wind visual impacts, whether a detailed assessment would be required in the Landscape and Visual Impact Assessment (LVIA) at EIS stage for the identified receivers and viewpoints within the study areas.

The PVIA-Wind identified that 12 private viewpoints and 6 public viewpoints would require assessment in the EIS.

The PVIA-Solar identified that no private viewpoints and three public viewpoints (PU-02, PU-04 and PU-06) would require detailed assessment in the EIS. The details of these receivers and viewpoints are presented in Appendix E.

There are three non-associated receivers that are within both the wind and solar study areas. These receivers are SH035, SH041 and SH055, all located on the southern side of the Sturt Highway, around 2.5 km from the nearest wind or solar components. Whilst these receivers were not identified as requiring a detailed assessment for impacts from solar, the cumulative impacts from both the wind and solar elements will be considered in the EIS.



KEY

- Koorakee Energy Park
- Project study area (8 km)
- Willandra Lakes World Heritage Area
- Wind turbine generator (WTG)
- Site access

Sensitive receiver

- Associated residence
- Non- associated residence

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody

Visibility of wind turbines

- < 30
- 31 - 60
- 61- 90
- 91 - 120
- 121-167

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 5 10 km

GDA 1994 MGA Zone 54

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Visibility of WTGs

Koorakee Energy Park
Scoping Report
Figure 6.5

EMM creating opportunities

KEY

- Koorakee Energy Park
- Photovoltaic (PV) layout
- Public viewpoint 2.5 km buffer
- Sensitive receiver 4 km buffer
- BESS and grid connection
- Public viewpoint

Sensitive receiver

- Associated residence
- Non- associated residence

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody

Visibility of development

- Highly visible
- Low level visible

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 2.5 5 km

GDA 1994 MGA Zone 54

N

Visibility of solar infrastructure

Koorakee Energy Park
Scoping Report
Figure 6.6

EMM creating opportunities

iii Assessment approach

A landscape and visual impact assessment (LVIA) will be prepared for the EIS that addresses impacts from both the solar and wind components of the project and will include:

- landscape character assessment
- visual magnitude and sensitivity assessment
- WTG setback assessment (WTG components only)
- WTG shadow flicker and blade glint assessment (WTG components only)
- night light impact assessment
- glint and glare assessment (solar components only)
- preparation of visual study inputs, including consulting the community on aspects of the study and providing an overview of landscape values as identified by the community
- zone of visual influence figures, including further detailed assessment from areas identified as having potential visibility in the PVIA
- viewpoint analysis including detailed assessment and rating of key viewpoints within the visual catchment
- detailed dwelling assessments from non-associated residences
- a cumulative visual impact assessment of the project and neighbouring renewable energy developments
- performance objectives and mitigation measures to reduce visual impacts

The LVIA will be prepared in accordance with the *State Significant Development Guidelines* (DPE 2022); the *Large-Scale Solar Energy Guidelines – technical Supplement for LVIA* (DPE 2022); and either the *Wind Energy: Visual Assessment Bulletin For State significant wind energy development* (DPE 2016b) or the *Draft Wind Energy Guideline – technical Supplement for LVIA* (DPE 2023), as required by the SEARs.

6.2.4 Amenity - Noise and vibration

A Preliminary Noise Assessment (PNA) (Appendix F) has been undertaken in accordance with the *NSW Wind Energy: Noise Assessment Bulletin* (DPE 2016c) (the Bulletin) and the *Draft Wind Energy Guideline – Technical Supplement for Noise Assessment* (DPE 2023c). These provide guidance for how noise impacts should be assessed for large-scale wind energy development projects classified as State Significant Development.

i Existing environment

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

ii Potential impacts

Noise impacts from the project during construction will include noise generated by preparatory earthworks, delivery and assembly of infrastructure, construction of the project components and operation of light and heavy vehicles.

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

The Bulletin provides a baseline noise criterion of 35 dB(A) at non-associated residences. At associated residences, the Bulletin enables an increase above the baseline noise criterion of 35 dB(A), subject to a formal agreement and ensuring that the landowner is appropriately informed and understands the agreed noise levels. The Guidelines suggest a level of 45 dB LAeq should be considered as a base criterion for associated residences. However, this level is not considered a limit, and noise levels at these properties would generally be controlled through commercial agreement between the wind farm developer and property owners.

a Non-associated receivers

Predicted noise levels at all non-associated receiver locations are below 30 dBA. Table 6.9 presents the predicted noise levels for all non-associated receivers within 5km of the proposed wind farm. Tabulated values of all non-associated receivers are provided in Appendix A of the PNA (Appendix F). All of the predicted non-associated receivers comply with the base limit of 35 dB, with all predicted noise levels being below 30 dBA. These predictions indicate that the project can be designed and operated in compliance with the Bulletin. Predicted noise contours are presented in Figure 6.7.

Table 6.9 Predicted noise levels – non-associated receivers

Receiver ID	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level
DLR001	669708	6178868	4336	13.9
DLR004	669849	6178761	4445	13.6
SH032	668294	6179000	4433	13.6

b Associated receivers

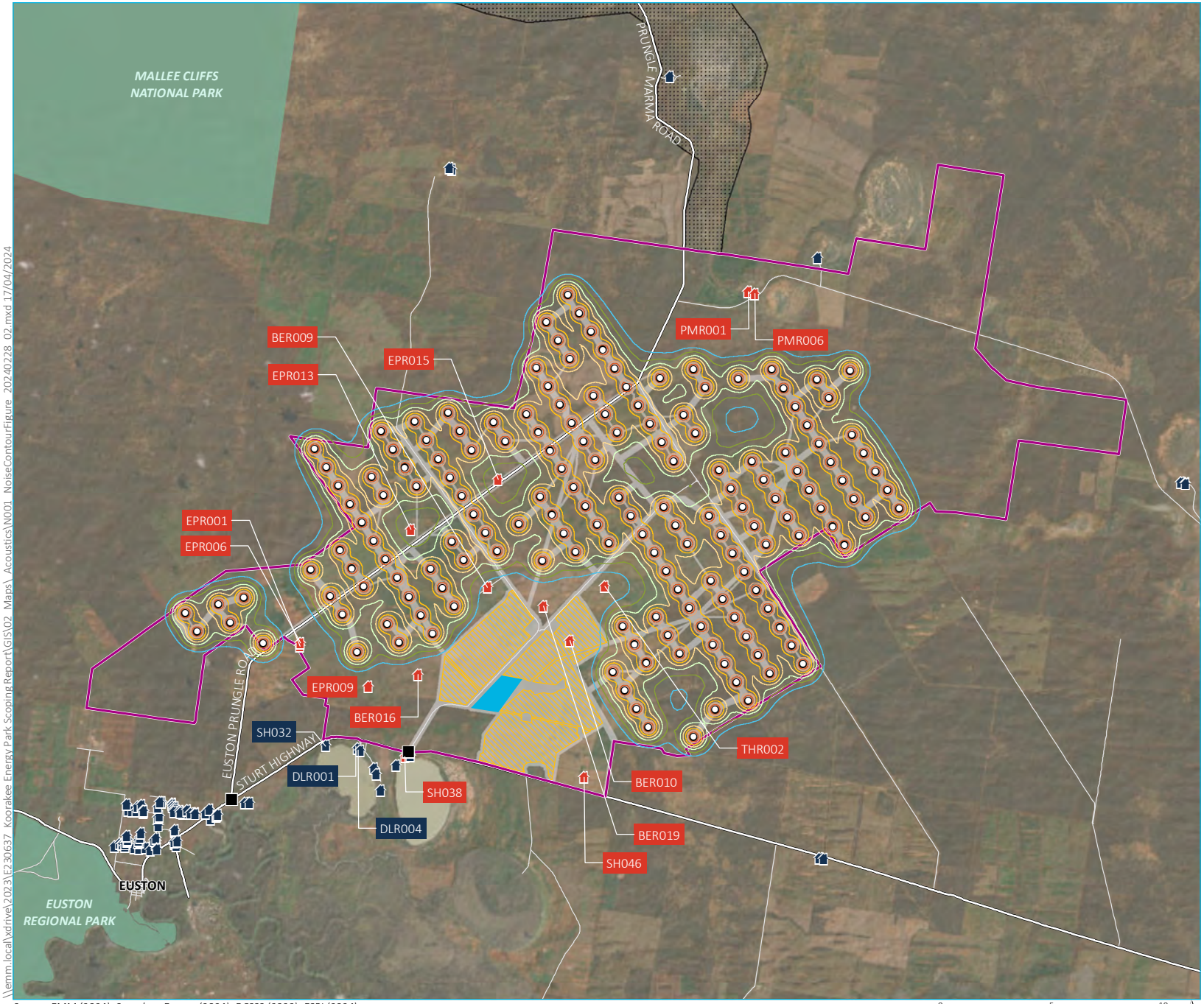
Table 6.10 provides the results for all associated receivers with predicted noise levels greater than 30 dBA. All of the predicted associated receivers comply with the recommended base criterion of 45 dBA. Tabulated values of associated receivers are provided in Appendix A of the PNA (Appendix F).

Table 6.10 Predicted noise levels – associated receivers

Receiver ID	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level
EPR013	672113	6188710	1762	35.8
EPR015	676036	6190940	1754	35.6
BER009	675551	6186106	1610	34.1
THR002	680817	6186133	1940	33.3

Table 6.10 Predicted noise levels – associated receivers

Receiver ID	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level
BER016	672434	6182186	1671	31.0
EPR006	667156	6183601	1662	31.0
EPR001	667136	6183447	1648	30.8



KEY

- Koorakee Energy Park
- Photovoltaic (PV) layout
- Development corridor
- BESS and grid connection
- Wind turbine generator
- Site access

Sensitive receiver

- Associated residence
- Non-associated residence

Operational noise contour

- 35 dB
- 37 dB
- 39 dB
- 41 dB
- 43 dB
- 45 dB
- 47 dB
- 49 dB
- 51 dB

Existing environment

- Major road
- Minor road
- NPWS reserve
- Willandra Lakes World Heritage Area

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 5 10 km

GDA 1994 MGA Zone 54

N

WTG operational noise contours

Koorakee Energy Park
Scoping Report
Figure 6.7

EMM creating opportunities

iii Assessment approach

A detailed noise and vibration assessment will be conducted as part of the EIS. This assessment will focus on:

- construction noise and vibration
- traffic noise assessment due to construction traffic
- operational wind farm noise
- operational noise from ancillary equipment.

Construction noise and vibration impacts will be assessed against NSW *Interim Construction Noise Guideline* (ICNG) and *Assessing Vibration: A Technical Guideline* (DECC 2006). Once construction schedules are developed and traffic impacts understood, an assessment of road traffic noise arising from haul routes and construction worker traffic will be conducted against the *Road Noise Policy* (DECCW 2011).

Ancillary equipment for the project may include various size transformers, associated HVAC equipment and battery storage. At this stage, there is no firm design information to conduct a detailed assessment. A detailed assessment will be conducted in the EIS against environmental noise requirements of NSW EPA's *Noise Policy for Industry* (NPFI) (EPA 2017).

The NSW Government has adopted the South Australian EPA's Wind farms environmental noise guidelines (published in 2009 and updated in 2021) (the SA Guidelines) as the basis for assessing and managing noise from wind energy projects in NSW. The SA Guidelines set out the methodology that applicants are required to follow when assessing the noise impacts associated with a proposed wind energy project, and the documentation requirements for a noise impact assessment.

In November 2023, DPHI released the Draft Energy Policy Framework (DEPF). This includes updates to the noise impact assessment methodology for wind energy that both aligns with SA Guidelines and recognises some variations specific to the NSW context.

As more information becomes available during the design process, and turbine technology is selected, a detailed assessment at all hub height wind speeds will be conducted to confirm compliance with the Bulletin and Draft Energy Policy Framework for the final design and selected technology. The results of these assessments will be incorporated into the Noise and Vibration Impact Assessment which will support the EIS for this Project.

6.2.5 Social

A social impact scoping report has been prepared (Appendix G) in accordance with the *Social Impact Assessment Guideline for State Significant Projects* (the 'SIA Guideline') (DPE, 2023a) and the *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects* (the 'SIA Technical Supplement') (DPE, 2023b).

i Existing environment

The study area determined for the SIA is based on the description of the project and the community profile, and includes the following areas:

- local area: Euston and Balranald
- key towns: Euston town, Robinvale town, Balranald town, Mildura – Buronga city
- sub-regional area: Balranald LGA

- regional area: The LGAs encompassing the South West REZ, being Wentworth, Balranald, Murray River, Hay, Edward River, Carrathool and Murrumbidgee LGAs.

The community profile identifies trends which are likely to influence the community's experience of the project's potential impacts and benefits. Key social trends within the project's social locality include:

- liveability values in the local study area are connected to the river front lifestyle in Euston, visual amenity of Euston and the natural environment as well as a sense of neighbourhood safety
- restricted housing and accommodation availability in the sub-regional area
- declining population is a feature of the sub-regional study area, where positive rates of growth are seen in the regional area. The sub-regional area also has a higher proportion of youth (people aged 15 to 24 years) compared to the regional area (ABS, 2021)
- infrastructure such as local roads, water and sewerage have been identified as a challenge faced by the community, as well as social infrastructure such as activities for young people, post-secondary education opportunities, and limited access to specialist health care
- the main industry of the region is agriculture and industries associated with primary production; however, tourism has been recognised as an important economic driver (ABS, 2021).

Community engagement for the project found that the following key matters were indicated by groups with varied interests in the project:

- visual impacts and changing landscapes
- noise
- workforce accommodation and housing
- biodiversity
- local business and economic opportunities
- traffic.

ii Potential impacts

The social impact scoping report (Appendix G) identified a total of 23 potential social impacts, of which fifteen social impacts require a standard level of assessment and eight social impacts require a detailed assessment, including:

- reduced sense of place and rural lifestyle values due to changes to the visual landscape and presence of WTGs
- potential disruption to agricultural operations due to establishment of project infrastructure, changes to land use and changes to access
- deterioration of residential amenity due to the generation of noise and dust
- increased competition for construction labour and services due to increased demand generated by the project

- reduced access and connectivity on local and regional road networks due to increased heavy vehicle and workforce traffic contributing to traffic congestion and delays
- increased demand for housing (rental) and short-term accommodation due to influx of construction workers
- diminishment of Aboriginal cultural values due to disturbance or displacement of Aboriginal heritage sites and/or artefacts
- enhanced community wellbeing and cohesion due to project community grants which support community initiatives such as improvements to social services.

The key predicted negative impacts of the project include:

- changes to local amenity (visual, noise, lighting and dust)
- potential disruption to agricultural operations
- changes to traffic conditions within local and regional road network
- increased competition for construction labour and rental accommodation
- impacts on environmental values (wildlife conservation).

Key predicted positive impacts of the project include:

- Community Benefits Plan from the project supporting community initiatives and improvements to social services
- enhanced opportunity for economic diversification of agricultural operations.

iii Assessment approach

As part of the EIS, the next stage for the SIA will involve the following key activities:

- an update of the baseline social profile to ensure that any further data relevant to the impacts identified are obtained
- further identification of, and consultation with, affected communities and vulnerable groups
- a comprehensive assessment and evaluation of social impacts against existing baseline conditions having regard to technical studies on various planning and environmental aspects
- further refinement of enhancement and mitigation measures
- consideration of cumulative impacts in the context of projects within the region.

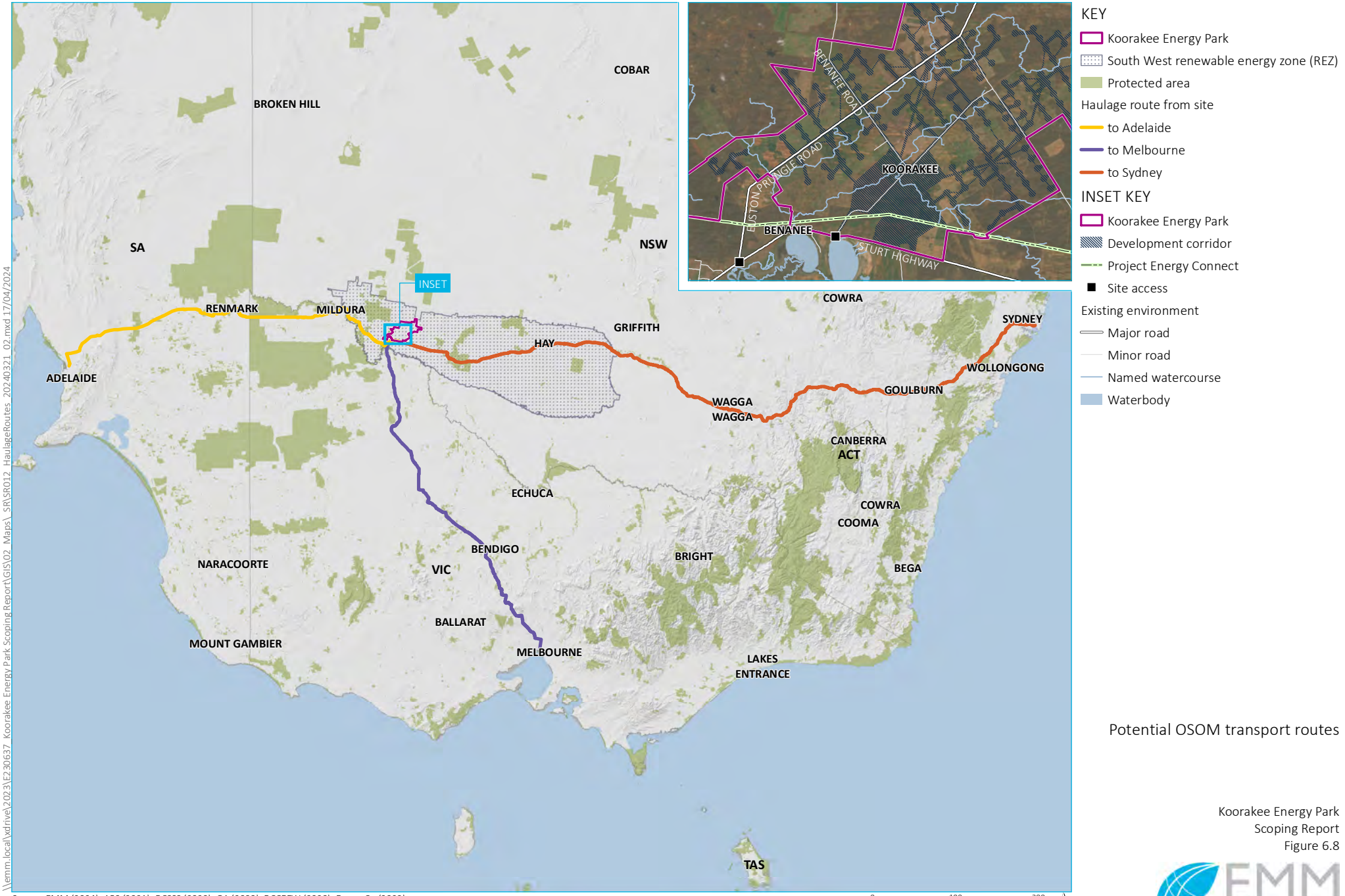
Potential social impacts and benefits will be assessed according to the requirements of the SIA Guidelines, utilising the risk matrix presented in the SIA Technical Supplement.

6.2.6 Traffic and access

i Existing environment

Access to the project will be from the Sturt Highway to the south. Sturt Highway (national route A20) is a fully sealed state highway running generally east to west from its eastern terminus at the junction with Hume Highway at Tarcutta, near Gundagai, NSW, and its western terminus, located at the interchange with Gawler Bypass and Northern Expressway on the outskirts of Gawler, South Australia. Sturt Highway is an important road link for the transport of passengers and freight between Sydney and Adelaide and the regions along the route.

The transport route to the project will be confirmed during the preparation of the EIS but is expected to comprise vehicle movements originating from either east or west of the project travelling along the Sturt Highway before turning onto either Euston Prungle Road or Benanee Road. From the Sturt Highway, both Euston Prungle Road and Benanee Road would be used to access the development corridor. These two intersections will be key intersections for the project and are shown in Figure 6.8.



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Source: EMM (2024); ABS (2021); DCSSS (2023); GA (2009); DCCEEW (2020); EnergyCo (2022)

Potential OSOM transport routes

Koorakee Energy Park
Scoping Report
Figure 6.8

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creating opportunities

ii Potential impacts

The project will generate traffic during construction related to the movement of construction workers and the delivery of materials, plant and equipment. Construction traffic generation has the potential to impact on intersection performance and traffic volume capacity on the surrounding network and along key transport routes.

OSOM vehicles will be required for the transport of oversized infrastructure and project components from port locations to the project. Intersection upgrades may be required for over size over mass (OSOM) access at Euston Prungle Road and Benanee Road. OSOM upgrades along State roads from NSW ports to the South West REZ are assumed to be managed by EnergyCo and TfNSW, as per the 'Port to REZ' Memorandum of Understanding (MOU) finalised in September 2023. Any upgrades to roads or intersections outside of NSW would be subject to relevant State based approvals. The potential OSOM routes are shown in Figure 6.8, including from ports in NSW, Victoria and South Australia.

Proposed new access points from the public road network will be required for project construction access. These are likely to be directly from Euston Prungle Road and Benanee Road to the adjacent project corridor. From these access points, internal access tracks will also be established to connect the project components and other infrastructure areas to the public road network. All internal access tracks will be unsealed.

Ongoing road maintenance requirements and any potential need for localised upgrades to mitigate traffic impacts during construction will also need to be considered. Should upgrades be identified, these will be detailed in the EIS.

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

iii Assessment approach

Engagement with Transport for NSW (TfNSW) and Balranald Shire Council will be required to identify any existing road safety concerns and ensure any potential deficiencies are clearly understood and assessed.

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

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

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

- *Guide to Traffic Generating Developments* (RTA 2002)
- Austroads Guides to Road Design (various publications)

- Austroads Guides to Traffic Management (various publications)
- Australian Standard AS 2890 Parts 1 and 2
- Australian Code for Dangerous Goods Transport.

6.2.7 Historic heritage

i Existing environment

The project lies within the Murray Darling Depression Bioregion, which covers 19,717,651 ha over New South Wales, Victoria and South Australia (NPWS, 2003). The region has been subject to land clearing to make way for pastoral activities, but substantial tracts of remnant vegetation remain. Moreover, the north boundary of the project investigation area abuts the Willandra Lakes World Heritage Area.

Statutory registers were reviewed including the World Heritage List (WHL), National Heritage List (NHL), the Commonwealth Heritage List (CHL), the State Heritage Register (SHR), the Section 170 Registers (s170) and Schedule 5 of the *Balranald Local Environmental Plan 2010*. Non-statutory registers reviewed as a part of this preliminary assessment include the Register of the National Estate (RNE) and Travelling Stock Reserves (TSRs). Schedule 5 of the *Wentworth Local Environmental Plan 2011* was also reviewed as the LGA is in the 10 km project investigation area search buffer.

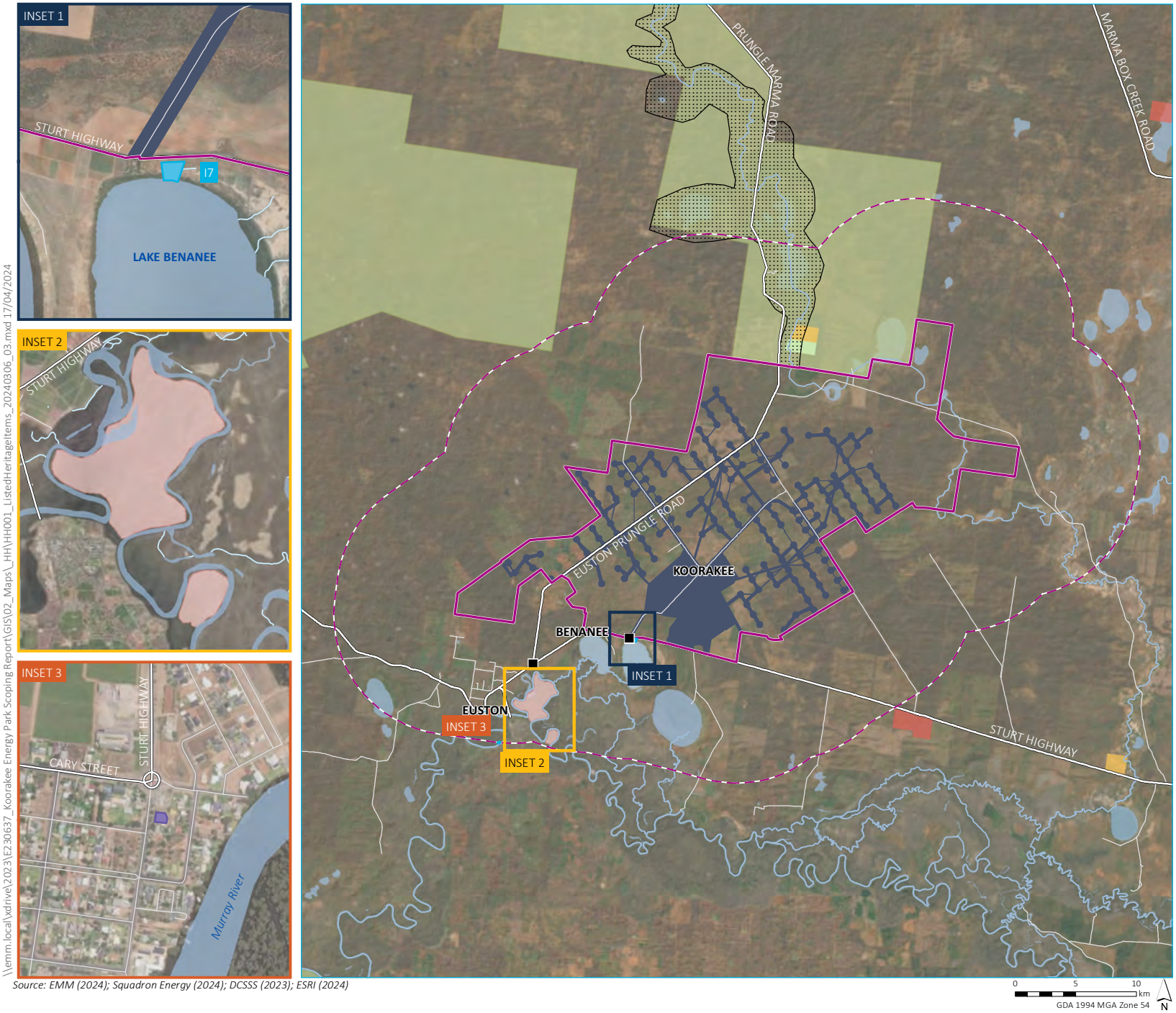
There are no listed heritage items in the project investigation area of National, State or local historical heritage significance. Heritage items in the vicinity of the project are outlined in Table 6.11 and Figure 6.9.

Table 6.11 Heritage register search results

Jurisdiction	Heritage Register	In project investigation area	Within 10 km of project investigation area
Federal	World Heritage List (WHL)	Nil	WHL 105107, *Willandra Lakes Region*, Arumpo Mungo National Park Road, Robinvale, abuts north-west boundary of project investigation area.
	Commonwealth Heritage List (CHL)	Nil	Nil
	National Heritage List (NHL)	Nil	NHL 105693, *Willandra Lakes Region*, Arumpo Mungo National Park Road, Robinvale, abuts north-west boundary of project investigation area.
State	State Heritage Register (SHR)	Nil	01010, *Willandra Lakes*, *Willandra Lakes*, 120km north of Balranald (Willandra Lakes Region World Heritage Property), abuts north-west boundary of project investigation area.
Local	Balranald Local Environmental Plan 2010	Nil	I7, *Burial Ground*, Sturt Highway, east of Euston, Lake Benanee (Lot 1, DP 92444), 140 m south of project investigation area. I8, *Willandra Lakes*, 120km northwest of Balranald (Willandra Lakes Region World Heritage Property), abuts north-west boundary of project investigation area.
	Wentworth Local Environmental Plan 2011	Nil	LEP #C1, *Willandra Lakes*, 120km north of Balranald (Willandra Lakes Region World Heritage Property), abuts north-west boundary of project investigation area.
Government agency list of heritage assets	S170 Section 170 of the *Heritage Act*	Nil	Nil

Table 6.11 Heritage register search results

Jurisdiction	Heritage Register	In project investigation area	Within 10 km of project investigation area
Non-statutory	Register of the National Estate (RNE)	Nil	RNE 689, *Willandra Lakes Region*, Mildura Ivanhoe Rd, Balranald, abuts north-west boundary of project investigation area. RNE 690, *Murray Mallee*, Mallee Cliffs National Park, Gol Gol, 8.9 km north-west of project investigation area.
	National Trust of Australia (NT)	Nil	-
	Travelling Stock Reserves (TSRs)	Nil	R47419 SWP663-Prungle Tank, Lot 663 DP761368, c.3 km north of project investigation area. R47421 SWP663-Prungle Tank, Lot 663 DP761368, c.2.5 km north of project investigation area.



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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

Listed heritage items in the vicinity of the project area

Koorakee Energy Park
Scoping Report
Figure 6.9

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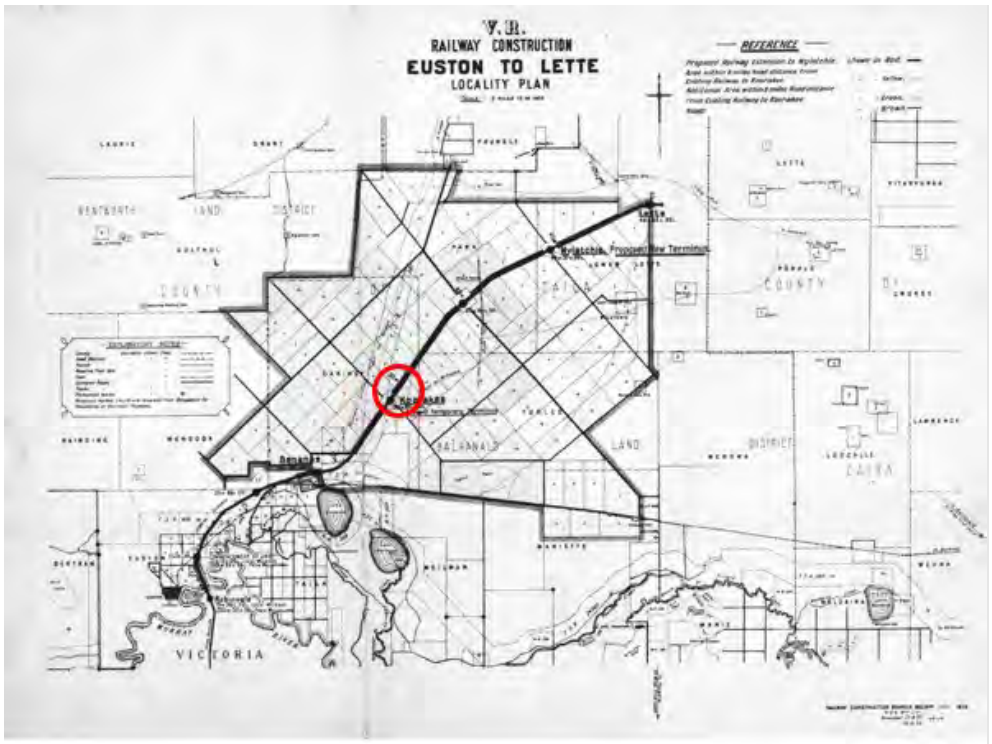
a Robinvale to Euston railway line

Research identified a non-listed historical item within the project corridor, being the disused Robinvale to Lette railway line. In the late 1920's, the Robinvale to Lette railway commenced construction, which was part of a government scheme intended to foster settlement of the Riverina district in NSW. Work started on the railway in 1926, then after a hiatus, railway works recommenced in April 1929. The following year, in April 1930, a special train ran as far as Koorakee. Although construction continued toward Lette, the track was never completed and the section to Koorakee was never officially opened for traffic. The location of the railway line compared to the approximate project investigation area is shown in Plate 6.1.

The remnants of the Koorakee station platform and the railway line are located in the southern part of the proposed project investigation area.



Source: Public Record Office Victoria 12800/P0001

Plate 6.1 Euston to Lette rail design c.1926. Koorakee railway station circled in red.

ii Potential impacts

Project work will include leveling, excavation, and ground disturbance activities, which has the potential to impact archaeological resources. In addition, the construction of facilities, roads, and installation of associated services will also create sub-surface disturbance, increasing the probability of disturbing archaeological resources. The project will not impact listed heritage items of National, State or local historical heritage significance.

The project will seek to avoid impacts to any non-listed or currently unidentified historic heritage sites wherever possible. Any impacts and mitigation and management measures will be identified in the EIS.

iii Assessment approach

The project investigation area is in an area of high archaeological potential due to the high likelihood of archaeological resources from the Robinvale to Euston railway line extension being present on site, and the lack of visual change present in aerial imagery analysed. Hence there is risk for the project to expose or impact archaeological resources or relics. As such, the following action is recommended:

- Preparation of a Statement of Heritage Impact (SoHI; technical report) as part of the EIS to gain further understanding of historical heritage assessment of built, archaeological and landscape values. The assessment will include more detailed desktop research and consultation, which will also provide valuable information on the historical heritage values of the project investigation area and broader region. Mitigation and management measure will also be included in the SoHI, if necessary.

- A site inspection of the development corridor should the desktop analysis yield information that clearly suggests the presence of historical sites.

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

6.3 Standard assessment

6.3.1 Land

i Existing environment

Regional land and soil mapping data has been reviewed with a focus on the project investigation area. Land and soil capability mapping across the project investigation area is shown on Figure 6.10 and Table 6.12. There is no Class 1–3 land identified in the project investigation area. A small portion of land within the western part of the development corridor is mapped as LSC Class 4, which is within land associated with the wind farm, but outside of the proposed solar farm extents. The project investigation area is predominantly mapped as LSC Class 5 (severe limitations).

The development corridor and broader project investigation area is not mapped as Biophysical Strategic Agricultural Land (BSAL). There are no acid sulfate soils (ASS) or potential acid sulphate soils mapped within the development corridor.

A search of the NSW Environment Protection Authority (EPA) contaminated land public record was undertaken for contaminated sites within the Balranald LGA January 2024. No recorded sites were returned.

Table 6.12 Land and soil characteristics

Soil landscapes	Great soil group	Australian soil classification (ASC)	Inherent soil fertility	Land soil capability (LSC) class
Wilkurra	Solonized Brown Soils	Calcarosols	Moderately low	4
Mungo	Grey, Brown and Red Clays	Vertosols	Moderate	5
Gulthul	Solonized Brown Soils	Calcarosols	Moderately low	5
Bulgamurra	Solonized Brown Soils	Calcarosols	Moderately low	5
Mulurulu	Red Earths – less fertile	Kandosols	Moderately low	6
Ki Downs	Siliceous Sands	Rudosols	Low	7

ii Potential impacts

Soil disturbance during construction may result in:

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

These impacts could result in reduction of soil quality that could be deleterious to agricultural productivity and land use after rehabilitation, if not suitably managed or mitigated. Decreasing soil quality or volumes during construction could result in limitations to rehabilitation from loss or degradation of soil materials that are needed to reinstate the soils in a suitable condition. Any negative impact to soil characteristics presents a risk of harm to the land and soil capability and productivity of the development footprint post-rehabilitation.

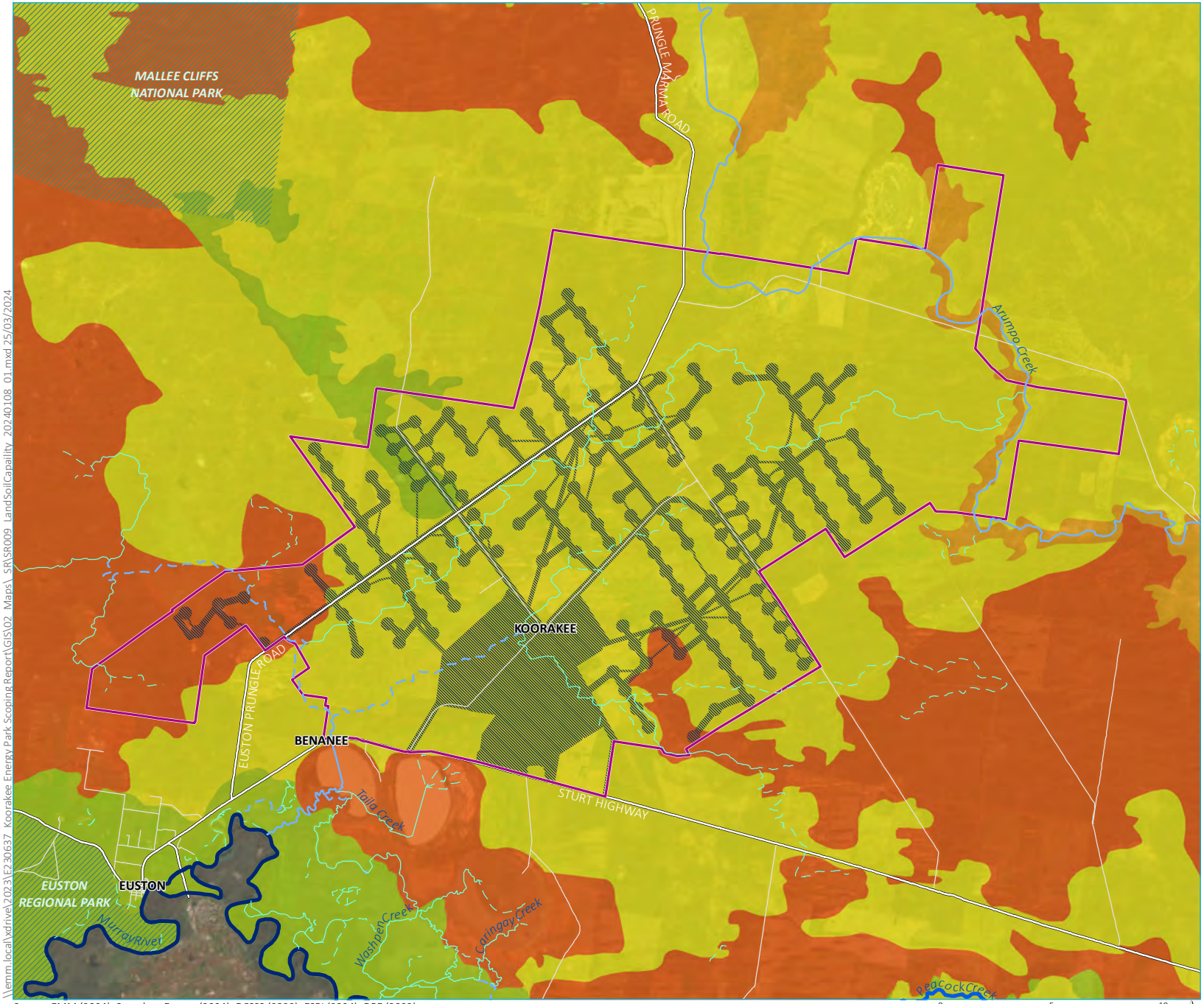
Once constructed, the land within the development footprint will not be able to be used for the same intensity of agricultural production; however, there are opportunities to co-locate agricultural land uses, such as sheep grazing, to maintain a level of agricultural productivity. Inappropriate management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

iii Assessment approach

A small portion of land within the western part of the project investigation area is mapped as LSC Class 4, although this land is outside of the proposed solar extents. Therefore, in accordance with the requirements of the *Large-Scale Solar Energy Guideline* (DPE 2022a), a soil survey is not required as part of the EIS to verify the LSC class and an agricultural impact assessment is not required.

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

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



KEY

- Koorakee Energy Park
- Development corridor

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 8th order
- 10th order

Most Limiting LSC

- 4 | Moderate to severe limitations
- 5 | Severe limitations
- 6 | Very severe limitations
- 7 | Extremely severe limitations
- 8 | Extreme limitations

Existing environment

- Major road
- Minor road
- NPWS reserve

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024); DPE (2022)

0 5 10 km

GDA 1994 MGA Zone 54

N

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Land and soil capability

Koorakee Energy Park
Scoping Report
Figure 6.10

EMM creating opportunities

6.3.2 Water

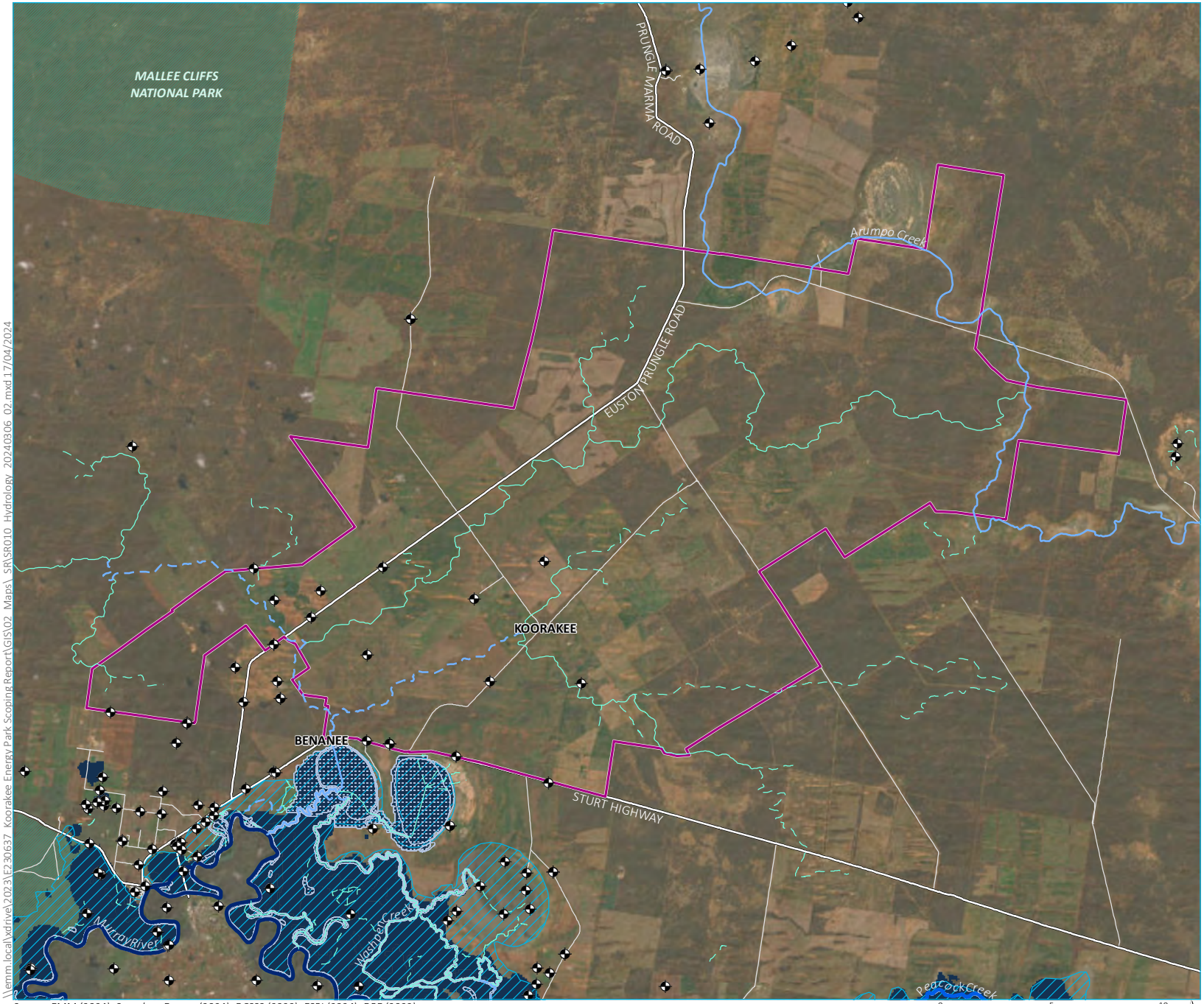
i Existing environment

The project is located within the Murray Darling Basin South. The Murray River flows from east to west in direction, approximately 5 km south of the project. Arumpo Creek (4th order Strahler stream) winds through the northern portion of the project investigation area, but is outside of the development corridor. There are a number of other Strahler streams that flow throughout the project investigation area that range from 1st to 3rd order.

Lake Benanee, Dry Lake and the surrounding wetland system associated with the Murray River are also situated in the vicinity of the project investigation area, albeit on the southern side of Sturt Highway where no project components are located.

The land south of Stuart Highway is also mapped as Flood Prone Land. However, this is limited to the land around Lake Benanee, Dry Lake and the Murray River.

There are a number of groundwater monitoring bores located mainly in the southern section of the project investigation area. See Figure 6.11 for mapped hydrological features in and around the project investigation area.



KEY

- Koorakee Energy Park
- Land subject to flooding
- Key fish habitat
- Wetland
- Groundwater bore

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 8th order
- 10th order

Existing environment

- Major road
- Minor road
- NPWS reserve

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024); DPE (2022)

0 5 10 km

GDA 1994 MGA Zone 54

N

Hydrology

Koorakee Energy Park
Scoping Report
Figure 6.11

EMM creating opportunities

ii Potential impacts

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

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

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

- demand for water for land management purposes
- potential ongoing erosion of soils and mobilisation of sediment into receiving watercourses
- contamination of surface water or groundwater as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support site activities, or through poor site and vegetation management practices
- partial blockage or redirection of floodwaters and downstream impacts as a result of poorly considered permanent facilities.

Specific design considerations and mitigation measures may be recommended to minimise potential impacts within and along drainage lines. Roads and services that require watercourse crossings will be designed and constructed in accordance with relevant regulations and best practice design and construction methods.

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

iii Assessment approach

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

- complete site characterisation including mapping to effectively characterise surface water features, groundwater features and relevant water users
- the likely impacts of the project (including flooding) on surface water and groundwater resources, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils,

related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts

- a qualitative review and assessment of the likely risks and impacts of the project on flooding and floodplain areas using available flood data and mapping
- a review of the relevant regulatory requirements (e.g. Water Sharing Plans) of relevance to the catchment and groundwater sources in which the project is located
- consideration of water requirements and supply arrangements for construction and operation
- erosion and sediment control measures that will be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).

6.3.3 Air

i Existing environment

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

ii Potential impacts

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

No significant dust generation is expected during operations given exposed areas will have been rehabilitated. Minor levels of dust may be generated during decommissioning as a result of structures being removed, areas being temporarily exposed and rehabilitation works. This will only occur for a short duration before rehabilitation of exposed areas has been established.

iii Assessment approach

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

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

6.3.4 Hazards and risk

i Aviation

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

The closest known aerodrome to the project is Balranald Aerodrome located 53km to the southeast. Given the rural landscape, there may also smaller aerodromes and runways surrounding the project investigation area.

Additional aviation activities associated with agricultural operations (e.g. aerial spraying and pest management) may also occur in the locality.

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

The assessment will be undertaken in accordance with:

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

ii Telecommunications

Wind turbines can result in electromagnetic interference that has potential to disrupt telecommunications such as radio, tv broadcasts, aviation signals, mobile phone service, GPS systems and radar services. The initial WTG layout has avoided known local telecommunications infrastructure and point to point routes.

The EIS will consider potential interactions between the proposed WTGs and nearby telecommunication services (including point to point microwave links, meteorological radars, mobile voice-based communications, wireless and satellite internet services, broadcast and digital radio and broadcast, digital and satellite television).

A telecommunications assessment will be prepared and will assess potential impacts on telecommunication services. Where impacts are identified, recommendations will be provided to mitigate and manage impacts.

iii Blade throw

A blade throw risk assessment will be completed as part of the EIS and will assess the likelihood of blade throw and calculate typical blade throw distances in order to determine appropriate separation distances between WTGs, residences and property boundaries. The assessment will also determine appropriate separation distances between WTGs and BESS infrastructure.

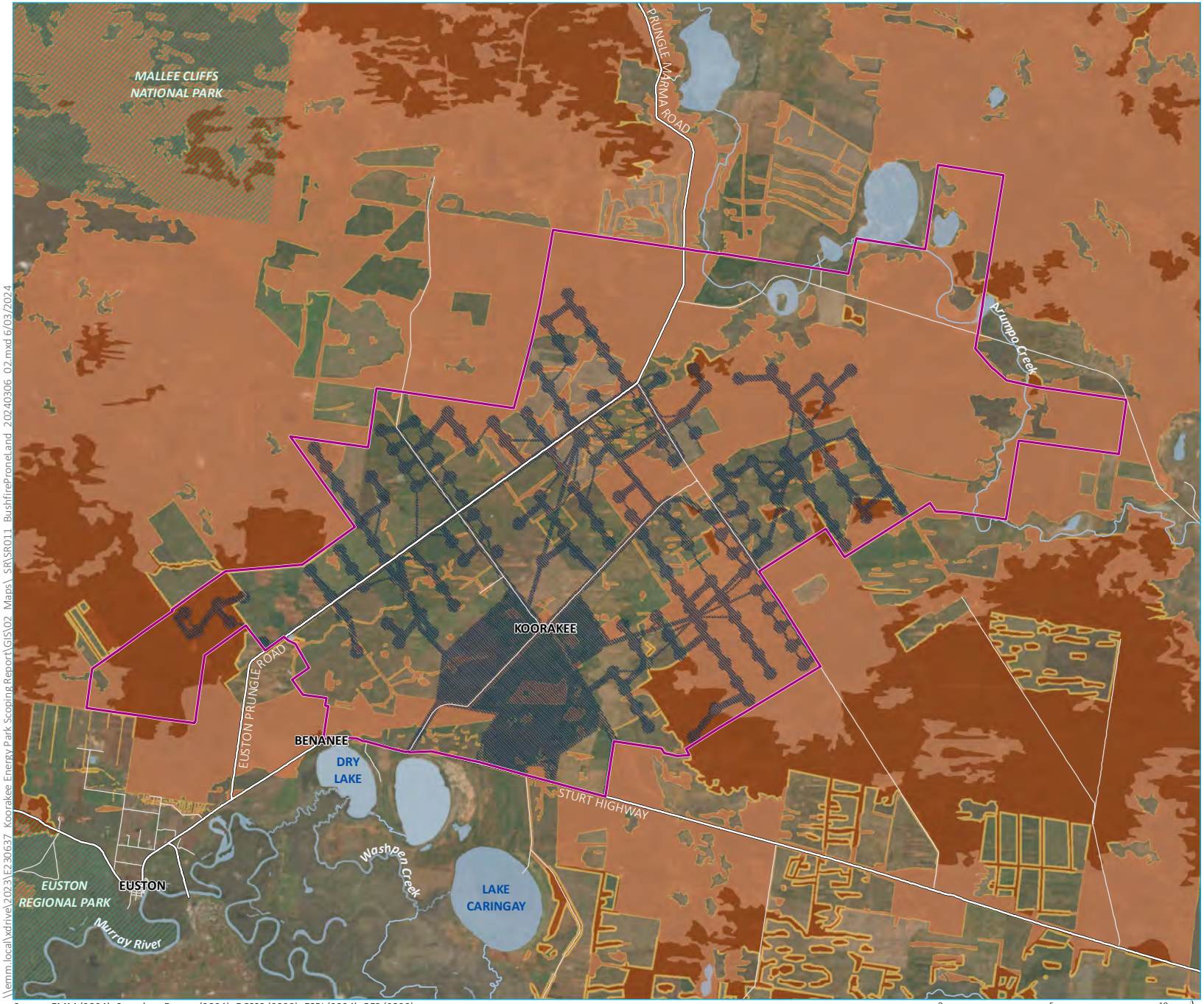
Management measures will be recommended, such as regular inspections of WTGs, to mitigate blade throw risk.

iv Bushfire

The project investigation area is mapped predominantly as either Vegetation Category 2 bushfire prone land or excluded land. Vegetation Category 2 is considered a lower bushfire risk than Category 1 and Category 3 land, but higher than excluded land. Small areas within the project investigation area are mapped as Vegetation Category 1. Mapping of bushfire prone land is illustrated in Figure 6.12.

The project has the potential to be exposed to bushfire risk from grasslands and areas of dense vegetation within and adjacent to the project investigation area. There is also a risk of a fire starting within the project and spreading to neighbouring properties.

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



KEY

- Koorakee Energy Park
- Development corridor

Bushfire prone land

- Vegetation Buffer
- Vegetation Category 1
- Vegetation Category 2

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024); RFS (2022)

0 5 10 km

GDA 1994 MGA Zone 54

N

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Bushfire prone land

Koorakee Energy Park
Scoping Report
Figure 6.12

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v Preliminary hazard analysis

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

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

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

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

vi Waste

The Project will produce various waste streams during construction, operation and decommissioning stages. All waste produced by the project will be classified, handled and managed in accordance with the *Waste Classification Guidelines – Part 1 Classifying Waste* (NSW EPA, 2014). Priority will be given to reusing materials on site or recycling if reusing is not possible.

Suitable reuse and/or waste disposal facilities will be identified in the EIS.

6.3.5 Aquatic biodiversity

There are no key fish habitats (KFHs) or threatened aquatic species predicted by the Fisheries NSW Spatial Data Portal to occur within the project investigation area. However, there are several unnamed watercourses of Strahler Stream Order 1 to 3, and Arumpo Creek (Stream Order 4) which intersect the project investigation area in several locations.

Five threatened fish species have the potential to occur in the project investigation area (Table 6.13). Of these species, three have a moderate likelihood of occurrence, although it is noted that impacts to the key watercourse of Arumpo Creek have been avoided in the north of the project investigation area from the preliminary project design.

Outside of the project investigation area, the Murray Darling Basin South KFH is located nearby. This includes Lake Benanee and Dry Lake and the surrounding wetland system associated with the Murray River. The Murray River is also a major KFH.

Table 6.13 Threatened fish species – Likelihood of Occurrence

Threatened fish species	FM Act	EPBC Act	Likelihood of occurrence
Flathead Galaxias (*Galaxias rostratus*)	Critically Endangered	Critically Endangered	**Moderate**
Murray Hardhead (*Caterocephals fluviatilis*)	Critically Endangered	Endangered	**Moderate**
Murray Cod (*Maccullochella peelii*)	Not listed	Vulnerable	**Moderate**
Silver Perch (*Bidyanus bidyanus*)	Vulnerable	Critically Endangered	**Nil**
Macquarie Perch (*Macquaria australasica*)	Endangered	Endangered	**Nil**

An aquatic habitat assessment for fish species listed under the *Fisheries Management Act* 1994 and EPBC Act and classification of waterways in the project boundary for fish passage will be required as part of the EIS.

6.3.6 Economic

Economic considerations span all project phases and will be most significant during the construction phase. It is expected the project will result in an increase in local and regional expenditure for the provision of goods and services and increase local workforce demand. Economic benefits during operation would be considered with regard to overall benefit to the regional economy by contributing to renewable energy reliability and the growth of renewable energy in the South West REZ. However, this may not be readily quantifiable.

The EIS will include a local effects analysis that translates the effects estimated at the State level to the impacts on the communities located in the local and sub-regional area. The analysis will consider effects relating to local employment, non-labour project expenditure and social impacts on the local community. The findings will be used to inform consultation with the local community and support the development of mitigation opportunities for any adverse impacts.

6.3.7 Built environment

An assessment of impact on the built environment, including leased and private properties, public land and public infrastructure will be undertaken in the EIS. This will include those areas described in Section 2.2, and will include assessment as part of various technical studies including terrestrial biodiversity, social, visual and traffic.

6.4 Cumulative impacts

Cumulative impacts have been scoped and would be assessed in the EIS in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Projects*, the CIA Guideline (DPIE 2022c).

The project has the potential to generate cumulative impacts and benefits in conjunction with surrounding energy developments and major projects, including future projects in planning, during both construction and operation. Of note is the Euston Wind Farm, a proposed 96 WTG wind farm located adjacent to the western border of the project investigation area.

Other relevant projects within the vicinity of the Koorakee Energy Park project are detailed in Section 2.2.4, and also presented in the Social Impact Scoping Report (Appendix G).

The scoping summary table (Appendix B) outlines the matters for which a cumulative impacts assessment (CIA) would be undertaken, and a CIA scoping table is provided in Appendix H.

6.5 Matters requiring no further assessment in the EIS

Based on the scoping assessment, the following matters are not considered to require any further assessment in the EIS:

- Access – Rail facilities, port and airport facilities (noting that any potential aviation impacts from WTGs would be addressed in the EIS)
- Amenity - Odour
- Hazards and risks - Coastal hazards, dam safety and land movement.

7 Conclusion

Koorakee Energy Park Pty Ltd (Squadron Energy) proposes to develop the Koorakee Energy Park (KEP), a large-scale wind and solar generation facility with battery energy storage system (BESS), supported by associated infrastructure.

The project will have an installed capacity of up to 2 GW, comprising up to 1 GW of generation capacity from each of the wind and solar components. The BESS will have a capacity of up to 1 GW and will have provision for up to 12 hours of storage (12 GWh). It is expected that the intended generation capacity of the project could power up to one third of the households in NSW.

The project investigation area is highly suitable for a wind, solar and BESS project, with the key selection factors for the project investigation area including:

- positioning within the South West REZ
- a reliable wind source
- flat topography and large land area available to position infrastructure and avoid constraints
- proximity adjacent to existing transmission and the approved Project EnergyConnect infrastructure
- distance from sensitive receivers
- proximity to the Sturt Highway
- leaseholder interest to be involved in the project.

This scoping report has been prepared to assist with the development of SEARs for the project, which will guide the preparation of the EIS. The following key environmental aspects have been identified in Chapter 6 as requiring detailed assessment within the EIS:

- biodiversity - terrestrial
- heritage – Aboriginal
- amenity – visual
- amenity – noise
- social
- access
- heritage – historic.

The project as outlined in this scoping report will be refined during the preparation of the EIS, including in response to the findings of detailed environmental investigations and feedback from community and stakeholder engagement. The EIS will be prepared in accordance with the SEARs issued by DPHI.

References

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

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

DCCEEW (2020) *Interim Biogeographic Regionalisation for Australia v. 7 (IBRA)*. Available at: http://www.environment.gov.au/land/nrs/science/ibra.

DCCEEW 2023, *Onshore Wind Farm Guidance*

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

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

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

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

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

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

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

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

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

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

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

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

DPE (Department of Planning and Environment) 2023a *Social Impact Assessment Guideline for State Significant Projects*

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

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

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

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

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

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

DPIE (Department of Planning, Industry and Environment) 2022a, *State significant development guidelines - preparing a scoping report: Appendix A to the state significant development guidelines.*

DPIE (Department of Planning, Industry and Environment) 2022b *Undertaking Engagement Guidelines for State Significant Project*

DPIE (Department of Planning, Industry and Environment) 2022c, *Cumulative Impact Assessment Guideline for State Significant Projects*

DPIE (Department of Planning, Industry and Environment) 2022d, *Draft Large-Scale Solar Energy Guideline*

DPIE (Department of Planning, Industry and Environment) 2022e, *State significant development guidelines – preparing an environmental impact statement*

Eco Logical Australia, (2008) Editing Mitchell Landscapes, Final Report. A Report prepared for the Department of Environment and Climate Change.

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

ICOMOS (Australia) (2013) *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. Burwood, Victoria, Victoria: Australia ICOMOS.

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

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

Mitchell PB (unpublished) NSW ecosystems study: background and methodology. Unpublished report to the NSW National Parks and Wildlife Service, Hurstville.

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

NSW National Parks and Wildlife Service (2003) *The Bioregions of New South Wales - their biodiversity, conservation and history.* Hurstville NSW: NSW National Parks and Wildlife Service. Available at: https://www.environment.nsw.gov.au/resources/nature/bioregionscontentsintro.pdf.

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

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

Abbreviations

ABS	Australian Bureau of Statistics
ACHA	Aboriginal Cultural Heritage Assessment
AEMO	Australia Energy Market Operator
AHIMS	Aboriginal Heritage Information Management System
ASC	Australian soil classification
BAM	*Biodiversity Assessment Method*
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BESS	battery energy storage system
BP	before present
BSAL	Biophysical Strategic Agricultural Land
CEEC	critically endangered ecological community
CIV	capital investment value
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure (formerly DPE)
EEC	endangered ecological community
EIS	Environmental Impact Statement
EMM	EMM Consulting Pty Limited
EPA	NSW Environment Protection Authority
EPL	environment protection licence
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GHG	greenhouse gas
GW	gigawatt
ha	hectares
HV	High voltage
HIPAP	Hazardous Industry Planning Advisory Paper
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	NSW *Interim Construction Noise Guideline*
km	kilometre
km^2	square kilometre
kV	kilovolt

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

Appendix A
Cadastral lots

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A.1 Cadastral lots within investigation area and development corridor

Lot	DP	Within development corridor?
1	1064009	Yes
1	1123678	Yes
1	756075	Yes
1	756083	Yes
1	756090	Yes
1	756104	Yes
1	756114	Yes
1	806414	Yes
2	1064009	Yes
2	1123678	Yes
2	44261	Yes
2	756075	Yes
2	756083	Yes
2	756084	Yes
2	756090	Yes
2	756104	
2	756114	Yes
3	756083	Yes
3	756084	Yes
3	756092	
3	756104	
3	756114	Yes
4	756083	Yes
4	756084	Yes
4	756092	
4	756108	Yes
4	756114	Yes
5	756075	Yes
5	756083	Yes
5	756084	Yes
5	756104	
5	756108	Yes
5	756114	Yes
6	756075	
6	756083	Yes

Lot	DP	Within development corridor?
6	756084	Yes
6	756090	Yes
6	756104	Yes
6	756108	Yes
6	756114	Yes
7	756075	Yes
7	756083	Yes
7	756084	Yes
7	756108	Yes
8	756075	Yes
8	756083	Yes
8	756084	Yes
8	756108	
8	756114	Yes
9	756075	Yes
9	756083	Yes
9	756084	Yes
9	756090	Yes
9	756108	Yes
10	756075	Yes
10	756083	Yes
10	756090	Yes
10	756104	
11	756090	Yes
11	756104	
13	756084	Yes
14	756092	
18	756075	Yes
19	756090	Yes
81	760386	
360	761060	Yes
1037	762254	
1418	763135	Yes
1729	763542	Yes
2351	764315	Yes
4238	766865	
4405	767298	Yes

Lot	DP	Within development corridor?
5601	768501	
6081	768936	Yes
6084	768945	
6089	768948	
6089	768948	
6089	768948	
6089	768948	
6089	768948	
6089	768948	
6090	768948	
6093	768948	
6520	769336	Yes
6525	769341	Yes
6527	769343	Yes
6871	48198	Yes
6872	48198	Yes
7300	1199741	Yes

Appendix B
Scoping summary table

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B.1 Scoping summary table

Level of assessment	Matter	Cumulative impact assessment	Engagement	Relevant policies and guidelines	Scoping report reference
Detailed	Terrestrial Biodiversity	Yes	Specific	• Biodiversity Assessment Method (DPIE 2020c). • Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004). • Surveying Threatened Plants and their Habitats: NSW Survey Guide for the Biodiversity Assessment Method (DPIE 2020d). • Species Credit Threatened Bats and their Habitats (OEH 2018). • NSW Survey Guide for Threatened Frogs (DPIE 2020e). • Commonwealth EPBC 1.1 Significant Impact Guidelines – Matters of National Environmental Significance (Commonwealth of Australia, 2013). • Commonwealth Department of the Environment – Survey Guidelines for Nationally Threatened Species (various). • Onshore Wind Farm Guidance (DCCEEW 2023)	Section 6.2.1
	Aboriginal heritage	Yes	Specific	• Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011). • Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010). • Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010).	Section 6.2.2
	Visual	Yes	Specific	• Guidelines for Landscape and Visual Impact Assessment (United Kingdom Landscape Institute of Environmental Management and Assessment 2013). • Wind Energy: Visual Assessment Bulletin AB 01 for State Significant Wind Energy Development (DPE 2016b). • Guidance Note for Landscape and Visual Assessment (Australian Institute of Landscape Architects 2018). • Draft Large-Scale Solar Energy Guideline DPIE (DPE 2022) • Large Scale Solar Energy Guideline; Technical Supplement for Landscape and Visual Impact Assessment (DPE 2022)	Section 6.2.3

Level of assessment	Matter	Cumulative impact assessment	Engagement	Relevant policies and guidelines	Scoping report reference
	Noise and vibration	Yes	Specific	• NSW Interim Construction Noise Guideline (DECC 2009). • NSW Noise Policy for Industry (EPA 2017). • NSW Road Noise Policy (DECCW 2011). • Assessing Vibration: A Technical Guideline (DECC 2006). • NSW Wind Energy: Noise Assessment Bulletin (DPE 2016).	Section 6.2.4
	Social	Yes	Specific	• Social Impact Assessment Guideline for State Significant Projects (DPE 2023).	Section 6.2.5
	Traffic and access	Yes	Specific	• Guide to Traffic Generating Developments (RTA 2002). • Austroads Guides to Road Design (various publications). • Austroads Guides to Traffic Management (various publications). • Australian Standard AS 2890 Parts 1 and 2. • Australian Code for Dangerous Goods Transport.	Section 6.2.6
	Historic heritage	No	General	• The principal articles of The Burra Charter – The Australia ICOMOS Charter for Places of Cultural Significance (ICOMOS 2013). • Statements of Heritage Impact (Heritage Office 1996). • Investigating Heritage Significance Draft Guideline (Heritage Office 2004). • Assessing Heritage Significance (Heritage Office 2001). • Assessing Significance for Historical Archaeological Sites and 'Relics' (Heritage Branch Department of Planning 2009).	Section 6.2.7
Standard	Land	No	General	• Land Use Conflict Risk Assessment Guideline (DPI 2011). • Best Practice Erosion and Sediment Control (IECA 2008) • Developments adjacent to National Parks and Wildlife Service lands (DPIE, 2020)	Section 6.3.1
	Water	No	General	• Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004). • Managing Urban Stormwater: Soils and Construction Volume 2 (DECC 2008). • Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000). • Guidelines for Instream Works on Waterfront Land (NOW 2012). • Guidelines for Riparian Corridors on Waterfront Land (NOW 2012). • Guidelines for Watercourse Crossings on Waterfront Land (NOW 2012).	Section 6.3.2

Level of assessment	Matter	Cumulative impact assessment	Engagement	Relevant policies and guidelines	Scoping report reference
	Air quality	No	General	• Approved Methods and Guidelines for the Modelling and Assessment of Air Pollutants in New South Wales (DECC, 2005)	Section 6.3.3
	Hazards and risk	No	General	• National Airports Safeguarding Framework Guideline D: Managing Wind Turbine Risk to Aircraft (NASAG, 2012) • Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis (DoP, 2011). • Multi-Level Risk Assessment (DoP, 2011). • Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (DoP, 2011). • Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields (ICNIRP 1998) • Planning for Bushfire Protection (RFS, 2019) • Waste Classification Guidelines (EPA, 2014)	Section 6.3.4
	Aquatic	No	General	• Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013)	Section 6.3.5

Appendix C
Preliminary Biodiversity Assessment

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Preliminary biodiversity assessment

Koorakee Energy Park

Prepared for Squadron Energy

March 2024

Preliminary biodiversity assessment

Koorakee Energy Park

Squadron Energy

E230637 RP#4

March 2024

Version	Date	Prepared by	Approved by	Comments
1	17 January 2023	Ben Parkin Katie Diver	Christopher Holloway	Draft for client review
2	12 March 2024	Katie Diver	Chistopher Holloway	Final

Approved by

Christopher Holloway
Associate Director
12 March 2024

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Appendices

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Figures

1 Introduction

Squadron Energy is proposing to construct Koorakee Energy Park (the project), located approximately 12 kilometres (km) north-east of Euston, in far south-western NSW. The project would comprise a mix of solar panels, wind turbines, battery storage, ancillary facilities and access roads.

This preliminary biodiversity assessment has been prepared to support the scoping report to request Secretary's Environmental Assessment Requirements (SEARs). The project will be assessed under Part 4 Division 4.7 of the *Environmental Planning & Assessment Act 1979* (EP&A Act), and therefore will require assessment in accordance with the Biodiversity Assessment Method (DPIE 2020) and the preparation of a Biodiversity Development Assessment Report (BDAR) is required. This report has also been prepared to provide supporting documentation for the referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW Commonwealth).

Potential biodiversity constraints and development opportunities have been identified to assist Squadron Energy with preliminary project design, and the NSW Department of Planning, Housing and Infrastructure (DPHI) in developing biodiversity-related SEARs.

2 Desktop review

2.1 Documents and datasets reviewed

A desktop review of the project area was undertaken to identify ecological values, areas of biodiversity constraint and development opportunities. The following information was reviewed for this preliminary biodiversity assessment:

- Commonwealth Protected Matters Search Tool (PMST) for Matters of National Environmental Significance (MNES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool)
- threatened species records within 10 km of the site, via the Atlas of NSW Wildlife (https://www.environment.nsw.gov.au/atlasapp/) data tool and the Fisheries NSW Spatial Data Portal (https://www.dpi.nsw.gov.au/fishing/fisheries-research/spatial-data-portal)
- NSW State Vegetation Type Map ((Department of Planning and Environment, 2022)) and key fish habitat datasets (https://www.dpi.nsw.gov.au/fishing/fisheries-research/spatial-data-portal)
- Bionet Vegetation Classification, to derive a list of threatened species associated with PCTs predicted by the State Vegetation Type Map (https://vegetation.bionet.nsw.gov.au/LoginPR.aspx?ReturnUrl=%2f)
- previous ecological reports relevant to the area (NGH Consultling and DP Energy, 2023)
- interpretation of aerial photo imagery
- NSW Government Biodiversity Values Map (Department of Planning and Environment, 2023)

2.2 Limitations

This assessment has relied upon information and existing spatial data for the site and should be considered preliminary in nature. Detailed field survey will be required to validate this assessment to inform the future BDAR.

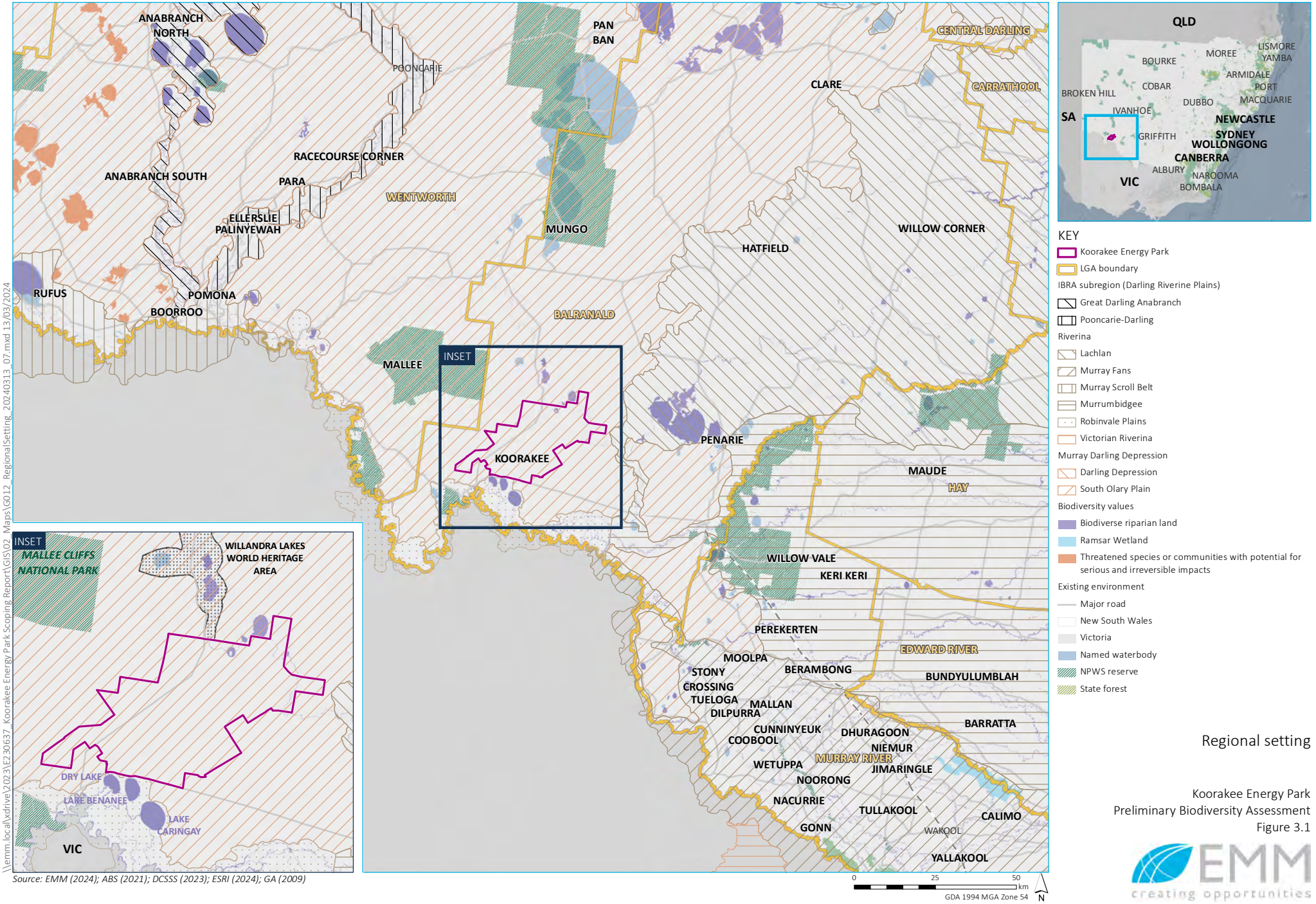
Some of the key limitations of the information consulted in this assessment include:

- reliance on the NSW State Vegetation Map (SVTM). This vegetation mapping project has been generated on a broad scale and therefore can contain inaccuracies when assessed at the site scale. Field surveys will be required to validate the actual vegetation communities present on site
- use of the NSW SVTM to identify candidate threatened species and ecological communities. Revised vegetation mapping of the site through field survey may identify additional candidate threatened species and communities requiring consideration.

3 Site context

The project is located within the Murray Darling Depression Interim Biogeographic Regionalisation of Australia (IBRA) region and South Olary Plain IBRA subregion. It is situated north of the Murray River and several significant waterbodies, including Lake Benanee, Dry Lake and Lake Caringay. The project boundary is 10km south-east of Mallee Cliffs National Park and adjacent to the southern extent of the Willandra Lakes World Heritage Area (Figure 3.1).

The central part of the project area has been previously cleared, with substantial tracts of remnant vegetation in the north, north-east and south-west corners. The project area is intersected by Arumpo Creek and several large waterbodies in the north-east, which are mapped as 'Biodiverse Riparian Land' according to the NSW Government Biodiversity Values Map (Figure 3.1).



KEY

- Koorakee Energy Park
- LGA boundary

IBRA subregion (Darling Riverine Plains)

- Great Darling Anabranch
- Pooncarie-Darling

Riverina

- Lachlan
- Murray Fans
- Murray Scroll Belt
- Murrumbidgee
- Robinvale Plains
- Victorian Riverina

Murray Darling Depression

- Darling Depression
- South Olary Plain

Biodiversity values

- Biodiverse riparian land
- Ramsar Wetland
- Threatened species or communities with potential for serious and irreversible impacts

Existing environment

- Major road
- New South Wales
- Victoria
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2024); ABS (2021); DCSSS (2023); ESRI (2024); GA (2009)

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Regional setting

Koorakee Energy Park
Preliminary Biodiversity Assessment
Figure 3.1

EMM creating opportunities

4 Preliminary land categories and biodiversity constraints

4.1 Preliminary land category assessment

The project area contains five separate land sub-categories under the Native Vegetation Regulatory Map. These subcategories, their regulatory effect and what the areas contain are shown in Table 4.1.

Table 4.1 Assessment of draft land categories

Category	Policy reference	Regulatory effect	What it contains
Category 1 - exempt	Section 60H of the LLS Act	Land that has been cleared (including significantly disturbed or modified) as at 1 January 1990 or lawfully cleared between 1 January 1990 and 25 August 2017. This is land where clearing native vegetation in rural areas does not require approval under the LLS Act, and does not need to comply with provisions relating to 'allowable activities' or any Land Management Code made under the LLS Act. Section 60H of the LLS Act Native vegetation regulatory map method statement 8 Category/overlay Regulatory effect. Other legislation and regulation may still apply on this land, e.g. development consent may be required under a Local Environmental Plan or a State Environmental Planning Policy.	Cleared land, as shown on the NSW State Vegetation Type Map
Category 2 - regulated	Section 60I(2)(l) of the LLS Act LLS Act - Schedule 5A Land Management Code	Land where native vegetation clearing in rural areas requires approval under the LLS Act unless the clearing complies with the provisions relating to allowable activities or any Land Management Code made under the LLS Act.	Land containing habitat for threatened species and communities, as shown on NSW State Vegetation Type Map (and PCT species associations), BV Map and Bionet records
Category 2 - vulnerable regulated land	Section 60F(2)(c) of the LLS Act	Category 2 areas that include steep and highly erodible lands and riparian areas. Additional restrictions apply to Land Management Codes and allowable activities in these areas	Riparian areas and wetlands, as shown on stream layer
Category 2 - sensitive regulated land	Section 108, 111, 113 of the LLS Regulation	Category 2 areas that contain sensitive lands such as critically endangered ecological communities (CEECs), rainforest, koala habitat, etc. Additional restrictions apply to allowable activities, and Land Management Code cannot be applied in these areas.	Set-aside areas
Category 2 – sensitive and vulnerable overlap	Section 60F(2)(c) of the LLS Act Section 108, 111, 113 of the LLS Regulation	This category is a combination of Category 2 sensitive land and Category 2 vulnerable land. In the project area, it is the overlap of riparian areas with areas that contain the biodiversity values associated with Category 2 sensitive regulated land.	Riparian areas and sensitive lands such as critically endangered ecological communities (CEECs), rainforest, koala habitat, etc.

Category 1 land is generally consistent with the area shown as cleared on Figure 4.1, while the remainder of lands represent the different subcategories of Category 2 land (Table 4.1).

4.2 Preliminary biodiversity assessment - overview

A preliminary assessment of biodiversity constraints has been conducted based on the results of the desktop review outlined in Section 2.1. Potential biodiversity constraints are discussed below in relation to native

vegetation, threatened ecological communities (TEC) and threatened species. Potential biodiversity constraints are also shown on Figure 4.1.

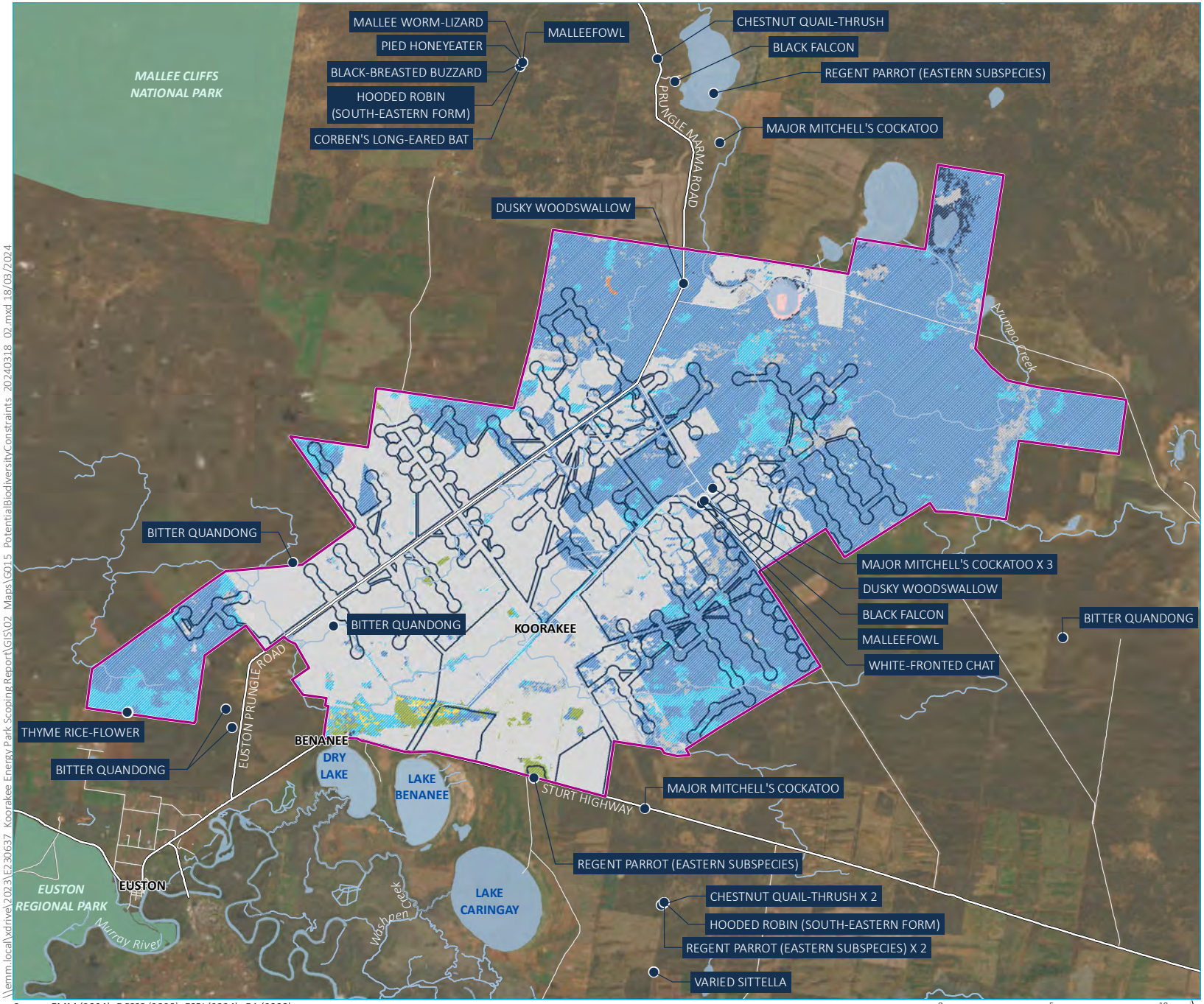
4.3 Native vegetation

A total of 14 Plant Community Types (PCTs) are mapped within the project area, with 10 PCTs predicted by the NSW SVTM to occur in the development corridor. These include a range of wetland, open woodland, shrubland and mallee communities. PCTs mapped within the project area and development corridor are shown in Table 4.2.

Table 4.2 PCTs predicted in the project area and development corridor

Plant community type	Predicted in project area?	Predicted in development corridor?
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)	Yes	Yes
PCT 12 - Shallow marsh wetland of regularly flooded depressions on floodplains mainly in the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Yes	No
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)	Yes	Yes
PCT 24 - Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains	Yes	No
PCT 28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Yes	Yes
PCT 57 - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion	Yes	Yes
PCT 58 - Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Yes	Yes
PCT 143 - Narrow-leaved Hopbush - Scrub Turpentine - Senna shrubland on semi-arid and arid sandplains and dunes	Yes	No
PCT 153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	Yes	Yes
PCT 159 - Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south-western NSW)	Yes	No
PCT 163 - Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones	Yes	Yes
PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Yes	Yes
PCT 171 - Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Yes	Yes
PCT 172 - Deep sand mallee of irregular dunefields of the semi-arid (warm) zone	Yes	Yes

Review of the scoping report for the adjacent Euston Wind Farm Project (NGH Consultling and DP Energy, 2023) revealed that six of these PCTs (13, 57, 58, 170, 171 and 172) were confirmed to occur on adjoining lands. Given the proximity of the project to the Euston Wind Farm Project (directly south-east), it is likely that these six PCTs will be present in the project area.



KEY

- Koorakee Energy Park
- Development corridor
- Bionet record

Plant Community Type ID

- 0
- 11
- 12
- 13
- 24
- 159
- 163

Potential TEC

- 28
- 57
- 58
- 143
- 153
- 170
- 171
- 172

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Waterbody
- NPWS reserve

Source: EMM (2024); DCSSS (2023); ESRI (2024); GA (2009)

0 5 10 km

GDA 1994 MGA Zone 54

N

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Potential biodiversity constraints

Koorakee Energy Park
Preliminary Biodiversity Assessment
Figure 4.1

EMM creating opportunities

4.4 Threatened ecological communities

Eight threatened ecological communities (TECs) listed under the NSW Biodiversity Conservation Act 2015 (BC Act) or EPBC Act were identified with the potential to occur within the project area. The likelihood of these TECs being present within the development corridor is summarised in Table 4.3. Of these, four are considered with a moderate to high likelihood of occurring in the development corridor:

- *Acacia loderi shrublands*
- *Acacia melvillei shrublands in the Riverina and Murray-Darling Depression bioregions*
- *Mallee Bird Community of the Murray Darling Depression Bioregion*
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions.

Table 4.3 Threatened Ecological Communities – Likelihood of Occurrence

Threatened Ecological Community	BC Act	EPBC Act	Associated PCTs	Likelihood of occurrence in development corridor
Acacia loderi shrublands	E	-	57, 58, 153, 170	**Moderate**. This community is known to occur in the South Olary Plain IBRA Subregion, however, field surveys for the Euston Wind Farm did not identify the diagnostic species *Acacia loderi* within any of the vegetation communities present on the adjacent site.
Acacia melvillei shrublands in the Riverina and Murray-Darling Depression bioregions	E	-	28, 58, 170	**Moderate**. This community is known to occur in the South Olary Plain IBRA Subregion and as close as Balranald to the east. However, field surveys for the Euston Wind Farm did not identify the diagnostic species *Acacia melvillei* within any of the vegetation communities present on the adjacent site.
Artesian Springs Ecological Community in the Great Artesian Basin	CE	-	163	**Nil**. This TEC is restricted to the Great Artesian Basin region in North-western NSW, and therefore does not occur within the project area.
Mallee Bird Community of the Murray Darling Depression Bioregion	-	E	170, 171, 172	**High**. This TEC is associated with mallee habitats mapped within the site. Field surveys conducted for the adjacent Euston Wind Farm ground-validated the presence of these habitats and concluded they meet condition thresholds of high value to the TEC. Accordingly, it is likely that this TEC occurs in the project area.
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions[1]	E	E	159	**Nil**. The community is not known to occur in the South Olary Plain IBRA subregion in which the project occurs, and PCT 159 is not predicted to occur in the development corridor.
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	-	E	-	**Nil**. No PCTs mapped currently within the site are consistent with this TEC, and the TEC was not identified on the adjacent Euston Wind Farm site, and therefore is unlikely to occur in the project area.
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	-	CE	170, 173	**Low**. This TEC primarily occurs in a region 60km south-west of the site. Similarly, surveys for the Euston Wind Farm found areas of PCT 170 and 173 did not meet diagnostic criteria for the TEC, and therefore it is unlikely to occur in the project area.

Table 4.3 Threatened Ecological Communities – Likelihood of Occurrence

Threatened Ecological Community	BC Act	EPBC Act	Associated PCTs	Likelihood of occurrence in development corridor
Porcupine Grass - Red Mallee - Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion	CE	-	172	**Nil**. The community is not known to occur in the South Olary Plain IBRA subregion in which the project is located.
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E	-	28	**Moderate.** The community is known from the Balranald LGA in which the project is located.

E = Endangered, CE = Critically Endangered

[1] This community is listed under the EPBC Act as the *Weeping Myall Woodlands Ecological Community*

4.5 Threatened and migratory species

In total, 158 threatened and migratory species listed under the BC Act or EPBC Act were identified with potential to occur in the project boundary, including 43 plants, 69 birds, 5 fish, 18 mammals, 21 reptiles and 2 frogs.

Of these species, 2 flora and 17 fauna species are known to occur on or nearby the site according to NSW Bionet Atlas database records and preliminary surveys conducted for the Euston Wind Farm Scoping Report (NGH Consultling and DP Energy, 2023), and therefore have a higher likelihood of occurring in the project area. During recent consultation, the south-west region of the Biodiversity and Conservation Division (BCD) advised that a further 13 fauna species are likely to occur in the area.

The 30 species known to occur in the project locality are listed in Table 4.4.

Table 4.4 Threatened species known to occur in the project locality

Species	Conservation status (BC Act)	Conservation status (EPBC Act)	Class of credit
Bitter Quandong (*Santalum murrayanum*)	Endangered	Not listed	Species
Black Falcon (*Falco subniger*)	Vulnerable	Not listed	Ecosystem
Black-breasted Buzzard (*Hamirostra melanosternon*)	Vulnerable	Not listed	Species/ecosystem
Blue-winged Parrot (*Neophema chrysostoma*)	Vulnerable	Vulnerable	Not yet determined
Bolam's Mouse (*Pseudomys bolami*)	Endangered	Not listed	Ecosystem
Brown Treecreeper (*Climacteris picumnus victoriae*)	Vulnerable	Vulnerable	Ecosystem
Chestnut Quail-thrush (*Cinclosoma castanotum*)	Vulnerable	Not listed	Ecosystem
Corben's Long-eared Bat (*Nyctophilus corbeni*)	Vulnerable	Vulnerable	Ecosystem

Table 4.4 Threatened species known to occur in the project locality

Species	Conservation status (BC Act)	Conservation status (EPBC Act)	Class of credit
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	Vulnerable	Not listed	Ecosystem
Hooded Robin (*Melanodryas cucullata cucullata*)	Vulnerable	Endangered	Ecosystem
Inland Forest Bat (*Vespadelus baverstocki*)	Vulnerable	Not listed	Ecosystem
Gilbert's Whistler (*Pacycephala inornata*)	Vulnerable	Not listed	Ecosystem
Little Eagle (*Hieraaetus morphnoides*)	Vulnerable	Not listed	Species/ecosystem
Little Pied Bat (*Chalinolobus picatus*)	Vulnerable	Not listed	Ecosystem
Major Mitchell's Cockatoo (*Cacatua leadbeateri*)	Vulnerable	Endangered	Species/ecosystem
Mallee Worm Lizard (*Aprasia inaurita*)	Endangered	Not listed	Ecosystem
Malleefowl (*Leipoa ocellata*)	Endangered	Vulnerable	Ecosystem
Marble-faced Delma (*Delma australis*)	Endangered	Not listed	Ecosystem
Pied Honeyeater (*Certhionyx variegatus*)	Vulnerable	Not listed	Ecosystem
Regent Parrot (*Polytelis antopeplus monarchoides*)	Endangered	Vulnerable	Species/ecosystem
Shy Heathwren (*Hylacaula cautus*)	Vulnerable	Not listed	Ecosystem
Southern Ningaui (*Ningaui yvonneae*)	Vulnerable	Not listed	Ecosystem
Southern Scrub-robin (*Dryomodes brunneopygia*)	Vulnerable	Not listed	Ecosystem
Southern Whiteface (*Aphelocephala leucopsis*)	Vulnerable	Vulnerable	Not yet determined
Spotted Harrier (*Circus assimilis*)	Vulnerable	Not listed	Ecosystem
Square-tailed Kite (*Lophoictinia isura*)	Vulnerable	Not listed	Species/ecosystem
Thyme Rice Flower (*Pimelea serpyllifolia*)	Endangered, SAII (see Section 4.6)	Not listed	Species/SAII
Varied Sitella (*Daphoenositta chrysoptera*)	Vulnerable	Not listed	Ecosystem
Western Blue-tongued Lizard (*Tiliqua occipitalis*)	Vulnerable	Not listed	Ecosystem

Table 4.4 Threatened species known to occur in the project locality

Species	Conservation status (BC Act)	Conservation status (EPBC Act)	Class of credit
Western Pygmy Possum (*Cercartetus concinnus*)	Endangered	Not listed	Ecosystem
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	Vulnerable	Marine	Species/ecosystem
White-fronted Chat (*Epthianura albifrons*)	Vulnerable	Not listed	Ecosystem

4.6 Candidate entities for serious and irreversible impacts

One candidate entity for serious and irreversible impacts (SAII) under the BC Act has been recorded within the locality and one has potential to occur in the project area. A description of these and their potential habitat in the project area is provided in Table 4.5.

Table 4.5 Potential SAII in project area

Candidate entity	Likelihood of occurrence in project area
Thyme Rice-Flower *(Pimelea serpyllifolia subsp. serpyllifolia*)	**Recorded.** This species has been previously recorded in the south-west corner of the project area and has been recorded within mallee woodland habitats in the broader Euston district. It has been excluded from the development corridor. Mallee communities are mapped within the project area and may present suitable habitat for the species outside known records.
Swamp She-oak (*Casuarina obesa*)	**Moderate.** Species is known to occur along the shores of Lake Benanee, just south of the project area. The species could occur along the shorelines of permanent, ephemeral or relict lakes if present within the project area.

4.7 Key fish habitat and aquatic species

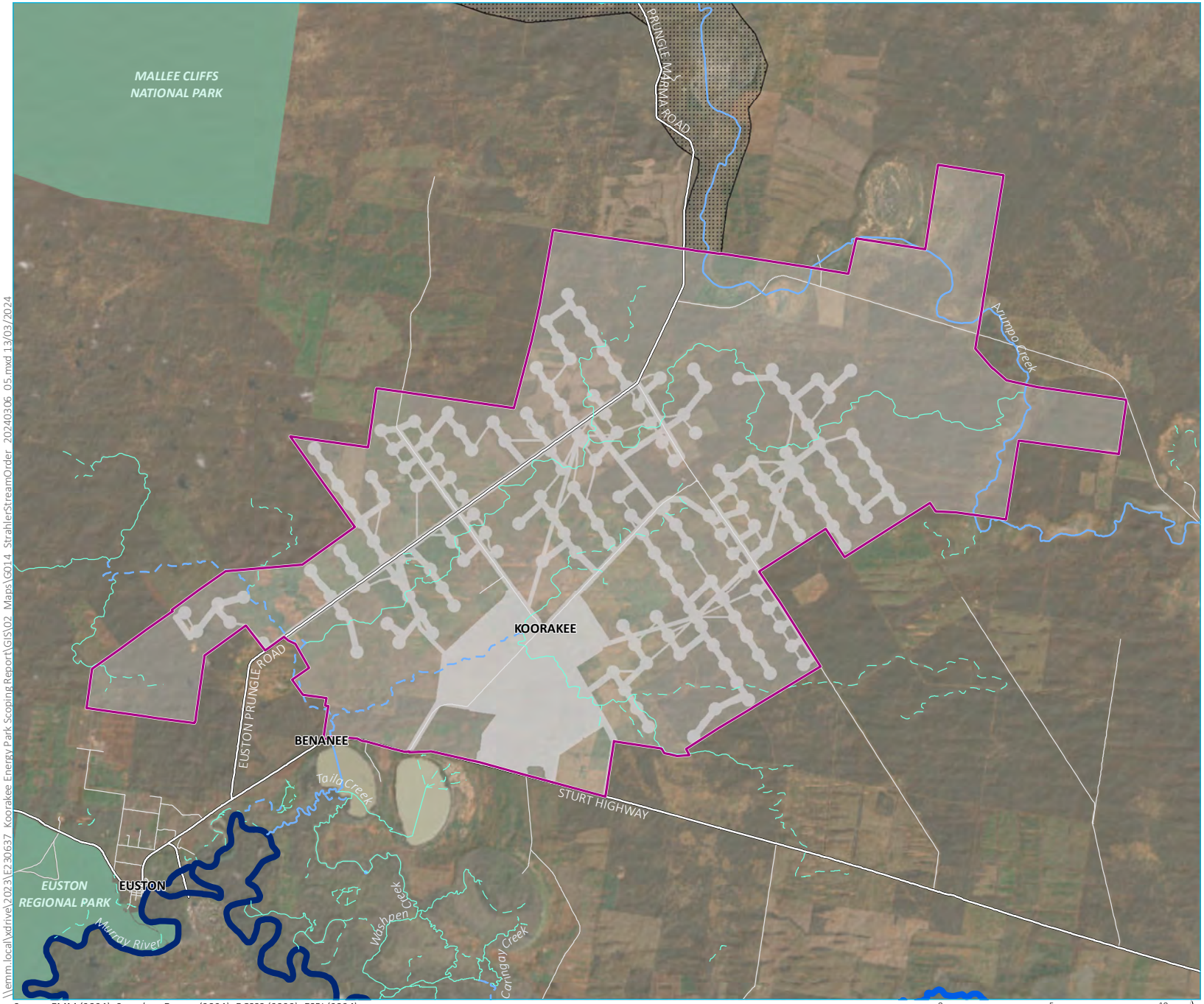
There are no key fish habitats or threatened aquatic species predicted by the Fisheries NSW Spatial Data Portal (https://www.dpi.nsw.gov.au/fishing/fisheries-research/spatial-data-portal) to occur in the project area.

The PMST predicted five threatened fish species may occur in the project area (Table 4.6). Of these species, three have a moderate potential to occur in the project area.

Table 4.6 Threatened fish species – Likelihood of Occurrence

Threatened fish species	FM Act	EPBC Act	Likelihood of occurrence
Flathead Galaxias (*Galaxias rostratus*)	Critically Endangered	Critically Endangered	**Moderate.** Occurs in slow-flowing lowland rivers and wetlands, which may occur in the project area.
Murray Hardhead (*Caterocephals fluviatilis*)	Critically Endangered	Endangered	**Moderate.** Occurs in lowland reaches of the Murray River and tributaries.
Murray Cod (*Maccullochella peelii*)	Not listed	Vulnerable	**Moderate.** May occur given the species wide distribution and habitat requirements, however would require deep pools >5 m and snags to occur.
Silver Perch (*Bidyanus bidyanus*)	Vulnerable	Critically Endangered	**Nil.** The species requires fast-flowing upland streams which do not occur in the project area.
Macquarie Perch (*Macquaria australasica*)	Endangered	Endangered	**Nil.** This is an upland species, while the project is in a lowland area.

The project area contains several unnamed watercourses of Strahler Stream Order 1 to 3, and Arumpo Creek (Stream Order 4) (Figure 4.2), which intersect the project area in several locations. The development corridor avoids Arumpo Creek in the north of the project area, however intersects several unnamed watercourses.



KEY

- Koorakee Energy Park
- Development corridor

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 8th order
- 10th order

Existing environment

- Major road
- Minor road
- NPWS reserve
- Willandra Lakes World Heritage Area

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 5 10 km

GDA 1994 MGA Zone 54

N

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Strahler stream order

Koorakee Energy Park
Preliminary Biodiversity Assessment
Figure 4.2

EMM
creating opportunities

5 Potential impacts

5.1 Potential impacts to TECs

Potential impacts on TECs likely to be present in the development corridor are outlined in Table 5.1.

Table 5.1 Potential TEC impacts

TEC	Associated PCTs	Potential impacts
Acacia loderi shrublands	57, 58, 153, 170	Permanent removal, loss of habitat, fragmentation
Acacia melvillei shrublands in the Riverina and Murray-Darling Depression bioregions	28, 58, 170	Permanent removal, loss of habitat, fragmentation
Mallee Bird Community of the Murray Darling Depression Bioregion	170, 171, 172	Permanent removal, loss of habitat, fragmentation, turbine strike
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	28	Permanent removal, loss of habitat, fragmentation

5.2 Potential impacts to threatened species

The preliminary likelihood of occurrence for threatened species was assessed. Potential impacts on threatened taxa likely in the development corridor are outlined in Table 5.2 for species likely to be present. Potential collision risk for bird and bat species are discussed in Section 5.4.

Table 5.2 Potential threatened species impacts

Threatened taxa	Threatened species	Potential impacts
Hollow-dependent birds	Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Regent Parrot (*Polytelis antopeplus monarchoides*)	Loss of hollow-bearing trees, loss of breeding and foraging habitat
Woodland/mallee birds	Blue-winged Parrot (*Neophema chrysostoma*), Brown Treecreeper (*Climacteris picumnus victoriae*), Chestnut Quail-thrush (*Cinclosoma castanotum*), Dusky Woodswallow (*Artamus cyanopterus cyanopterus*), Gilbert's Whistler (*Pachycephala inornata*), Hooded Robin (*Melanodryas cucullata cucullata*), Malleefowl (*Leipoa ocellata*), Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Pied Honeyeater (*Certhionyx variegatus*), Shy Heathwren (*Hylacaula cautus*), Southern Scrub-robin (*Dryomodes brunneopygia*), Southern Whiteface (*Aphelocephala leucopsis*), Varied Sitella (*Daphoenositta chrysoptera*), White-fronted Chat (*Epthianura albifrons*)	Loss of breeding (excepting Blue-winged Parrot) and foraging habitat
Mammals	Southern Ningaui (*Ningaui yvonneae*), Western Pygmy Possum (*Cercartetus concinnus*)	
Microbats	Corben's Long-eared Bat (*Nyctophilus corbeni*), Little Pied Bat (*Chalinolobus picatus*), Inland Forest Bat (*Vespadelus baverstocki*)	Loss of hollow-bearing trees, loss of breeding and foraging habitat

Table 5.2 Potential threatened species impacts

Threatened taxa	Threatened species	Potential impacts
Raptors	Black Falcon (*Falco subniger*), Black-breasted Buzzard (*Hamirostra melanosternon*), Little Eagle (*Hiteraeetus morphnoides*), Spotted Harrier (*Circus assimilis*), Square-tailed Kite (*Lophoictinia isura*), White-bellied Sea-eagle (*Hieraeetus mophnoides*)	Loss of mature trees, loss of breeding and hunting habitat
Reptiles	Mallee Worm Lizard (*Aprasia inaurita*), Marble-faced Delma (*Delma australis*), Western Blue-tongued Lizard (*Tiliqua occipitalis*)	Habitat loss and fragmentation
Fish	Flathead Galaxias (*Galaxias rostratus*), Murray Hardhead (*Caterocephals fluviatilis*), Murray Cod (*Maccullochella peelii*)	Bed and bank impacts from crossing construction
Plants	A spear-grass (*Austrostipa metatoris*), Bitter Quandong (*Santalum murrayanum*), Chariot Wheels (*Maireana cheelii*), Menindee Nightshade (*Solanum karsense*), Slender Darling Pea (*Swainsona murrayana*), Thyme Rice Flower (*Pimelea serpyllifolia subsp. serpyllifolia*), Yellow Swainson-pea (*Swainsona pyrophila*)	Habitat loss and fragmentation, potential for SAII (see Section 5.3)

5.3 Potential impacts to candidate entities for SAII

The project has potential to result in SAII for Thyme Rice Flower (*Pimelea serpyllifolia subsp. serpyllifolia*) as it has previously been recorded in the south-west corner of project area and has a restricted distribution, only being known from a small number of locations. The project also has potential to result in SAII for Swamp She-oak (*Casuarina obesa*), with individuals known from directly south of the project area, and potential habitat in a lake in the central northern part of the project area.

The preliminary design of the project has avoided direct impacts on known individuals of Thyme Rice Flower (*Pimelea serpyllifolia subsp. serpyllifolia*) (see Chapter 8), and does not impact the lake, therefore impacts on known individuals have been avoided.

5.4 Potential wind turbine strike impacts

To assess potential wind turbine strike impacts upon threatened and migratory birds and bat species, a preliminary site characterisation was undertaken with guidance from the Commonwealth 'Onshore wind farms – interim guidance on bird and bat management' (DAWE 2021) and a desktop analysis of site context, following Draft Turbine Risk Assessment and Avoidance Guidance (BCD, 2023). The outcomes of this assessment for species considered likely to occur on the site are provided in Table 5.3.

Species information used to inform the assessment has been drawn from species profiles on the NSW Department of Climate Change, Energy, Environment and Water (DCCEEW NSW) threatened species profile database (OEH 2024), along with species conservation advice from the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW Commonwealth), where available.

If present in the project area, several species represent a possible collision risk, including species recorded in the locality like Dusky Woodswallow (*Artamus cyanopterus cyanopterus*), Inland Forest Bat (*Vespadelus baverstocki*), Little Eagle (*Hieraeetus morphnoides*), Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Pied Honeyeater (*Cerhionyx variegatus*), Regent Parrot (*Polytelis antopeplus monarchoides*), Spotted Harrier (*Circus assimilis*), Square-tailed Kite (*Lophoictinia isura*), Varied Sitella (*Daphoenositta chrysoptera*), White-bellied Sea-eagle (*Haliaeetus leucogaster*).

Table 5.3 Preliminary site characterisation and potential collision risk

Species	Site characteristics	Behaviour	Presence	Potential site use	Demographics	Migratory Flight Paths	Flight characteristics
Black Falcon (*Falco subniger*)	Inhabits a diverse range of habitats, including shrublands, grasslands, woodlands and farmlands (SWIFFT 2023), which are all present on site.	Nests in large old trees alongside rivers and creeks (SWIFFT 2023).	Ongoing	Breeding and foraging	Solitary individuals, pairs, or in family groups of parents and offspring	Not migratory, although travels hundreds of kilometres	Fly at great heights
Black-breasted Buzzard (*Hamirostra melanosternon*)	Lives in a range of inland habitats, especially along timbered watercourses which are likely to occur on site. Suitable foraging habitat in the form of grassland and sparsely timbered woodland is also present.	Nests in tall trees alongside water.	Ongoing	Breeding and foraging	Likely to be solitary or in breeding pairs	Not migratory	Fly at great heights
Blue-winged Parrot (*Neophema chrysostoma*)	Suitable foraging habitat in the form of semi-arid chenopod shrublands and sparse grasslands are present on site. Species is often found near wetlands which are likely to occur on site.	Breed in Tasmania and coastal south-eastern Australia and southern Victoria	Transitory	Foraging	Feed in pairs or small groups	Migrate north and inland from breeding territories in the southern states during winter, travelling as far as 100km inland to feed	Fly at reasonable heights
Brown Treecreeper (*Climaceris picumnus victoriae*)	Suitable mallee woodland and river red gum habitat are likely to occur on site.	Nests in hollows in dead or live trees and tree stumps, forages in trees and on the ground	Ongoing	Breeding and foraging	Usually observed in pairs or small groups of 8-12 birds	Not migratory	Fly at reasonable heights
Chestnut Quail-thrush (*Cinclosoma castanotum*)	Suitable mallee woodland habitats are present on the site.	Forages on the ground, often among spinifex clumps .Nests in a depression on the ground lined with vegetation nearby tree trunks, fallen branches or low bushes .	Ongoing	Breeding and foraging	Occur in pairs or small family parties of 3-5 (Morcombe 2004).	Not migratory	Low-flyer, predominantly ground-dwelling bird.

Table 5.3 Preliminary site characterisation and potential collision risk

Species	Site characteristics	Behaviour	Presence	Potential site use	Demographics	Migratory Flight Paths	Flight characteristics
Corben's Long-eared Bat (*Nyctophilus corbeni*)	Suitable mallee woodland habitats (DPE 2023) are present on the site.	Low-flying bat, foraging under the canopy and sometimes on the ground .	Ongoing	Breeding and foraging	Solitary roosting. Most roost sites are used for a single day and large distances are travelled at night, with consecutive roost sites within 4km.	Not migratory	Low-flying bat, foraging under the canopy and sometimes on the ground
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	Suitable dry, open eucalypt forests and woodlands, including mallee associations are present on site. Also occurs in shrublands and farmland), which are present on site.	Primarily forages above the canopy or low over waterbodies, but occasionally consumes nectar, fruit and seed within the canopy. Nests in shrubs or low trees.	Ongoing/Migratory - depending on location	Breeding and foraging	Breeds in solitary pairs or small flocks, however large flocks may form around abundant food sources in winter and preceding migration.	NSW populations migrate to the north of the state and southeastern Queensland after breeding.	Fly at reasonable heights
Hooded Robin (*Melanodryas cucullata cucullata*)	Suitable open eucalypt woodland, acacia scrub and mallee habitats are present on the subject site	Breeds between July and November	Ongoing	Breeding and foraging	Largely sedentary, occurring in pairs and small groups.	Not migratory	Low-flyer, breeds and forages close to the ground.
Gilbert's Whistler (*Pachycephala inornata*)	Occurs mainly in mallee shrublands which are predicted to occur onsite, but also occurs in, Cypress Pine and Belah woodlands and River Red Gum forests which are also predicted.,	Forages on or near the ground, and construct nests between 2-6 m height.	Ongoing	Breeding and foraging	Movements poorly understood, but pairs are believed to be sedentary.		Low-flyer, constructs nests up to 6 m height and forages close to the ground.

Table 5.3 Preliminary site characterisation and potential collision risk

Species	Site characteristics	Behaviour	Presence	Potential site use	Demographics	Migratory Flight Paths	Flight characteristics
Inland Forest Bat (*Vespadelus baverstocki*)	Requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including Mallee and River Red Gum woodland, predicted to occur onsite..	Roosts in tree hollows and abandoned buildings. Known to roost in very small hollows in stunted trees only a few metres high	Ongoing	Breeding and foraging	Colony size ranges from a few individuals to more than sixty. Females congregate to raise young in November and December, with young carried for the first week following birth. Young are independent by January.	Not migratory	Flight height unknown, however These bats fly rapidly and cover an extensive foraging area and are presumed to be an aerial hunter, feeding on flying insects.
Little Eagle (*Hieeraeetus morphnoides*)	Suitable open eucalypt forest, woodland or open woodland are present on site.	Nests in tall living trees within remnant patches of vegetation. Preys predominantly on birds, reptiles, and mammals.	Ongoing	Breeding and foraging	Solitary individuals or breeding pairs.	Not migratory	Fly at great heights
Little Pied Bat (*Chalinolobus picatus*)	Suitable mallee woodland habitats are present on the site.	Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	Ongoing	Breeding and foraging	Can roost in groups of 20 to 40 bats	Not migratory	An aerial forager, taking insects mid-flight close to vegetation, mainly in the low and middle strata of the canopy (Churchill 2009). Communiting height unknown.
Major Mitchell's Cockatoo (*Cacatua leadbeateri*)	Inhabits a wide range of treed and treeless habitats, always within reach of water Suitable breeding habitat (e.g. hollow-bearing trees) and foraging habitat nearby large waterbodies is present on site.	Feeds mostly on the ground, especially on the seeds of native and exotic melons and seeds of saltbush, wattles, cypress pines. Nests in tree hollows	Ongoing	Breeding and foraging	Normally found in pairs or small groups occupying large home ranges, although flocks of hundreds may be found where food is abundant .	Not migratory	Fly at reasonable heights

Table 5.3 Preliminary site characterisation and potential collision risk

Species	Site characteristics	Behaviour	Presence	Potential site use	Demographics	Migratory Flight Paths	Flight characteristics
Malleefowl (*Leipoa ocellata*)	Inhabits mallee communities and eucalypt woodlands, which are present on site.	Incubate eggs in large mounds and occupies home ranges from 50 - 500 ha in size).	Ongoing	Ongoing	Lives in pairs, sometimes with overlapping ranges.	Not migratory	Low flyer, predominantly ground-dwelling bird
Pied Honeyeater (*Certhionyx variegatus*)	Suitable mallee, spinifex and eucalypt woodlands are present on site.	Feeds on nectar, predominantly from emu-bushes and mistletoes (DPE 2023). Highly nomadic species, following the erratic flowering of shrubs and breeds in the fork of a shrub or tree up to 5m above the ground (DPE 2023).	Transitory	Breeding and foraging	Variable, small groups to large flocks	Unpredictable; follows erratic flowering of food trees	Fly at reasonable heights
Regent Parrot (*Polytelis antopeplus monarchoides*)	Suitable mallee woodland foraging habitat is present on site. Nests in mature river red gums (DPE 2023) which may be present in riparian areas of the site.	Breeding is colonial. Can be cryptic and frequently sits quietly within trees.	Ongoing	Foraging, potentially breeding	Usually occur in pairs or small groups, although breeding is colonial with many nests occurring within 150m of each other	Not migratory	Fly at reasonable heights
Shy Heathwren (*Hylacaula cautus*)	Inhabits mallee woodlands which are predicted to occur onsite, with a relatively dense understorey of shrubs and heath plants.	Feeds on the ground, almost entirely on insects (cockroaches, grasshoppers, bugs, lerps, beetles, caterpillars, moths, ants, spiders and insect eggs) and rarely on seeds, including those of saltbush	Ongoing	Breeding and foraging	Generally occurs singly or in pairs	Not migratory	Low flier

Table 5.3 Preliminary site characterisation and potential collision risk

Species	Site characteristics	Behaviour	Presence	Potential site use	Demographics	Migratory Flight Paths	Flight characteristics
Southern Scrub-robin (*Dryomodes brunneopygia*)	Inhabits mallee and acacia scrub which are predicted to occur onsite, particularly with dense sub-shrubs in the understorey, including Broombush and other dry shrubs.	Forages around the base of mallee trees and on the ground beneath shrubs for ground- and litter-dwelling invertebrates, with certain ant species dominating	Ongoing	Breeding and foraging	Unknown. Assumed to be individuals or pairs as with other robin species.	Not migratory	Low flier
Spotted Harrier (*Circus assimilis*)	Suitable mallee, grassy open woodland and wetland habitats are likely to occur on site.	Nests in tall trees (DPE 2023).	Ongoing	Breeding and foraging	Likely to be solitary or in breeding pairs	Not migratory	Fly at great heights
Square-tailed Kite (*Lophoictinia isura*)	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses, which occur onsite. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland, which are predicted to occur onsite.	Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.	Transitory, occupies large hunting ranges of 100 square kilometres	Breeding and foraging	Mainly solitary but occurs in pairs during the breeding season	Not migratory, but occupies a large hunting range	Fly at great heights
Varied Sitella (*Daphoenositta chrysoptera*)	Broadly inhabits eucalypt forest and woodlands , which are present on site	Feeds on arthropods in rough or decorticating bark, dead branches, dead trees and small branches in the tree canopy . Builds a nest high up in the tree canopy.	Ongoing	Breeding and foraging	Normally occur in small flocks (Morcombe 2004).	Not migratory	Fly at reasonable heights

Table 5.3 Preliminary site characterisation and potential collision risk

Species	Site characteristics	Behaviour	Presence	Potential site use	Demographics	Migratory Flight Paths	Flight characteristics
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.	Hunts its prey from a perch or whilst in flight (by circling slowly, or by sailing along 10–20 m above the shore). Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground	Transitory	Breeding and foraging	May be solitary, or live in pairs or small family groups consisting of a pair of adults and dependent young	Uncertain, however would likely follow migratory flight paths along large rivers such as the Murray	Fly at reasonable heights
White-fronted Chat (*Epthianura albifrons*)	Utilises bare or grassy ground nearby wetland areas (DPE 2023), which occur in areas of the site.	Builds nests in low vegetation between 20cm to 2.5m above the ground (DPE 2023).	Ongoing	Breeding and foraging	Occurs singly or in pairs (DPE 2023).	Not migratory	Low-flyer, breeds and forages close to the ground.

6 Summary of potential impacts on MNES

If present in the development corridor, the project has potential to result in the following impacts on MNES (Table 6.1).

Table 6.1 Potential MNES impacts

MNES	Threatened biodiversity	Potential impacts
Threatened ecological communities	Mallee Bird Community of the Murray Darling Depression Bioregion	Potential impacts on mallee-dependent bird species in PCTs 170, 171 and 172
Threatened plants	A spear-grass (*Austrostipa metatoris*), Chariot Wheels (*Maireana cheelii*), Menindee Nightshade (*Solanum karsense*), Slender Darling Pea (*Swainsona murrayana*), Yellow Swainson-pea (*Swainsona pyrophila*)	Potential impacts on riparian woodland, wetland and mallee vegetation in PCTs 11, 13, 170, 171 and 172
Threatened birds	Blue-winged Parrot (*Neophema chrysostoma*), Regent Parrot (*Polytelis antopeplus monarchoides*), Hooded Robin (*Melanodryas cucullata cucullata*), Major Mitchell's Cockatoo (*Cacatua leadbeateri*), Malleefowl (*Leipoa ocellata*), Murray Mallee Striated Grasswren (*Amytornis striatus howei*), Southern Whiteface (*Aphelocephala leucopsis*)	Potential impacts on riparian woodland, Belah woodland, wetland and mallee vegetation in PCTs 11, 13, 57, 170, 171 and 172
Threatened microbat	Corben's Long-eared Bat (*Nyctophilus corbeni*)	Potential impacts on riparian woodland, Belah woodland, wetland and mallee vegetation in PCTs 11, 13, 57, 170, 171 and 172
Threatened fish	Murray Hardhead (*Caterocephals fluviatilis*), Murray Cod (*Maccullochella peelii*)	Potential bed and bank impacts in streams from crossing construction
Threatened frog	Southern Bell Frog (*Litoria raniformis*)	Potential impacts on riparian areas and PCT 11 and 13

7 Assessment requirements

As the project will be assessed under Part 4 Division 4.7 of the EP&A Act, an assessment in accordance with the Biodiversity Assessment Method (DPIE 2020) and the preparation of a Biodiversity Development Assessment Report (BDAR) is required. The following key tasks would be completed during the BDAR:

- validate and refine the State Vegetation Type Map, and delineate into vegetation zones
- conduct vegetation integrity plots
- revise Bionet threatened species search radius to 20 km, to identify any additional threatened species from surrounding conservation reserves
- conduct field-based threatened species habitat assessment
- generate a list of candidate species for further assessment, and conduct targeted surveys for those candidate 'species credit' species, where a habitat constraint and or suitable microhabitats are present
- conduct targeted surveys (if required) for MNES
- conduct BAM calculations and prepare BDAR for lodgement.

An aquatic habitat assessment for fish species listed under the FM Act and EPBC Act (Section 4.7) and classification of waterways in the development corridor for fish passage will be required.

Given the potential for impacts on threatened bird and bat species, a Bird and Bat Utilisation Study (BBUS) and monitoring program will be required (see Section 5.4). The Biodiversity and Conservation Division (BCD) of DCCEEW NSW have advised that they require a 24 -month monitoring dataset, with one survey per season (8 surveys total). BCD have recently provided guidance documents to proponents working in the south-west renewable energy zone, comprising:

- draft Turbine Risk Assessment and Avoidance Guideline
- suggested BBUS Method
- draft BBAMP Framework 2023.

DCCEEW Commonwealth have also recently released an updated version of the Onshore Wind Farm Guidance. The aforementioned guidelines would be considered when developing the monitoring program and when assessing prescribed impacts during the BDAR.

As the project also has potential to impact MNES, a referral will be lodged with DCCEEW Commonwealth. The referral would address the MNES outlined in Section 6 an any other issues deemed relevant by DCCEEW Commonwealth. As the project will likely use the bilateral assessment, SEARs would be issued by DPHI with supplementary environmental assessment requirements provided by DCCEEW Commonwealth if required.

8 Avoidance and minimisation

Squadron Energy have considered biodiversity constraints in their design since the preliminary site layout (Option 1) was developed. Design Option 1 considered Class 1 constraints including avoidance of the Willandra Lakes World Heritage Area, and conservation (set-aside) areas associated with property vegetation plans, classified on the Native Vegetation Regulatory Map as Category 2 Sensitive Regulated Land.

EMM provided advice on likely biodiversity constraints to Squadron Energy, which was the primary driver of Design Option 2. Design Option 2 results in a reduction of 9,129 ha in the development corridor (Table 8.1), when compared with Design Option 1. Design Option 2 considers the aforementioned Class 1 constraints, but also:

- avoids direct impacts on Arumpo Creek (Stream Order 4) and associated potential impacts to EPBC Act-listed fish species
- avoids direct impacts on known individuals of Thyme Rice-flower (*Pimelea serpyllifolia subsp. serpyllifolia*) in the south-west corner of the project area, a species listed as a candidate entity for SAII under the BC Act
- reduces potential impacts on native vegetation, including a large area of PCT 170 and 171 which is likely to represent the EPBC Act-listed Mallee Bird Community TEC and habitat for several threatened species
- maximises use of cleared land (non-native vegetation)

Table 8.1 details the reduction in disturbance areas and avoidance of ecological impacts achieved through initial design development at the scoping phase of the project.

Table 8.1 Avoidance and minimisation measures already implemented through design

Comparison	Design Option 1	Design Option 2	Direct impact reduction with Design Option 2 (ha)
Development corridor (ha)	22,814.00	13,684.80	9,129
Native vegetation in development corridor (ha)	10,840.67	5,308.63	5,532
Potential TEC in development corridor (ha)	10,833.51	5,304.62	5,529
Non-native vegetation in development corridor (ha)	11,267.72	8,356.16	2,912

The proposed development corridor will be subject to ongoing design refinement and the final development corridor will be presented in the Environmental Impact Statement (EIS), informed by the BDAR and additional technical studies. A smaller portion of the development corridor (the development footprint) will be disturbed based on the final design of the project, post approval. Native vegetation and habitat will be assessed across the entire development corridor to inform design refinements and a final disturbance footprint that avoids and/or minimises biodiversity impacts.

The development corridor presented in the EIS will be located to maximise the use of cleared and disturbed land and minimise impacts on native vegetation, threatened ecological communities and threatened species habitats. As the project design is refined, key avoidance and minimisation measures considered will include:

- avoidance and minimisation of direct and indirect impacts on candidate entities for SAII, including Thyme Rice-flower (*Pimelea serpyllifolia subsp. serpyllifolia*) and Swamp She-oak (*Casuarina obesa*)

- further minimisation of clearing mallee PCTs and associated potential impacts on Mallee Bird Community of the Murray Darling Depression Bioregion TEC
- further minimisation of clearing native vegetation and threatened species habitats
- location of wind turbines to minimise turbine strike impacts
- design of wind turbines to avoid and/or minimise turbine strike impacts
- design of appropriate waterway crossings in accordance with DPI 2013.

References

Churchill S 2009, *Australian Bats,* Jacana Publishing

DAWE 2021, *Onshore wind farms – interim guidance on bird and bat management*, Department of Agriculture, Water and the Environment

DCCEEW 2023, *Conservation Advice for Neophema chrysostoma (blue-winged parrot),* Department of Climate Change, Energy, the Environment and Water

DPI 2013, *Policy and guidelines for fish habitat conservation and management,* Department of Primary Industries (Fisheries)

Morcombe, MK 2004, *Field guide to Australian Birds*, Steve Parish Publishing Pty Ltd

NGH and DP Energy 2023, *Scoping Report: Euston Wind Farm,* report to DP Energy

OEH 2024, *Threatened Biodiversity Profile Search*, Department of Planning and Environment, https://www.environment.nsw.gov.au/threatenedspeciesapp/

SWIFFT 2023, *Black falcon – species profile*, State Wide Integrated Fauna and Flora Teams, accessed 12 October 2023, https://www.swifft.net.au/cb_pages/sp_black_falcon.php?mobile_mode=true

Appendix A
Database search results

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DatasetName	SightingKey	SpeciesCode	KingdomName	ClassName	FamilyName	SortOrder	ScientificName	Exotic	CommonName	NSWStatus	CommStatus	SensitivityClass	ProfileID	DateFirst	DateLast	NumberIndividuals	EstimateTypeCode	SourceCode	ObservationType	Status	ValidationFlags	LocationKey	Description	Latitude GDA94	Longitude GDA94	Zone	Easting	Northing	Accuracy	SightingNotes	LocationNotes
Gulthul Fauna Survey 2	SPXE00157882	2143	Fauna	Reptilia	Pygopodidae	670	Aprasia inaurita		Mallee Worm-lizard	E1,P			10060	15/03/1996	15/03/1996	1		4	T	Valid and accepted without modification		LPXEI0155704	Crest of dune 1km N of gate on Moonlight Lake Road, dense whipstick mallee to 4m over Spinifex, Gulthul(4-WRBIO) Specified Map No: 7429	-34.2389316	142.9232493	54	677121	6209678	100		
Birdlife Australia - Atlas Record Forms	B07396767	7	Fauna	Aves	Megapodiidae	1729	Leipoa ocellata		Malleefowl	E1,P	V		10459	29/10/2000 11:15	29/10/2000 17:00			4	O	Valid and accepted without modification		BL-739676	Werrimble Downs Station	-34.41639	143.01472	54	685156	6189834	100	None	
DPIE Data from Scientific Licences dataset	SXRI1025096	2	Fauna	Aves	Megapodiidae	1729	Leipoa ocellata		Malleefowl	E1,P	V		10459	12/03/2015	12/03/2015	1		4	O	Valid and accepted without modification		LXRI0082391	51km NE of Euston	-34.17155094	143.0155847	54	685811	6216886	20		Prungle Station
Gulthul Fauna Survey	SPXE00156602	7	Fauna	Aves	Megapodiidae	1729	Leipoa ocellata		Malleefowl	E1,P	V		10459	16/11/1994	16/11/1994	1		4	E	Valid and accepted without modification		LPXEI0155704	Crest of dune 1km N of gate on Moonlight Lake Road, dense whipstick mallee to 4m over Spinifex, Gulthul(4-WRBIO) Specified Map No: 7429	-34.2389316	142.9232493	54	677121	6209678	100		
Gulthul Fauna Survey	SPXE00156598	231	Fauna	Aves	Accipitridae	2137	Hamirostra melanosternon		Black-breasted Buzzard	V,P,3		3	10395	9/11/1994	9/11/1994	1		4	O	Valid and accepted without modification		LPXEI0155704	Crest of dune 1km N of gate on Moonlight Lake Road, dense whipstick mallee to 4m over Spinifex, Gulthul(4-WRBIO) Specified Map No: 7429	-34.2389316	142.9232493	54	677121	6209678	100		
Birdlife Australia - Atlas Record Forms	B07396821238	238	Fauna	Aves	Falconidae	2157	Falco subniger		Black Falcon	V,P			20269	1/07/2001 11:30	1/07/2001 12:30			4	O	Valid and accepted without modification		BL-739681	Werrimble Downs Station	-34.4148807	143.0160122	54	685278	6189999	100	None	
Birdlife Australia - Birdata (2004 - 2016)	B1105582238	238	Fauna	Aves	Falconidae	2157	Falco subniger		Black Falcon	V,P			20269	3/11/1999 3:00	8/11/1999 3:00	2		4	O	Valid and accepted without modification		BL-1105582	Prungle- shearers' sheds	-34.24556	142.99778	54	683972	6208811	10	None	
Birdlife Australia - Atlas Record Forms	B0727462270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	14/06/1999 10:15	14/06/1999 10:35			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.54	142.99	54	682614	6176169	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0739674270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	30/09/2000 9:30	30/09/2000 11:00			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.41	143.02	54	685656	6190533	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0739675270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	29/10/2000 10:00	29/10/2000 11:00			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.41	143.02	54	685656	6190533	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0739677270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	21/01/2001 9:00	21/01/2001 10:10			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.41	143.02	54	685656	6190533	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0739679270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	5/05/2001 10:00	5/05/2001 11:00			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.41	143.02	54	685656	6190533	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0739682270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	4/08/2001 10:15	4/08/2001 11:45			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.41	143.02	54	685656	6190533	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0739683270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	2/12/2001 18:00	2/12/2001 19:30			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.41	143.02	54	685656	6190533	100	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Birdata (2004 - 2016)	B1109195270	270	Fauna	Aves	Cacatuidae	2411	Lophochroa leadbeateri		Major Mitchell's Cockatoo	V,P,2		2^^	10116	8/09/2006 16:37	8/09/2006 16:57			4	O	Valid and accepted without modification		Withheld	Location Description withheld	-34.27	143.02	54	685965	6206060	10	Sighting Notes withheld	Location Notes withheld
Birdlife Australia - Atlas Record Forms	B0725409278	709	Fauna	Aves	Psittacidae	2519	Polytelis anthopeplus monarchoides		Regent Parrot (eastern subspecies)	E1,P,3	V	3	10644	22/10/2000 7:15	22/10/2000 9:15			4	O	Valid and accepted without modification		BL-725409	Tapra Station	-34.57778	143.00027	54	683474	6171960	100	None	
Birdlife Australia - Atlas Record Forms	B1076643278	709	Fauna	Aves	Psittacidae	2519	Polytelis anthopeplus monarchoides		Regent Parrot (eastern subspecies)	E1,P,3	V	3	10644	9/05/2007 10:00	9/05/2007 10:00	8		4	O	Valid and accepted without modification		BL-1076643	Euston	-34.25	143.01667	54	685702	6208284	500	None	
Birdlife Australia - Birdata (2004 - 2016)	B1016354278	709	Fauna	Aves	Psittacidae	2519	Polytelis anthopeplus monarchoides		Regent Parrot (eastern subspecies)	E1,P,3	V	3	10644	13/10/2006 10:53	13/10/2006 12:42	2		4	O	Valid and accepted without modification		BL-1016354	Tillara - Site 2	-34.60611	142.99583	54	683004	6168826	10	None	
DPIE Default Sightings	SMIT16120102	709	Fauna	Aves	Psittacidae	2519	Polytelis anthopeplus monarchoides		Regent Parrot (eastern subspecies)	E1,P,3	V	3	10644	29/11/2016 12:00	29/11/2016 12:00	5	X	4	O	Valid and accepted without modification		LMIT16120101	Sturt Highway	-34.52843338	142.9353909	54	677627	6177549	50	Flying north across highway	
DPIE Default Sightings	SPMC01012908	709	Fauna	Aves	Psittacidae	2519	Polytelis anthopeplus monarchoides		Regent Parrot (eastern subspecies)	E1,P,3	V	3	10644	22/10/2000	22/10/2000	12	X	4	O	Valid and accepted without modification		LPMC01012908	26 km east of Euston Specified Map No: 7428	-34.57907723	142.9990103	54	683356	6171818	100		
Gulthul Fauna Survey	SPXE00156607	602	Fauna	Aves	Meliphagidae	2942	Certhionyx variegatus		Pied Honeyeater	V,P			10156	10/11/1994	10/11/1994	1		4	O	Valid and accepted without modification		LPXEI0155704	Crest of dune 1km N of gate on Moonlight Lake Road, dense whipstick mallee to 4m over Spinifex, Gulthul(4-WRBIO) Specified Map No: 7429	-34.2389316	142.9232493	54	677121	6209678	100		
Birdlife Australia - Atlas Record Forms	B0739676448	448	Fauna	Aves	Meliphagidae	2951	Epthianura albifrons		White-fronted Chat	V,P			20143	29/10/2000 11:15	29/10/2000 17:00			4	O	Valid and accepted without modification		BL-739676	Werrimble Downs Station	-34.41639	143.01472	54	685156	6189834	100	None	
Gulthul Fauna Survey	SPXE00156668	448	Fauna	Aves	Meliphagidae	2951	Epthianura albifrons		White-fronted Chat	V,P			20143	10/11/1994	10/11/1994	2		4	O	Valid and accepted without modification		LPXEI0155790	moonlight lake gulthul(69-WRBIO) Specified Map No: 7429	-34.19532474	142.943961	54	679121	6214478	100		
Birdlife Australia - Atlas Record Forms	B0725409437	437	Fauna	Aves	Psophodidae	3129	Cinclosoma castanotum		Chestnut Quail-thrush	V,P			10168	22/10/2000 7:15	22/10/2000 9:15			4	O	Valid and accepted without modification		BL-725409	Tapra Station	-34.57778	143.00027	54	683474	6171960	100	None	
Birdlife Australia - Atlas Record Forms	B0732972437	437	Fauna	Aves	Psophodidae	3129	Cinclosoma castanotum		Chestnut Quail-thrush	V,P			10168	21/11/1999 15:36	21/11/1999 15:56			4	O	Valid and accepted without modification		BL-732972	Arumpo Road	-34.23627016	142.9890598	54	683189	6209857	100	Nonspecific breeding activity	
DPIE Default Sightings	SPMC01012909	437	Fauna	Aves	Psophodidae	3129	Cinclosoma castanotum		Chestnut Quail-thrush	V,P			10168	22/10/2000	22/10/2000	1	X	4	O	Valid and accepted without modification		LPMC01012908	26 km east of Euston Specified Map No: 7428	-34.57907723	142.9990103	54	683356	6171818	100		
Birdlife Australia - Birdata (2004 - 2016)	B1016354549	549	Fauna	Aves	Neosittidae	3141	Daphoenositta chrysoptera		Varied Sittella	V,P			20135	13/10/2006 10:53	13/10/2006 12:42			4	O	Valid and accepted without modification		BL-1016354	Tillara - Site 2	-34.60611	142.99583	54	683004	6168826	10	None	
Birdlife Australia - Atlas Record Forms	B0732967547	8519	Fauna	Aves	Artamidae	3232	Artamus cyanopterus cyanopterus		Dusky Woodswallow	V,P			20303	21/11/1999 16:05	21/11/1999 16:25			4	O	Valid and accepted without modification		BL-732967	Arumpo Road	-34.32710045	143.0037908	54	684347	6199757	100	None	
Birdlife Australia - Atlas Record Forms	B0739683547	8519	Fauna	Aves	Artamidae	3232	Artamus cyanopterus cyanopterus		Dusky Woodswallow	V,P			20303	2/12/2001 18:00	2/12/2001 19:30			4	O	Valid and accepted without modification		BL-739683	Werrimble Downs Station	-34.4148807	143.0160122	54	685278	6189999	100	Nonspecific breeding activity	
Birdlife Australia - Atlas Record Forms	B0725409385	8367	Fauna	Aves	Petroicidae	3395	Melanodryas cucullata cucullata		Hooded Robin (south-eastern form)	V,P			10519	22/10/2000 7:15	22/10/2000 9:15			4	O	Valid and accepted without modification		BL-725409	Tapra Station	-34.57778	143.00027	54	683474	6171960	100	None	
Gulthul Fauna Survey 2	SPXE00157830	8367	Fauna	Aves	Petroicidae	3395	Melanodryas cucullata cucullata		Hooded Robin (south-eastern form)	V,P			10519	18/03/1996	18/03/1996	1		4	O	Valid and accepted without modification		LPXEI0156949	OPPOSITE SITE 3 ,GULTHUL(1250- WRBIO) Specified Map No: 7429	-34.24075132	142.922205	54	677021	6209478	100		
DPIE Data from Scientific Licences dataset	SXRI1024907	1352	Fauna	Mammalia	Vespertilionidae	3975	Chalinolobus picatus		Little Pied Bat	V,P			10159	5/02/2015	5/02/2015	4		4	U	Valid and accepted without modification		LXRI0082387	47km NE of Euston	-34.19299262	142.9811106	54	682550	6214671	20		Prungle Station
Gulthul Fauna Survey 2	SPXE00157871	T315	Fauna	Mammalia	Vespertilionidae	3988	Nyctophilus corbeni		Corben's Long-eared Bat	V,P	V		10568	18/03/1996	18/03/1996	1		4	T	Valid and accepted without modification		LPXEI0155704	Crest of dune 1km N of gate on Moonlight Lake Road, dense whipstick mallee to 4m over Spinifex, Gulthul(4-WRBIO) Specified Map No: 7429	-34.2389316	142.9232493	54	677121	6209678	100		
DPIE Data from Scientific Licences dataset	SDMP00073500	5869	Flora	Flora	Santalaceae	17811	Santalum murrayanum		Bitter Quandong	E1			10742	13/06/2002	13/06/2002	1		4	L	Valid and accepted without modification		LDMP00068466	Mylatchie Station	-34.46744815	143.192465	54	701371	6183831	100	single tree growing on the dune crest	
DPIE Default Sightings	SLHP00078856	5869	Flora	Flora	Santalaceae	17811	Santalum murrayanum		Bitter Quandong	E1			10742	12/10/2021	12/10/2021			4	L	Valid and accepted without modification		LLHP00022969	flora survey site KWSP117N along the alignment of the Transgrid Powerline between Gol Gol and Balranald	-34.51027778	142.7875	54	664088	6179813	10		
DPIE Default Sightings	SPXE0901141V	5869	Flora	Flora	Santalaceae	17811	Santalum murrayanum		Bitter Quandong	E1			10742	29/10/2008	29/10/2008	1		4	L	Valid and accepted without modification		LPXE0901140F	'Mendook' PVP Reserve	-34.5029421	142.7843878	54	663816	6180631	100		
DPIE Default Sightings	SPXE0901141W	5869	Flora	Flora	Santalaceae	17811	Santalum murrayanum		Bitter Quandong	E1			10742	30/10/2008	30/10/2008	1		4	L	Valid and accepted without modification		LPXE0901140G	'Oakdale' SMR	-34.44299625	142.8158388	54	666823	6187228	100		
DPIE Default Sightings	SPXE1001290O	5869	Flora	Flora	Santalaceae	17811	Santalum murrayanum		Bitter Quandong	E1			10742	28/01/2010	28/01/2010	4		4	L	Valid and accepted without modification		LPXE1001290O	'Mendook' - Remnants of old channel (rest of vegetation cleared)	-34.46863319	142.8361754	54	668640	6184351	100	4 trees (and 1 eucalypt) retained after clearing without approval (PVP)	
SLUITER Vegetation Survey	SPJGI7S1667	5898	Flora	Flora	Santalaceae	17811	Santalum murrayanum		Bitter Quandong	E1			10742	12/10/2021	12/10/2021			4	J	Valid and accepted without modification		LPJGI0723741	Transgrid alignment from Gol Gol to Balranald	-34.51027778	142.7875	54	664088	6179813	10		
DPIE Default Sightings	SLHP00078852	7792	Flora	Flora	Thymelaeaceae	18470	Pimelea serpyllifolia subsp. serpyllifolia		Thyme Rice-Flower	E1			10631	12/10/2021	12/10/2021			4	L	Valid and accepted without modification		LLHP00022965	flora survey site KWSP106N along the alignment of the Transgrid Powerline between Gol Gol and Balranald	-34.505	142.7363889	54	659405	6180480	10		
DPIE Default Sightings	SLHP00078853	7792	Flora	Flora	Thymelaeaceae	18470	Pimelea serpyllifolia subsp. serpyllifolia		Thyme Rice-Flower	E1			10631	12/10/2021	12/10/2021			4	L	Valid and accepted without modification		LLHP00022966	flora survey site KWSP107N along the alignment of the Transgrid Powerline between Gol Gol and Balranald	-34.50472222	142.7366667	54	659431	6180510	10		
SLUITER Vegetation Survey	SPJGI7483353	7792	Flora	Flora	Thymelaeaceae	18470	Pimelea serpyllifolia subsp. serpyllifolia		Thyme Rice-Flower	E1			10631	12/10/2021	12/10/2021			4	J	Valid and accepted without modification		LPJGI0723658	Transgrid alignment from Gol Gol to Balranald	-34.505	142.7363889	54	659405	6180480	10		
SLUITER Vegetation Survey	SPJGI7485B15	7792	Flora	Flora	Thymelaeaceae	18470	Pimelea serpyllifolia subsp. serpyllifolia		Thyme Rice-Flower	E1			10631	12/10/2021	12/10/2021			4	J	Valid and accepted without modification		LPJGI0723733	Transgrid alignment from Gol Gol to Balranald	-34.505	142.7361111	54	659380	6180480	10		

Kingdom	Class	Scientific name	Common name	BC Act listing	EPBC Act listing	SAII?	Class of credit
Animalia	Amphibia	Litoria raniformis	Southern Bell Frog	Endangered	Vulnerable	No	Species
Animalia	Amphibia	Neobatrachus pictus	Painted Burrowing Frog	Endangered	-	No	Species
Animalia	Aves	Amytornis modestus inexpectatus	Thick-billed Grasswren (central NSW subspecies)	Extinct	-	Yes	Species
Animalia	Aves	Amytornis modestus obscurior	Thick-billed Grasswren (north-west NSW subspecies)	Critically Endangered	Critically Endangered	Yes	Species
Animalia	Aves	Amytornis striatus striatus	Amytornis striatus striatus	Critically Endangered	-	Yes	Species
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	-	No	Ecosystem
Animalia	Aves	Ardeotis australis	Australian Bustard	Endangered	-	No	Species
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	-	No	Ecosystem
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered	No	Ecosystem
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	-	No	Species
Animalia	Aves	Calidris alba	Sanderling	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Calidris ferruginea	Curlew Sandpiper	Endangered	Critically Endangered	Yes	Species/Ecosystem
Animalia	Aves	Calidris tenuirostris	Great Knot	Vulnerable	Critically Endangered	Yes	Species/Ecosystem
Animalia	Aves	Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (inland subspecies)	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Vulnerable	Vulnerable	No	Species/Ecosystem
Animalia	Aves	Certhionyx variegatus	Pied Honeyeater	Vulnerable	-	No	Ecosystem
Animalia	Aves	Charadrius mongolus	Lesser Sand-plover	Vulnerable	Endangered	No	Species/Ecosystem
Animalia	Aves	Cinclosoma castanotum	Chestnut Quail-thrush	Vulnerable	-	No	Ecosystem
Animalia	Aves	Circus assimilis	Spotted Harrier	Vulnerable	-	No	Ecosystem
Animalia	Aves	Climacteris affinis - endangered population	White-browed Treecreeper population in Carrathool local government area south of the Lachlan River and Griffith local government area	Endangered	-	No	Species
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	-	No	Ecosystem
Animalia	Aves	Drymodes brunneopygia	Southern Scrub-robin	Vulnerable	-	No	Ecosystem
Animalia	Aves	Epthianura albifrons	White-fronted Chat	Vulnerable	-	No	Ecosystem
Animalia	Aves	Falco hypoleucos	Grey Falcon	Vulnerable	Vulnerable	No	Ecosystem
Animalia	Aves	Falco subniger	Black Falcon	Vulnerable	-	No	Ecosystem
Animalia	Aves	Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	Critically Endangered	Vulnerable	Yes	Species
Animalia	Aves	Glossopsitta porphyrocephala	Purple-crowned Lorikeet	Vulnerable	-	No	Ecosystem
Animalia	Aves	Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable	No	Ecosystem
Animalia	Aves	Grus rubicunda	Brolga	Vulnerable	-	No	Ecosystem
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	-	Vulnerable	No	Ecosystem
Animalia	Aves	Hylacola cautus	Shy Heathwren	Vulnerable	-	No	Ecosystem
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Critically Endangered	Yes	Species/Ecosystem
Animalia	Aves	Leipoa ocellata	Malleefowl	Endangered	Vulnerable	No	Ecosystem
Animalia	Aves	Lichenostomus cratitius	Purple-gaped Honeyeater	Vulnerable	-	No	Ecosystem
Animalia	Aves	Limosa limosa	Black-tailed Godwit	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Lophochroa leadbeateri	Major Mitchell's Cockatoo	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Manorina melanotis	Black-eared Miner	Critically Endangered	Endangered	Yes	Species
Animalia	Aves	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	-	No	Ecosystem
Animalia	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	-	No	Ecosystem
Animalia	Aves	Neophema splendida	Scarlet-chested Parrot	Vulnerable	-	No	Ecosystem
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	-	No	Species/Ecosystem
Animalia	Aves	Oxyura australis	Blue-billed Duck	Vulnerable	-	No	Ecosystem
Animalia	Aves	Pachycephala inornata	Gilbert's Whistler	Vulnerable	-	No	Ecosystem
Animalia	Aves	Pachycephala rufogularis	Red-lored Whistler	Critically Endangered	Vulnerable	Yes	Species
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	-	No	Ecosystem
Animalia	Aves	Phaps histrionica	Flock Bronzewing	Endangered	-	No	Ecosystem
Animalia	Aves	Polytelis anthopeplus monarchoides	Regent Parrot (eastern subspecies)	Endangered	Vulnerable	No	Species/Ecosystem
Animalia	Aves	Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	No	Species/Ecosystem
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	-	No	Ecosystem
Animalia	Aves	Pyrrholaemus brunneus	Redthroat	Vulnerable	-	No	Ecosystem
Animalia	Aves	Rostratula australis	Australian Painted Snipe	Endangered	Endangered	No	Ecosystem
Animalia	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable	-	No	Ecosystem
Animalia	Aves	Stictonetta naevosa	Freckled Duck	Vulnerable	-	No	Ecosystem
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	-	No	Species/Ecosystem
Animalia	Mammalia	Antechinomys laniger	Kultarr	Endangered	-	No	Ecosystem
Animalia	Mammalia	Cercartetus concinnus	Western Pygmy Possum	Endangered	-	No	Ecosystem
Animalia	Mammalia	Chalinolobus picatus	Little Pied Bat	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Lasiorhinus latifrons	Southern Hairy-nosed Wombat	Endangered	-	No	Species
Animalia	Mammalia	Leggadina forresti	Forrest's Mouse	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	-	No	Species
Animalia	Mammalia	Ningaui yvonneae	Southern Ningaui	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Notomys fuscus	Dusky Hopping-mouse	Endangered	Vulnerable	No	Ecosystem
Animalia	Mammalia	Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable	No	Ecosystem
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	-	No	Species
Animalia	Mammalia	Petaurus norfolcensis - endangered population	Squirrel Glider in the Wagga Wagga Local Government Area	Endangered	-	No	Species
Animalia	Mammalia	Petrogale xanthopus	Yellow-footed Rock-wallaby	Endangered	Vulnerable	Yes	Species
Animalia	Mammalia	Phascolarctos cinereus	Koala	Endangered	Endangered	No	Species
Animalia	Mammalia	Pseudomys bolami	Bolam's Mouse	Endangered	-	No	Ecosystem
Animalia	Mammalia	Pseudomys desertor	Desert Mouse	Critically Endangered	-	Yes	Species
Animalia	Mammalia	Pseudomys hermannsburgensis	Sandy Inland Mouse	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Rattus villosissimus	Long-haired Rat	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Sminthopsis macroura	Stripe-faced Dunnart	Vulnerable	-	No	Ecosystem
Animalia	Mammalia	Vespadelus baverstocki	Inland Forest Bat	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Anomalopus mackayi	Five-clawed Worm-skink	Endangered	Vulnerable	No	Ecosystem
Animalia	Reptilia	Antaresia stimsoni	Stimson's Python	Vulnerable	-	No	Species
Animalia	Reptilia	Aprasia inaurita	Mallee Worm-lizard	Endangered	-	No	Ecosystem
Animalia	Reptilia	Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable	Vulnerable	No	Species
Animalia	Reptilia	Aspidites ramsayi	Woma	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Ctenotus brooksi	Wedgesnout Ctenotus	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Ctenotus pantherinus ocellifer	Leopard Ctenotus	Endangered	-	No	Species
Animalia	Reptilia	Cyclodomorphus melanops elongatus	Mallee Slender Blue-tongue Lizard	Endangered	-	No	Ecosystem
Animalia	Reptilia	Delma australis	Marble-faced Delma	Endangered	-	No	Ecosystem
Animalia	Reptilia	Demansia rimicola	a whip snake	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Diplodactylus platyurus	Eastern Fat-tailed Gecko	Endangered	-	No	Species
Animalia	Reptilia	Echiopsis curta	Bardick	Endangered	-	No	Ecosystem
Animalia	Reptilia	Lerista xanthura	Yellow-tailed Plain Slider	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Lucasium stenodactylum	Crowned Gecko	Vulnerable	-	No	Species
Animalia	Reptilia	Pseudonaja modesta	Ringed Brown Snake	Endangered	-	No	Ecosystem
Animalia	Reptilia	Ramphotyphlops endoterus	Interior Blind Snake	Endangered	-	No	Ecosystem
Animalia	Reptilia	Simoselaps fasciolatus	Narrow-banded Snake	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Strophurus elderi	Jewelled Gecko	Vulnerable	-	No	Ecosystem
Animalia	Reptilia	Tiliqua occipitalis	Western Blue-tongued Lizard	Vulnerable	-	No	Ecosystem
Communit	Community	Acacia loderi shrublands	Acacia loderi shrublands	Endangered	-	No	Community

Kingdom	Class	Scientific name	Common name	BC Act listing	EPBC Act listing	SAII?	Class of credit
Communit	Community	Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Endangered	-	No	Community
Communit	Community	Artesian Springs Ecological Community in the Great Artesian Basin	Artesian Springs Ecological Community in the Great Artesian Basin	Critically Endangered	-	Yes	Community
Communit	Community	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered	-	No	Community
Communit	Community	Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	-	Critically Endangered	No	Community
Communit	Community	Porcupine Grass, Red Mallee, Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion	Porcupine Grass, Red Mallee, Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion	Critically Endangered	-	Yes	Community
Plantae	Flora	Acacia acanthoclada	Harrow Wattle	Endangered	-	No	Species
Plantae	Flora	Acacia carneorum	Purple-wood Wattle	Vulnerable	Vulnerable	Yes	Species
Plantae	Flora	Acacia notabilis	Mallee Golden Wattle	Endangered	-	No	Species
Plantae	Flora	Acanthocladium dockeri	Spiny Everlasting	Extinct	Critically Endangered	No	Species
Plantae	Flora	Amphibromus fluitans	Floating Swamp Wallaby-grass	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Atriplex infrequens	A saltbush	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Austrostipa metatoris	A spear-grass	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Brachyscome papillosa	Mossgiel Daisy	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Calotis moorei	A burr-daisy	Endangered	Endangered	Yes	Species
Plantae	Flora	Casuarina obesa	Swamp She-oak	Endangered	-	Yes	Species
Plantae	Flora	Convolvulus tedmoorei	Bindweed	Endangered	-	Yes	Species
Plantae	Flora	Cratystylis conocephala	Bluebush Daisy	Endangered	-	No	Species
Plantae	Flora	Crotalaria cunninghamii	Green Bird Flower	Endangered	-	Yes	Species
Plantae	Flora	Dentella minutissima	Dentella minutissima	Endangered	-	No	Species
Plantae	Flora	Dodonaea sinuolata subsp. acrodentata	A Hopbush	Endangered	-	Yes	Species
Plantae	Flora	Dodonaea stenozyga	Desert Hopbush	Critically Endangered	-	Yes	Species
Plantae	Flora	Dysphania plantaginella	Dysphania plantaginella	Endangered	-	Yes	Species
Plantae	Flora	Eleocharis obicis	Spike-Rush	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Eriocaulon australasicum	Austral Pipewort	Endangered	Endangered	Yes	Species
Plantae	Flora	Eucalyptus leucoxylon subsp. pruinosa	Yellow Gum	Vulnerable	-	No	Species
Plantae	Flora	Goodenia occidentalis	Western Goodenia	Endangered	-	Yes	Species
Plantae	Flora	Grevillea ilicifolia subsp. ilicifolia	Holly-leaf Grevillea	Critically Endangered	-	Yes	Species
Plantae	Flora	Ipomoea diamantinensis	Desert Cow-Vine	Endangered	-	Yes	Species
Plantae	Flora	Ipomoea polymorpha	Silky Cow-Vine	Endangered	-	Yes	Species
Plantae	Flora	Kippistia suaedifolia	Fleshy Minuria	Endangered	-	Yes	Species
Plantae	Flora	Lasiopetalum behrii	Pink Velvet Bush	Critically Endangered	-	Yes	Species
Plantae	Flora	Lepidium aschersonii	Spiny Peppercress	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Lepidium monoplocoides	Winged Peppercress	Endangered	Endangered	No	Species
Plantae	Flora	Leptorhynchos waitzia	Button Immortelle	Endangered	-	Yes	Species
Plantae	Flora	Pilularia novae-hollandiae	Austral Pillwort	Endangered	-	Yes	Species
Plantae	Flora	Pimelea elongata	Rice Flower	Endangered	-	No	Species
Plantae	Flora	Pimelea serpyllifolia subsp. serpyllifolia	Thyme Rice-Flower	Endangered	-	Yes	Species
Plantae	Flora	Pterostylis cobarensis	Greenhood Orchid	Vulnerable	-	No	Species
Plantae	Flora	Santalum murrayanum	Bitter Quandong	Endangered	-	No	Species
Plantae	Flora	Scaevola collaris	Fan Flower	Endangered	-	Yes	Species
Plantae	Flora	Sida rohlenae	Shrub Sida	Endangered	-	No	Species
Plantae	Flora	Solanum karsense	Menindee Nightshade	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Swainsona adenophylla	Violet Swainson-Pea	Endangered	-	Yes	Species
Plantae	Flora	Swainsona colutoides	Bladder Senna	Endangered	-	No	Species
Plantae	Flora	Swainsona flavicarinata	Yellow-Keeled Swainsona	Endangered	-	Yes	Species
Plantae	Flora	Swainsona murrayana	Slender Darling Pea	Vulnerable	Vulnerable	No	Species
Plantae	Flora	Swainsona pyrophila	Yellow Swainson-pea	Vulnerable	Vulnerable	No	Species

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Listed Threatened Species [Resource Information]

Species ID	Scientific Name	Common Name	Class	Simple Presence	Presence Text	Threatened Category	Migratory Status	Migratory Category	Marine Status	Cetacean Status	Website
906	*Pedionomus torquatus*	Plains-wanderer	Bird	May	Species or species	Critically Endangered					Species Profile and
744	*Lathamus discolor*	Swift Parrot	Bird	May	Species or species	Critically Endangered			Listed - overfly marine		Species Profile and
856	*Calidris ferruginea*	Curlew Sandpiper	Bird	May	Species or species	Critically Endangered	Migratory	Migratory Wetlands	Listed - overfly marine		Species Profile and
1001	*Botaurus poiciloptilus*	Australasian Bittern	Bird	May	Species or species	Endangered					Species Profile and
59350	*Pezoporus occidentalis*	Night Parrot	Bird	May	Species or species	Endangered					Species Profile and
77037	*Rostratula australis*	Australian Painted Snipe	Bird	Likely	Species or species	Endangered			Listed - overfly marine		Species Profile and
67093	*Melanodryas cucullata cucullata*	South-eastern Hooded Robin,	Bird	Likely	Species or species	Endangered					Species Profile and
91648	*Amytornis striatus howei*	Murray Mallee Striated	Bird	May	Species or species	Endangered					Species Profile and
449	*Manorina melanotis*	Black-eared Miner	Bird	May	Species or species	Endangered					Species Profile and
82926	*Lophochroa leadbeateri leadbeateri*	Major Mitchell's Cockatoo	Bird	Known	Species or species	Endangered					Species Profile and
726	*Neophema chrysostoma*	Blue-winged Parrot	Bird	Known	Species or species	Vulnerable			Listed - overfly marine		Species Profile and
929	*Falco hypoleucos*	Grey Falcon	Bird	Likely	Species or species	Vulnerable					Species Profile and
470	*Grantiella picta*	Painted Honeyeater	Bird	May	Species or species	Vulnerable					Species Profile and
59398	*Stagonopleura guttata*	Diamond Firetail	Bird	May	Species or species	Vulnerable					Species Profile and
59612	*Polytelis anthopeplus monarchoides*	Regent Parrot (eastern)	Bird	Likely	Breeding likely to occur	Vulnerable					Species Profile and
529	*Aphelocephala leucopsis*	Southern Whiteface	Bird	Known	Species or species	Vulnerable					Species Profile and
934	*Leipoa ocellata*	Malleefowl	Bird	Known	Species or species	Vulnerable					Species Profile and

Appendix B

Likelihood of threatened MNES occurrence

EMM
creating opportunities

Taxa	Scientific name	Common name	Source	Status				Habitat	Likelihood of occurrence
				FM Act	BC Act	EPBC Act	EPBC Mi		
Birds	*Pedionomus torquatus*	Plains-wanderer	PMST		Endangered	Critically Endangered		Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.;1|Habitat structure appears to play a more important role than plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses.;3|Most of the grassland habitat of the Plains-wanderer is <5 cm high, but some vegetation up to a maximum of 30 cm is important for concealment, as long as grass tussocks are spaced 10-20 cm apart.;4|During prolonged drought, the denudation of preferred habitats may force birds into marginal denser and taller grassland habitats that become temporarily suitable.;5|The average home range of a single bird is about 12 ha. Breeding pairs have overlapping home ranges that total approximately 18 ha.;6|The Plains-wanderer is a ground-dwelling grassland bird, which is cryptic and very difficult to observe during the day. Graziers have seen Plains-wanderers during the day when mustering sheep. The species can only be properly surveyed at night using spotlighting techinques.;7|	Nil
Birds	*Lathamus discolor*	Swift Parrot	PMST, PCT associations		Endangered	Critically Endangered		Migrates to the Australian south-east mainland between February and October.;1|On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.;2|Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Forest Red Gum E. tereticornis, Mugga Ironbark E. sideroxylon, and White Box E. albens.;3|Commonly used lerp infested trees include Inland Grey Box E. microcarpa, Grey Box E. moluccana, Blackbutt E. pilularis, and Yellow Box E. melliodora.;4|Return to some foraging sites on a cyclic basis depending on food availability.;5|Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus.;6|	Nil
Fish	*Galaxias rostratus*	Flathead Galaxias	PMST	Critically Endangered	-	Critically Endangered		Flathead Galaxias is known from the southern part of the Murray Darling Basin. They have been recorded in the Macquarie, Lachlan, Murrumbidgee and Murray Rivers in NSW. Despite extensive scientific sampling over the past 15 years there have been very few recorded sightings of Flathead Galaxias. They have not been recorded and are considered locally extinct in the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers.	Nil
Birds	*Calidris ferruginea*	Curlew Sandpiper	PMST		Endangered	Critically Endangered	Mi	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.;1|It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.;2|It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.;3|It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.;4|Curlew Sandpipers are omnivorous, feeding on worms, molluscs, crustaceans, insects and some seeds.;5|Birds breed at 2 years of age and the oldest recorded bird is 19 years old. Most birds caught in Australia are between 3 and 5 years old.;6|	Nil
Fish	*Bidyanus bidyanus*	Silver Perch	PMST	Vulnerable	-	Critically Endangered		Silver perch are consistently reported by anglers and researchers to show a general preference for faster-flowing water, including rapids and races, and more open sections of river, throughout the Murray-Darling Basin (Clunie and Koehn, 2001). In the upper Murrumbidgee River during the 1960s and 1970s, the species was renowned for migrating into clear fast-flowing rapids in summer, in which anglers observed and targeted them	Nil
Birds	*Botaurus poiciloptilus*	Australasian Bittern	PMST, PCT associations		Endangered	Endangered		Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.).;1|Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails.;2|Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.;3|Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch.;4|	Low

Taxa	Scientific name	Common name	Source	Status				Habitat	Likelihood of occurrence
				FM Act	BC Act	EPBC Act	EPBC Mi		
Mammals	*Phascolarctos cinereus*	Koala	PMST		Endangered	Endangered		Inhabit eucalypt woodlands and forests.;1|Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.;2|Inactive for most of the day, feeding and moving mostly at night.;3|Spend most of their time in trees, but will descend and traverse open ground to move between trees.;4|Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.;5|Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.;6|Females breed at two years of age and produce one young per year.;7|	Nil
Herbs and Forbs	*Lepidium monoplocoides*	Winged Peppercress	PMST		Endangered	Endangered		Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by Allocasuarina luehmannii (Bulloak) and/or eucalypts, particularly Eucalyptus largiflorens (Black Box) or Eucalyptus populnea (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses.;1|Recorded in a wetland-grassland community comprising Eragrostis australasicus, Agrostis avenacea, Austrodanthonia duttoniana, Homopholis proluta, Myriophyllum crispatum, Utricularia dichotoma and Pycnosorus globosus, on waterlogged grey-brown clay. Also recorded from a Maireana pyramidata shrubland.;2|Flowers from late winter to spring, or August to October.;3|The species is highly dependent on seasonal conditions. Occurs in periodically flooded and waterlogged habitats and does not tolerate grazing disturbance.;4|The number of plants at each site varies greatly with seasonal conditions, but sites tend to be small in area with local concentrations of the plant. Has been recorded as uncommon to locally common with hundreds of plants at sites.;5|	Low
Birds	*Pezoporus occidentalis*	Night Parrot	PMST		Extinct	Endangered		Most habitat records are of Triodia (Spinifex) grasslands and/or chenopod shrublands (Garnet	Nil
Fish	*Craterocephalus fluviatilis*	Murray Hardyhead	PMST	Critically Endangered	-	Endangered		The Murray hardyhead is endemic to the lowland reaches of the Murray and Murrumbidgee rivers and their tributaries, floodplain billabongs and lakes. The species formerly was abundant from Lake Alexandrina, near the mouth of the Murray River, to as far upstream as Yarrawonga on the Murray and Narrandera on the Murrumbidgee River	Moderate
Birds	*Rostratula australis*	Australian Painted Snipe	PMST		Endangered	Endangered		Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.;1|Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.;2|The nest consists of a scrape in the ground, lined with grasses and leaves.;3|Breeding is often in response to local conditions; generally occurs from September to December. Incubation and care of young is all undertaken by the male only.;4|Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.;5|	Nil
Birds	*Melanodryas cucullata cucullata*	Hooded Robin (south-eastern form)	PMST, Bionet		Vulnerable	Endangered		Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.;1|Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.;2|Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey.;3|Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season.;4|May breed any time between July and November, often rearing several broods.;5|The nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground.;6|The nest is defended by both sexes with displays of injury-feigning, tumbling across the ground.;7|A clutch of two to three is laid and incubated for fourteen days by the female. Two females often cooperate in brooding.;8|	Moderate
Fish	*Macquaria australasica*	Macquarie Perch	PMST	Endangered	Endangered	Endangered		Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments.	Nil
Birds	*Amytornis striatus howei*	Murray Mallee Striated Grasswren	PMST		Endangered	Endangered		The habitat of Murray Mallee striated grasswren is sandplains dominated by mature spinifex (	Moderate

Taxa	Scientific name	Common name	Source	Status				Habitat	Likelihood of occurrence
				FM Act	BC Act	EPBC Act	EPBC Mi		
Birds	*Manorina melanotis*	Black-eared Miner	PMST, PCT associations		Critically Endangered	Endangered		Birds are restricted to large tracts (30,000 hectares or greater) of mature, unfragmented mallee on the more fertile soils.;1|Occupies vegetation with a post fire age of greater than 25 years, but is most abundant in areas with a post fire age of 50 years or more.;2|Their diet consists of arthropods (including grasshoppers, bugs, lerps, beetles, weevils, flies, caterpillars, bees, wasps, ants, and spiders) obtained by gleaning and probing loose and hanging bark of mallee trunks. The diet also includes nectar, pollen, plant material, seeds and fruit.;3|They breed communally in groups of between eight and 40 birds and use a cup-shaped nest constructed from grasses and sticks within mallee eucalypts located in a fork or mistletoe clump. Breeding appears to be opportunistic and may occur whenever conditions are suitable, but is most often recorded between September and December.;4|Groups persist throughout the year, though may feed in smaller groups or singly. Much shyer than other species of miners, feeding quietly and mainly calling only in the breeding season. Will sometimes approach observers briefly but usually flies away from observers and difficult to view.;5|Hybrids can be difficult to separate in the field, and 'pure' Black-eared Miners may only be identifiable after the bird is captured.;6|	Low
Birds	*Lophochroa leadbeateri leadbeateri*	Major Mitchell's Cockatoo	PMST, Bionet		Vulnerable	Endangered		The eastern Major Mitchell's cockatoo lives in arid and semi-arid woodlands dominated by mulga (Acacia aneura), mallee and box eucalypts, slender cypress pine (Callitris gracilis) or belah (Casuarina cristata). Within these vegetation types, the subspecies main requirements are fresh surface water, and trees with suitable nesting hollows.	Recorded
Repties	*Hemiaspis damelii*	Grey Snake	PMST		Endangered	Endangered		Key attributes of grey snake habitat are the floodplains and ephemeral wetlands which provide breeding habitat for the frog species that are its main prey, the presence of the frog species themselves, and the heavy clay soils which provide and cracks and crevices that the species uses in its hunting strategy and for shelter.	Low
Birds	*Neophema chrysostoma*	Blue-winged Parrot	PMST		Vulnerable	Vulnerable		Blue-winged parrots inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones	Moderate
Birds	*Falco hypoleucos*	Grey Falcon	PMST, PCT associations		Vulnerable	Vulnerable		Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.;1|Also occurs near wetlands where surface water attracts prey.;2|Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken.;3|Like other falcons it utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring; two or three eggs are laid.;4|	Low
Herbs and Forbs	*Pterostylis xerophila*	Desert Greenhood	PMST		-	Vulnerable		The Desert Greenhood is currently known from only eight populations containing about 150 plants, in Victoria and South Australia. In Victoria, it occurs in open mallee scrublands, usually on rocky outcrops or stony rises, under Broombush or Mallee Tea-tree Leptospermum coriaceum, on well-drained red sands and heavier clay loams.	Low
Birds	*Grantiella picta*	Painted Honeyeater	PMST, PCT associations		Vulnerable	Vulnerable		Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests.;1|A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.;2|Insects and nectar from mistletoe or eucalypts are occasionally eaten.;3|Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.;4|	Nil
Birds	*Stagonopleura guttata*	Diamond Firetail	PMST		Vulnerable	-		Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.;1|Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.;2|Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.;3|Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).;4|Usually encountered in flocks of between 5 to 40 birds, occasionally more.;5|Groups separate into small colonies to breed, between August and January.;6|Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests.;7|Birds roost in dense shrubs or in smaller nests built especially for roosting.;8|Appears to be sedentary, though some populations move locally, especially those in the south.;9|Has been recorded in some towns and near farm houses.;10|	Nil

Taxa	Scientific name	Common name	Source	Status				Habitat	Likelihood of occurrence
				FM Act	BC Act	EPBC Act	EPBC Mi		
Herbs and Forbs	*Swainsona pyrophila*	Yellow Swainson-pea	PMST		Vulnerable	Vulnerable		Grows in mallee scrub on sandy or loamy soil, usually found only after fire.;1|Sites include cleared and burnt mallee scrub on red loam to sand, previously burnt Eucalyptus dumosa mallee, disturbed woodland in sheltered aspects, a bulldozed firebreak adjacent to wheat paddocks, roadsides, claypans and at the edge of fire ash.;2|Flowers mainly from September to December.;3|The species is usually found only after fire, which may be the stimulus for seed germination.;4|Recorded in small to moderately large populations, including 3, 20, 50, 250 and 300 plants, often scattered.;5|	Moderate
Herbs and Forbs	*Maireana cheelii*	Chariot Wheels	PMST		Vulnerable	Vulnerable		Usually found on heavier, grey clay soils with Atriplex vesicaria (Bladder Saltbush). Recorded on the Hay Plain in Atriplex vesicaria, Maireana aphylla and Acacia homalophylla shrublands. Soils include heavy brown to red-brown clay-loams, hard cracking red clay, other heavy texture-contrast soils.;1|Tends to grow in shallow depressions, often on eroded or scalded surfaces, and does not extend to the higher soils in the habitat. It has been found on the edges of bare, windswept claypans, in shallow depressions of eroded surfaces where rainwater collects and on a “shelf” in the crabhole complex of heavy grey soils. ;2|Associated species include Atriplex vesicaria, Maireana pentagona, M. excavata, M. ciliata, Cressa cretica, Avena fatua and Acacia homalophylla.;3|Flowering time is mostly spring to summer. Bears fruits mostly from September to November.;4|The species is never common, with small localised occurrences in scattered localities. It has been recorded as common, dense and very abundant in its localised populations.;5|	Moderate
Amphibians	*Litoria raniformis*	Southern Bell Frog	PMST		Endangered	Vulnerable		Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat.;1|Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels.;2|During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops.;3|Tadpoles require standing water for at least 4 months for development and metamorphosis to occur but can take up to 12 months to develop.;4|Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.;5|Prey includes a variety of invertebrates as well as other small frogs, including young of their own species.;6|	Moderate
Bats	*Nyctophilus corbeni*	(blank)	PMST, Bionet		0	0		Inhabits a variety of vegetation types, including mallee, bulloke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.;1|Roosts in tree hollows, crevices, and under loose bark.;2|Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground.;3|Mating takes place in autumn with one or two young born in late spring to early summer.;4|	Recorded
Herbs and Forbs	*Austrostipa metatoris*	A spear-grass	PMST		Vulnerable	Vulnerable		Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.;1|Associated species include Eucalyptus populnea, E. intertexta, Callitris glaucophylla, Casuarina cristata, Santalum acuminatum and Dodonaea viscosa.;2|Flowers in response to rain.;3| It is not known if fire plays a role in the ecology of this species although most species of Austrostipa provide an abundance of highly flammable ephemeral fuel in periods following above-average rainfall.;4|Recorded in populations as locally frequent or dominant only in scattered patches.;5|	Moderate
Herbs and Forbs	*Brachyscome papillosa*	Mossgiel Daisy	PMST		Vulnerable	Vulnerable		Recorded primarily in clay soils on Bladder Saltbush (Atriplex vesicaria) and Leafless Bluebush (Maireana aphylla) plains, but also in grassland and in Inland Grey Box (Eucalyptus microcarpa) - Cypress Pine (Callitris spp.) woodland.;1|Flowers from June to December.;2|Recorded as locally occasional to common in populations.;3|	Low

Taxa	Scientific name	Common name	Source	Status				Habitat	Likelihood of occurrence
				FM Act	BC Act	EPBC Act	EPBC Mi		
Herbs and Forbs	*Swainsona murrayana*	Slender Darling Pea	PMST		Vulnerable	Vulnerable		The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.;1|Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.;2|Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains.;3|The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated.;4|Swainsona species contain a poisoning principle, swainsonine, which affects the nervous system and is toxic to stock.;5|	Moderate
Fish	*Maccullochella peelii*	Murray Cod	PMST	-	-	-			Moderate
Birds	*Polytelis anthopeplus monarchoides*	Regent Parrot (eastern subspecies)	PMST, Bionet		Endangered	Vulnerable		The species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers, and possibly the Darling River downstream of Pooncarie. Typical nest trees are large, mature healthy trees with many spouts (though dead trees are used) and are usually located close to a watercourse.;1|Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands. Mallee woodland within 20 kilometres of nesting sites is critical foraging habitat for breeding birds.;2|They may utilise cereal crops and will feed on spilt grain. Is claimed to be a pest in almond orchards.;3|Birds move between the riverine nesting habitat and foraging sites along corridors of natural vegetation.;4|Outside the breeding season birds may move away from the riverine plain, with birds observed in mallee over 60 kilometres from the river. However, there are very few records in NSW away from the Murray River during the non-breeding season and it has been speculated that most birds may join non-breeding flocks in Victoria.;5|Breeding is colonial with up to 27 nests within the colony. Nests are usually within 150 metres of each other and up to five nests have been recorded in a single tree.;6|Usually occurs in pairs or small parties, though may form larger flocks during the non-breeding season. Despite its size it can be quite cryptic and frequently sits quietly within trees and can only be detected by occasional calls.;7|	Recorded
Birds	*Aphelocephala leucopsis*	Southern Whiteface	PMST		-	Vulnerable		Southern whitefaces live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains.	Moderate
Birds	*Leipoa ocellata*	Malleefowl	PMST, Bionet		Endangered	Vulnerable		Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species.;1|Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers.;2|Malleefowl will occupy areas within 5 years of fire, however higher breeding densities are recorded from older age classes.;3|A pair may occupy a range of between 50 and 500 ha, overlapping with those of their neighbours. Mainly forage in open areas on seeds of Acacias and other native shrubs (Cassia, Beyeria, Bossiaea), buds, flowers and fruits of herbs and various shrubs, insects (cockroaches, ants, soil invertebrates), and cereals if available.;4|Incubate eggs in large mounds that contain considerable volumes of sandy soil. The litter within the mounds must be dampened for it to decompose and provide heat for incubation of eggs. Up to 34 eggs may be laid in a single season, though usually between 15 and 24 (and clutches smaller in dry years). The male monitors the temperature within the egg chamber using its bill, and regularly works the mound during the breeding season to maintain a constant temperature around 34 degrees. The chicks hatch after between 49 and 96 days (average around 60) and can walk as soon as they emerge from the mound, can run quickly within 2 hours and can fly within 24 hours.;5|Recently burnt areas are used for foraging, with malleefowl taking advantage of increased herbage, while adjacent unburnt habitats are used for roosting, nesting, and daytime shelter.;6|	Recorded

Taxa	Scientific name	Common name	Source	Status				Habitat	Likelihood of occurrence
				FM Act	BC Act	EPBC Act	EPBC Mi		
Herbs and Forbs	*Solanum karsense*	Menindee Nightshade	PMST		Vulnerable	Vulnerable		Grows in occasionally flooded depressions with heavy soil, including level river floodplains of grey clay with Black Box and Old Man Saltbush, and open treeless plains with solonized brown soils.;1|Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.;2|Flowers chiefly in spring.;3|Has been observed in the field to have an extensive root system which will grow when cut and left on the soil surface. This species is ephemeral in nature, appearing following rainfall events. It also tolerates disturbance and will often appear after such activities as grading, ploughing and flooding for irrigation.;4|Menindee Nightshade is a clonal species and is recorded as common to locally abundant in most populations. It can form small colonies of several hundred plants, to large spreading colonies found over an area of 8-12000 hectares (11 stands over about 6 km). Isolated and few plants have also been recorded at some sites.;5|	Moderate
Birds	*Calidris acuminata*	Sharp-tailed Sandpiper	PMST		-	-	Mi		Nil
Birds	*Motacilla flava*	Yellow Wagtail	PMST		-	-	Mi		Nil
Birds	*Actitis hypoleucos*	Common Sandpiper	PMST		-	-	Mi		Nil
Birds	*Calidris ferruginea*	Curlew Sandpiper	PMST		Endangered	Critically Endangered	Mi	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts.;1|It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.;2|It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.;3|It roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores.;4|Curlew Sandpipers are omnivorous, feeding on worms, molluscs, crustaceans, insects and some seeds.;5|Birds breed at 2 years of age and the oldest recorded bird is 19 years old. Most birds caught in Australia are between 3 and 5 years old.;6|	Nil
Birds	*Gallinago hardwickii*	Latham's Snipe	PMST		-	-	Mi		Nil
Birds	*Apus pacificus*	Fork-tailed Swift	PMST		-	-	Mi		Nil
Birds	*Calidris melanotos*	Pectoral Sandpiper	PMST		-	-	Mi		Nil

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Appendix D

Preliminary Visual Impact Assessment - Wind

EMM
creating opportunities

Koorakee Energy Park

Wind Energy Preliminary Visual Impact Assessment

Prepared for Squadron Energy

May 2024

Koorakee Energy Park

Wind Energy Preliminary Visual Impact Assessment

Squadron Energy

E230637 RP005b

May 2024

Version	Date	Prepared by	Approved by	Comments
1	29 January 2024	Tadd Andersen	Christopher Holloway	
2	8 March 2024	Tadd Andersen	Christopher Holloway	
3	1 May 2024	Mark Trudgett	Christopher Holloway	
4	14 May 2024	Tadd Andersen	Christopher Holloway	

Approved by

Christopher Holloway
Associate Director
14 May 2024

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1 Introduction

Squadron Energy proposes to develop Koorakee Energy Park (the project), a large-scale grid connected wind and solar energy generating along with a battery energy storage system (BESS) and associated infrastructure. The project is located approximately 12 km north-east of Euston, NSW. Figure 1.1 shows the regional context of the project.

The project is within the South West Renewable Energy Zone (REZ), which has been formally declared by the NSW Minister for Energy under Section 19(1) of the NSW Electricity Infrastructure Investment Act 2020. The Riverina region has been selected by the NSW Government for the development of the South West REZ due to its abundance of high-quality wind and solar energy potential.

Visual impacts from wind projects are assessed under the *Wind Energy: Visual Assessment Bulletin* (VA Bulletin, DPE 2016). The visual impacts from solar projects are assessed under the *Large-Scale Solar Energy Guideline* (DPE, 2022). The two guidelines require different assessment methodologies and criteria, and therefore a separate approach. The project includes both wind and solar elements and as such, separate Preliminary Visual Impact Assessment (PVIA) reports have been prepared.

This Wind PVIA describes elements of the overall project for context, but only addresses the potential visual impacts of winds components, with the solar energy and BESS portions of the project addressed in a separate Solar PVIA report. The Wind PVIA required under the VA Bulletin consists of two main elements:

- Preliminary baseline study to establish the existing landscape character
- Preliminary assessment that identifies residences and public places with potential visual impacts and includes:
    - Community consultation
    - Visual magnitude tool
    - Multiple wind turbine tool
    - Viewshed mapping.

1.1 Project overview

The project will include energy generation through both wind turbines generators (WTGs) and solar photovoltaic (PV) panels, as well as battery storage, transmission, ancillary and temporary infrastructure. The project will have an installed capacity of up to approximately 2 GW, comprising approximately 1 GW of installed capacity from each of the wind and solar components. The BESS will have a capacity of up to approximately 1 GW and will have provision for up to 12 hours of storage (12 GWh).

Project infrastructure will be contained within the development corridor, the area within which infrastructure, including WTGs, will be placed. This corridor provides the necessary flexibility for further detailed design (i.e. micro-siting) whilst also allowing a detailed environmental assessment process to be completed. Refer to Figure 1.2 for the project layout.

The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of stakeholder engagement, engineering assessments and design of project infrastructure. It is noted that the proposed development corridor is a conservative area for early assessment purposes and the proposed disturbance area will likely be significantly smaller.

1.1.1 Wind turbines

The project will include the installation of approximately 167 WTGs positioned to maximise the use of the available wind resource, whilst avoiding key constraints and responding to stakeholder inputs and environmental constraints.

The WTGs will have three blades with the rotor and nacelle mounted on a tower with an internal ladder or lift. The final number and proposed placement of WTGs will be determined as part of the final layout to be assessed in the EIS. WTGs will be installed at final locations within the development corridor and in accordance with the micro-siting restrictions identified in the EIS and will depend on a range of factors including WTG technology, available grid capacity, economies of scale, grid connection and environmental constraints.

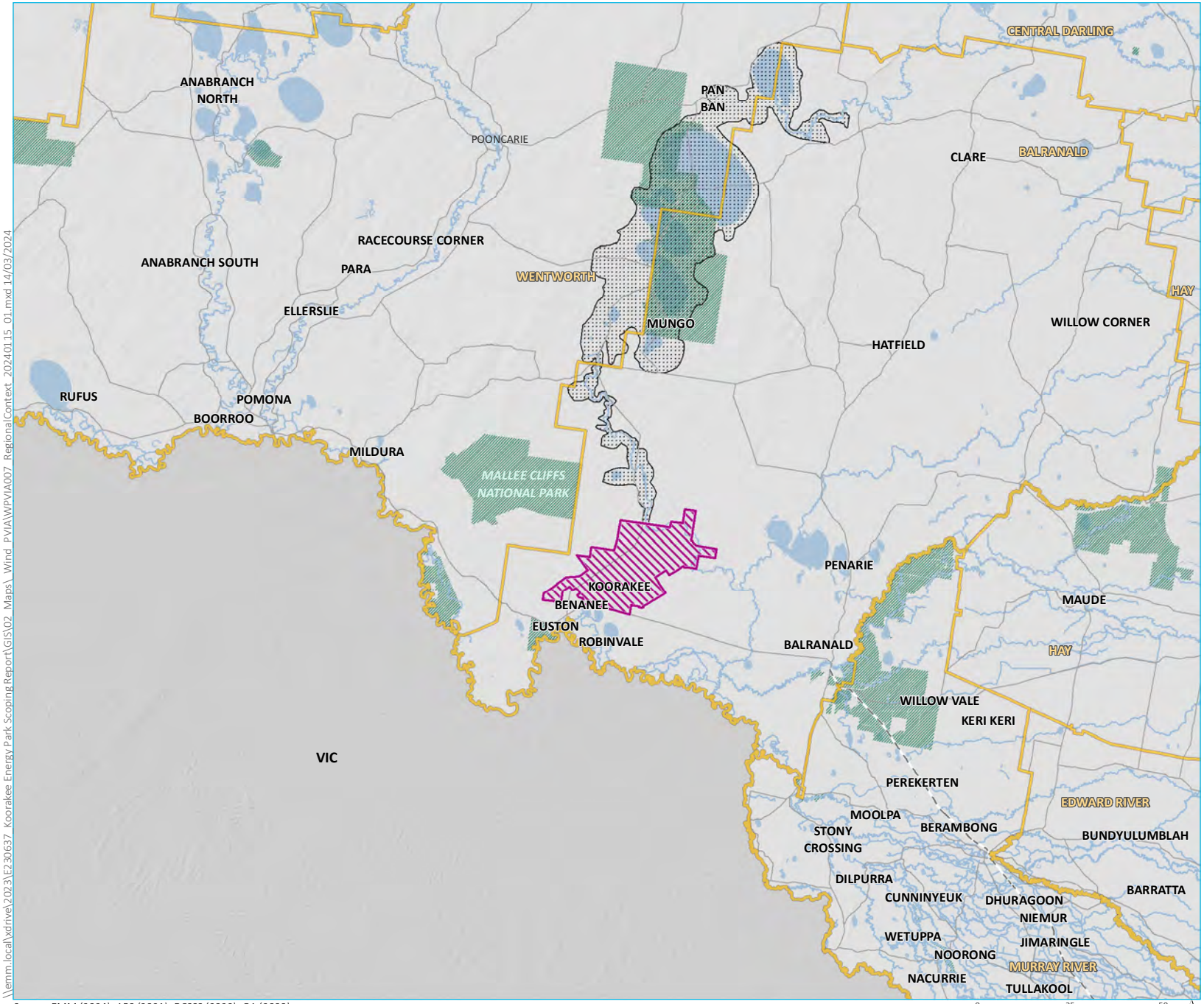
A summary of the project elements and the indicative dimensions for the WTG components are detailed in Table 1.1.

Table 1.1 Indicative project summary

Project element	Details	Quantity
Overview		
Project investigation area	Approximately 58,000 ha	
Development corridor	Approximately 13,700 ha (subject to further design refinement as the project progresses)	
Land tenure	The land is Crown Lands within the Western Lands region where landholders hold perpetual leases with Crown Lands. Squadron Energy holds 7 licences with landholders and licence with Crown Land for site investigations and is working with landholders and Crown Lands on further licensing and land tenure arrangements.	
Project capacity	Up to 2 GW (up to 1 GW wind and 1 GW solar)	
Wind		
WTGs	3 blade system	167
WTG height	Approximately 270 m	
Rotor diameter	Approximately 185 m	
Lowermost blade tip height above ground	30–60 m	
Tower (hub) height	110–180 m	
WTG foundations (excavation size)	Approximately 60 m diameter	167
Ancillary Infrastructure		**Quantity**
Hardstands adjacent to each WTG (including blade laydown and component storage areas)	220 m x 14 m	167
Substations	Up to 250 m x 250 m	Up to 5
Operations and maintenance compounds	150 m x 150 m	8
Underground transmission cables (medium to low voltage)	Approximately 400 km length of underground medium to low voltage transmission cables linking WTGs to substations with an approximately 3 m wide corridor	

Table 1.1 Indicative project summary

Project element	Details	Quantity
Overhead transmission cables (high voltage)	Approximately 60 km length of high-voltage transmission lines, with an easement width of approximately 45–60 m, linking substations to the grid connection.	
Grid connection	In the southern part of the site, the project will connect to the existing 220 kV transmission line or the future 330 kV Project EnergyConnect transmission line.	
Meteorological masts	Approximately 160 m tall	Up to 4
Internal roads and drainage	Approximately 5.5 m wide unsealed private roads (excluding batters)	
Temporary construction facilities		
Ancillary sites	Approximately 500 m x 500 m	Up to 5
Concrete (or asphalt) batching plants and crushing facilities	Approximately 50 m x 100 m	Up to 5
Stockpiles and materials storage compounds/laydowns	Subject to construction requirements	
Roads		
Site access	Access will be primarily from the Sturt Highway to the south of the project. From the Sturt Highway, both Euston Prungle Road and Benanee Road would be used to access the project.	



KEY

- Koorakee Energy Park
- Willandra Lakes World Heritage Area
- LGA boundary

Existing environment

- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2024); ABS (2021); DCSSS (2023); GA (2009)

0 25 50 km

GDA 1994 MGA Zone 54

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Regional context

Koorakee Energy Park - Wind Energy
Preliminary Visual Impact Assessment
Figure 1.1

EMM creating opportunities

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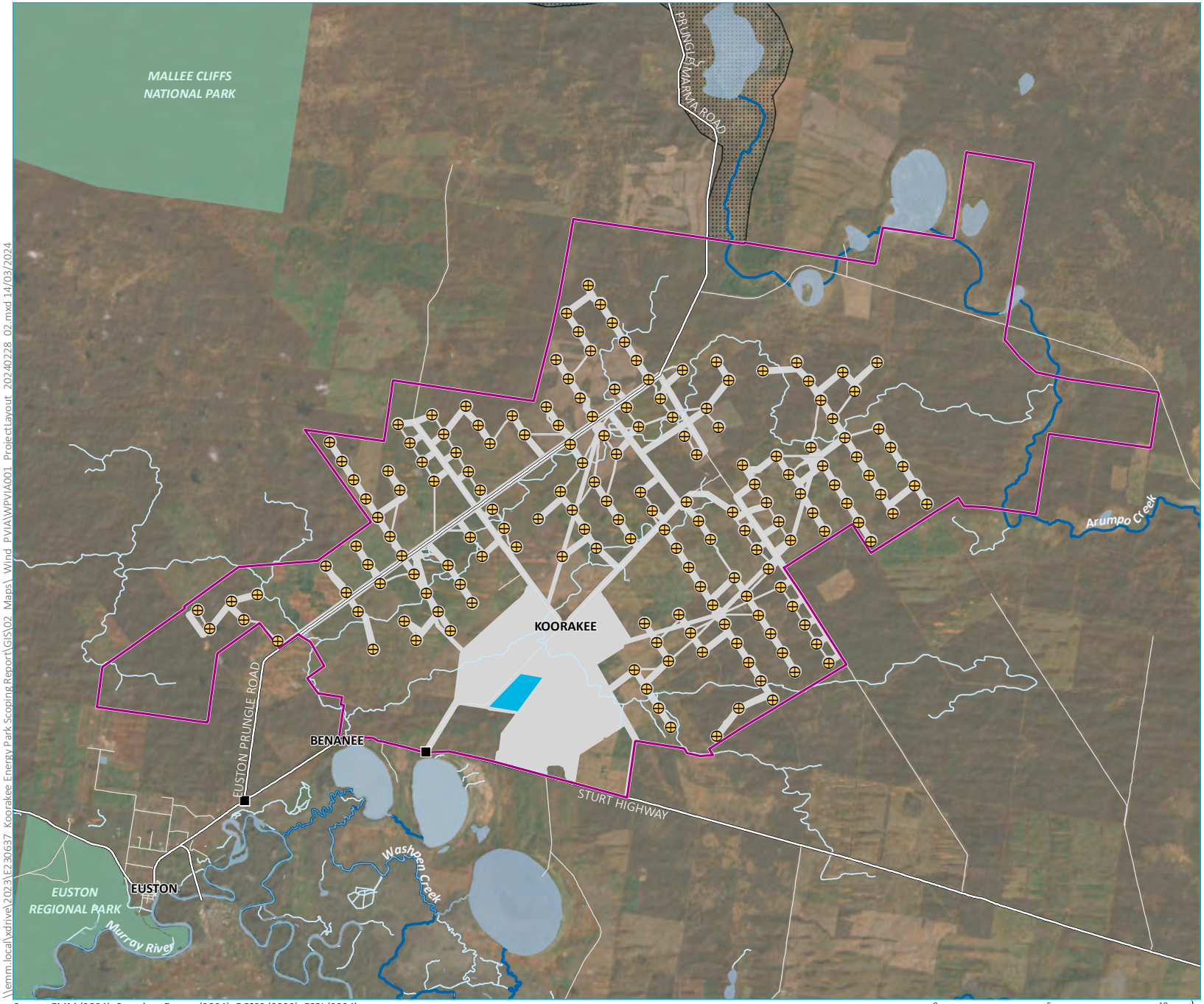

KEY

- Koorakee Energy Park
- BESS and grid connection
- Development corridor
- Willandra Lakes World Heritage Area
- Wind turbine generator
- Site access

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody
- NPWS reserve

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

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Project overview

Koorakee Energy Park - Wind Energy
Preliminary Visual Impact Assessment
Figure 1.2

EMM
creating opportunities

2 Preliminary baseline study

2.1.1 Project setting

The project investigation area is within the Balranald Shire Council local government area (LGA), approximately 700 km west of Sydney and 400 km north of Melbourne. The Sturt Highway, directly south of the project investigation area, connects the region to major population centres in NSW, Victoria and South Australia. The Balranald Shire Council LGA encompasses an area of approximately 21,693 square kilometres (km2) and forms part of the NSW Riverina region. The Riverina region is one of the most productive farming regions in Australia producing rice, citrus, grapes and wool.

The project is located within the South West Renewable Energy Zone (South West REZ). The existing 220kV Buronga/Balranald Transgrid transmission line traverses the southern section of the project and the proposed Project EnergyConnect 330kV transmission line will be constructed within the existing Buronga/Balranald 220kV easement.

There are also a number of other State Significant Development (SSD) and SSD modification projects within the South West REZ, the Balranald LGA and the neighbouring Wentworth LGA. Of note, the Euston Wind Farm (SSD-62466963), currently preparing an EIS, is located immediately to the west of the proposed project.

The project is located about 70 km south-east from Mildura (Figure 1.1), a regional centre with a population of about 34,000. A range of services to the region are located in Mildura including an airport, a hospital and other health services and a university.

There are also small townships in the vicinity of the project. Euston is approximately 12 km south west of the project and has a population of around 800 people. Robinvale (approximately 10 km south-west) is located in Victoria, east of Euston and just south of the Murray River and has a population of approximately 3500 people. Development in and around the project investigation area is largely related to cropping and grazing and includes rural residences.

2.1.2 Land use

The project area is zoned RU1 Primary Production under the *Balranald Local Environment Plan 2010* (Balranald LEP). The majority of the land within the project investigation area is currently used for grazing or dry cropping, with scattered rural residences and agricultural structures. The project investigation area predominately consists of pasture with scattered paddock trees. Sections of the site contain intact native vegetation (woodland and grasses) in good condition, which has been avoided where possible in the development of the indicative project layout.

The project investigation area is directly south of the Willandra Lakes World Heritage Area (WLWHA). The WLWHA contains important natural and cultural features including exceptional examples of past human civilization.

2.1.3 Existing landscape

The landscape within the project investigation area was originally Mallee woodland and scrubland. Recent history has seen approximately half of the project investigation area cleared for agricultural uses – primarily grazing or cropping. The Mallee woodland and scrubland remains intact across some of the northeastern area of the project investigation area.

Arumpo Creek runs through the northern portion of the project investigation area, adding a distinct landscape along its meandering path. A number of other unnamed water course run throughout the site draining into Arumpo Creek or toward the south to Dry Lake and Lake Benanee.

Elevation across the project boundary is fairly constant, ranging from approximately 55 m to 70 m AHD. The Arumpo Creek drains the northern portion of the site. The southern portion drains into Dry Lake via a number of unnamed water courses.

2.1.4 Landscape character

An assessment of "how the project will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character" (Technical Supplement) is required in the EIS. This preliminary review of the landscape character is based upon desktop analysis and a field visit.

The landscape of the project investigation area and its surrounds can be characterised into four broad categories as described below. These are defined by the vegetation, land form, land use and presence of water.

i Murray River corridor

The Murray River is a significant feature in the landscape as it winds its way from east to west, south of the project area. The river influences wide swathes of the landscape on either side of the waterway. These lands are subject to flooding and contain lakes and smaller waterways that connect the water bodies.

The river is controlled by a series of locks/weirs and used for irrigation for the surrounding agricultural lands. The river is also used for recreational boating and fishing. A photograph of the Murray River nearby to the project is shown in Photograph 2.1.

Photograph 2.1 Murray River

ii Arumpo Creek corridor

Arumpo Creek runs northwest to southeast in the northern part of the project investigation area, but outside of the development corridor. It connects a series of lakes as it meanders through the landscape. The Arumpo Creek corridor along the creek is devoid of most trees (there are occasional trees) and the soil has formed a crusty surface that is different in colour and texture from the surrounding woodlands. The distinct character of the corridor makes it a distinctive visual feature in the landscape.

Photograph 2.2 shows the Arumpo Creek landscape.

Photograph 2.2 Arumpo Creek corridor landscape

iii Agricultural pastures

The agricultural pastures make up the majority of the landscape across the project investigation area. The woodland has been cleared to provide pastures for grazing and fields for dry cropping and irrigated crops. The topography is fairly flat with low rises divided by water courses.

There are occasional corridors of remnant woodland along watercourses, roads, and property boundaries. Visually, the pastures are vast, flat fields of crops that are punctuated by remnant trees.

Photograph 2.3 shows the open agricultural plains within the project investigation area.

Photograph 2.3 Agricultural pastures landscape

iv Mallee woodlands and shrublands

The Mallee woodlands and shrublands occur in semi-arid landscapes within and around the project area. It is dominated by low, multi-stemmed eucalyptus (Mallee) that rarely grow taller than six metres. The understorey can be made up of shrubs or grasses, depending on the local rainfall, soil and fire history.

Visually, the Mallee woodlands and shrublands creates a uniform landscape with sculptural multi-stemmed trees of similar size. This is in sharp contrasted with adjacent cleared paddocks and roadways that cut through the woodlands.

Photograph 2.4 depicts the woodland around the project investigation area.

Photograph 2.4 Mallee woodlands and shrublands landscape

3 Preliminary assessment

3.1 Study area

The initial step in the assessment process is to define the visual study area around the proposed wind farm. The study area defines the limits of the visual impact assessment. Even though the project infrastructure may be visible beyond the study area extents, there is no requirement that the visual impacts be assessed.

The study area is defined by the VA Bulletin as 8 km from the WTGs. Figure 3.3 illustrates the extents of the study area.

Notwithstanding the prescribed study area, the WLWHA should be considered for assessment. The southernmost area of the WLWHA abuts the north of the project investigation area (refer to Figure 3.3) and extends northward along Prungle Marma Road. This southern area of the WLWHA is included in the PVIA study area and is included in the assessment. Further discussion with the World Heritage Area committee is needed to identify any specific locations that should be included in the assessment.

3.2 Sensitive receivers

'Sensitive receiver' refers to people who have potential views of the project. They are represented and assessed using the locations of dwellings that surround the project area. There are 20 non-associated residences within the study area. Figure 3.3 shows the sensitive receivers (associated and non-associated) who are considered in this PVIA.

Heritage items are also considered receivers in this context. The Balranald LEP lists three items in the Euston area. These are:

- Lake Benanee Burial Ground (Balranald LEP listing I7). This is located in the Lake Benanee rest area.
- Euston Courthouse (Balranald LEP listing I6),
- Euston Lock and Weir 15 (Balranald LEP listing I5).

Bumbang Island Historic Reserve, located in the Murray River corridor (Victoria), is also a listed Aboriginal cultural heritage location. Of the heritage items listed above, only Lake Benanee Burial Ground is located within the bounds of this PVIA and is identified as viewpoint PU1.

The WLWHA, located north of the project, is an important heritage area and has meaning to the local Aboriginal community as well as the larger human history. The WLWHA needs to be included in the assessment as a heritage item. It is identified as viewpoint PU11.

3.3 Community consultation

Community consultation at this stage of the project is meant to inform the community about the project and also gleans feedback from the community to shape the project. Squadron Energy has been consulting with the landowners and community to develop the project. This consultation has influenced the project design by moving the WTG locations and consolidating the project footprint to its current configuration.

Key elements of required consultation include:

- informing the landholders and community about the proposed project
- allow the community to identify landscape features, areas of scenic quality, and key public viewpoints
    - ranking the significance of the landscape features

- gathering the community's feedback relating to project siting and visual impacts.

Section 5 of the Koorakee Energy Park Scoping Report outlines the key stakeholder and community engagement completed during the scoping phase of the project. Engagement modes included meetings via telephone/teleconference and in person, and a Community Open Day. This engagement has informed the landholders and community about the project and gathered feedback on important landscape features and potential impacts, including potential visual impacts from the WTGs.

The key landscape features identified during this engagement included the view lines of the lakes south of Sturt Highway and more generally appreciating natural viewpoints in nature. The WLWHA has also been identified as an important landscape to the Aboriginal community.

Responses related to visual impacts included one respondent being "not keen on the visual aspect" of the WTGs, potential impacts from the WTG lighting required for aircraft safety and a query related to shadow flicker.

3.4 Preliminary assessment tools

The preliminary assessment tools identify the locations that may have a substantial visual impact and need to be considered in the design development of the wind farm. These locations will also need to be assessed in further detail during the EIS.

The tools used to identify the locations with potential visual impacts are described below.

3.4.1 Visual magnitude

The visual magnitude tool identifies the distance from the WTG at which viewpoints or dwellings need to be assessed. This distance is based on the WTG height, which is 270 m. The visual magnitude tool (Figure 3.1) uses two lines as follows:

- Black line – indicates where detailed consideration to the visual impacts on dwellings and key public viewpoints. The locations below the black line need detailed consideration.
    - The black line distance for this project is 3.6 km from the WTGs.
- Blue line – indicates the threshold within which a viewpoint may need further consideration due to factors like topography or landscape features. These would be considered for further assessment during the EIS.
    - The blue line distance for this project is 5.3 km from the WTGs.

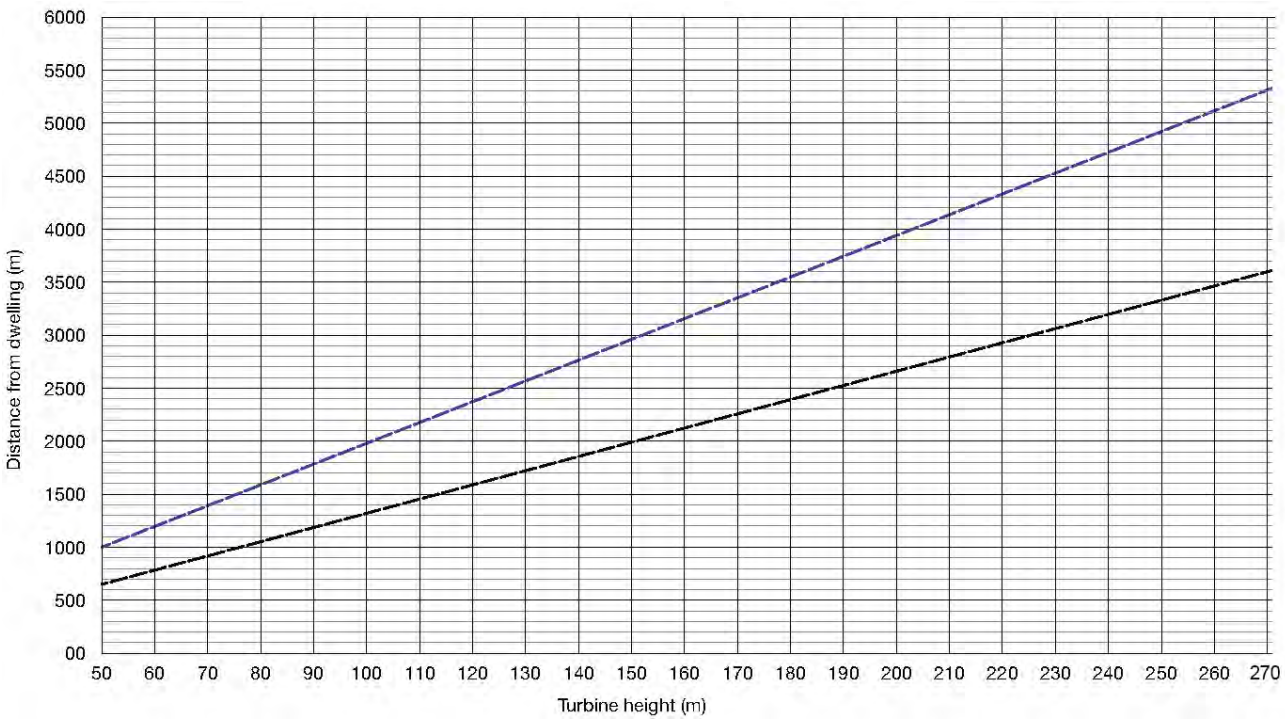


Figure 3.1 Visual magnitude tool

This study maps the 'black line threshold' and 'blue line threshold' around each WTG location as illustrated on Figure 3.3.

3.4.2 Multiple wind turbine tool

The multiple wind turbine tool provides a preliminary indication of the potential cumulative impacts from the proposed project. To do this, views from each dwelling are mapped into 60° sectors (6 sectors to cover 360° views). Where WTGs are located in three or more sectors, detailed consideration needs to be given to the potential cumulative visual impacts. Figure 3.2 illustrates the sector approach as presented in the VA Bulletin and the number of sectors for each receptor are shown in Figure 3.3 and detailed in Table 3.1 and Table 3.2.

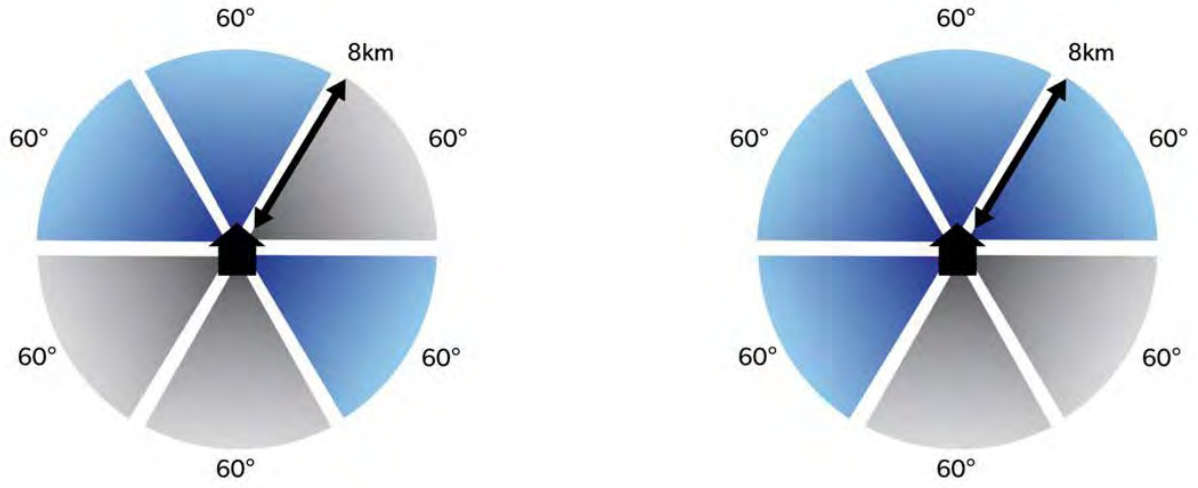
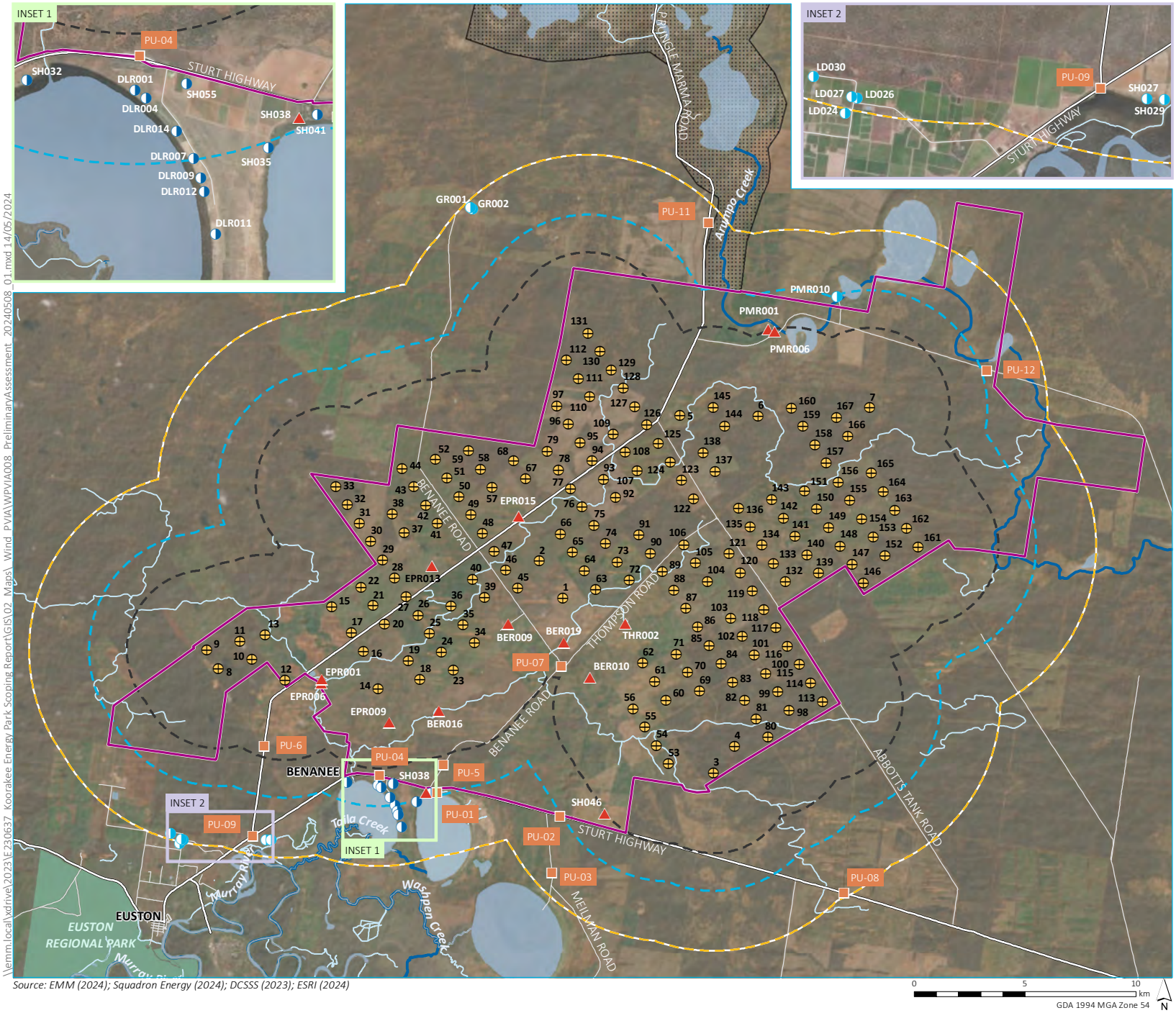


Figure 3.2 Multiple wind turbine tool



KEY

- Koorakee Energy Park
- Project study area (8 km)
- Black line threshold (3.6 km)
- Blue line threshold (5.3 km)
- Willandra Lakes World Heritage Area
- Wind turbine generator
- Public viewpoint
- Associated residence

Non-associated residence

- Up to two 60° sectors
- Three or more 60° sectors

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody
- NPWS reserve

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 5 10 km

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Preliminary assessment

Koorakee Energy Park - Wind Energy
Preliminary Visual Impact Assessment
Figure 3.3

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3.5 Viewshed mapping

Viewshed mapping is a method of mapping the theoretical visibility of the project across the surrounding landscape. Using geographic information systems (GIS) technology, it combines the topography of the land with project modelling to analyse potential visibility of the project. The results are the zone of visual influence (ZVI).

Viewshed mapping is used to identify the locations with views to the project infrastructure. It illustrates the area in the surrounding landscape from which the project may be visible. It also indicates areas that have intervening hills or other landforms that block views.

The ZVI will assist in determining where potential visual impacts will occur, and to what extent. This will be used to eliminate the need to assess viewpoints that do not have line of sight to the WTGs.

3.5.1 Zone of visual influence

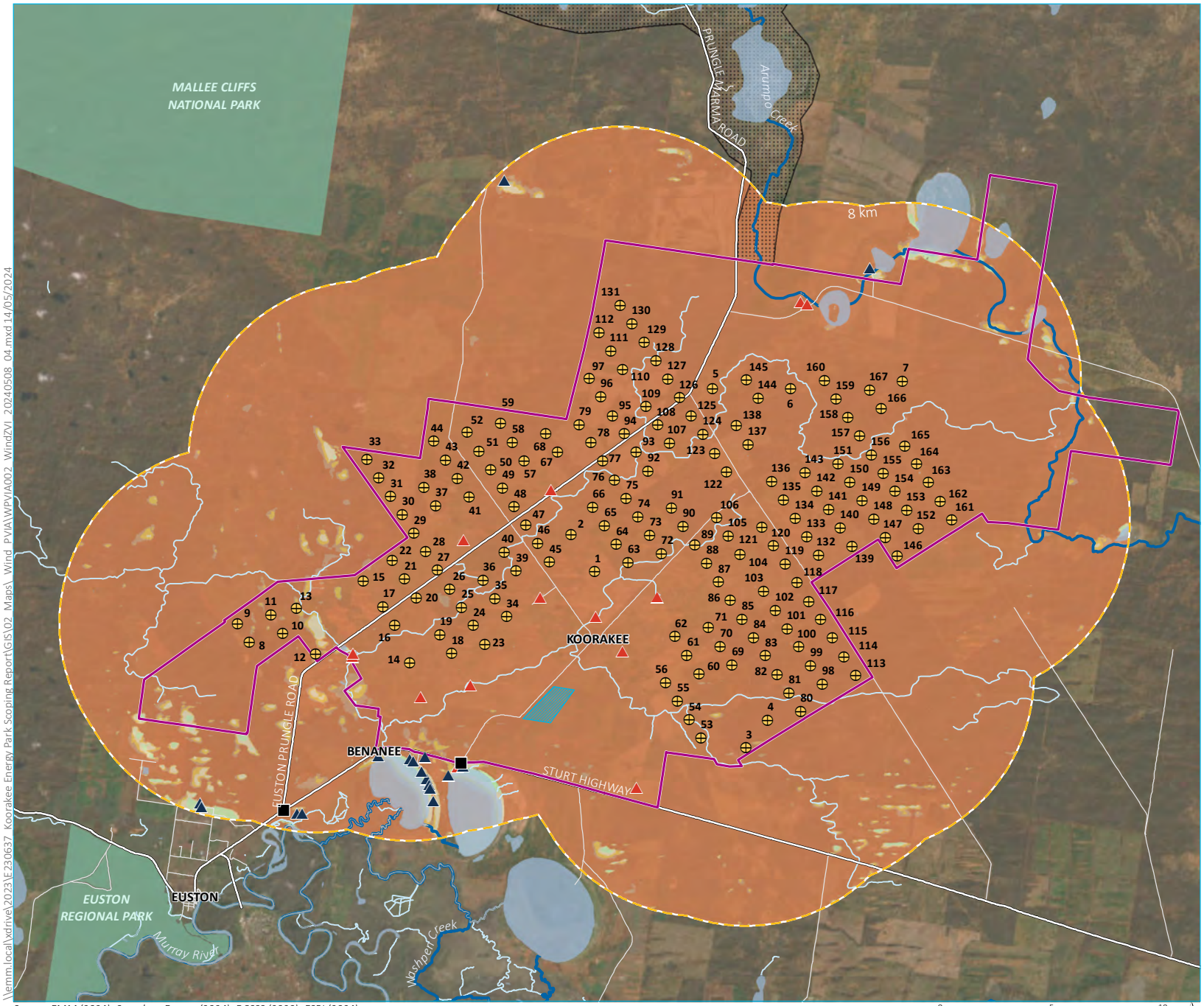
A ZVI diagram illustrates the theoretical visibility of the proposed project infrastructure, or the area over which a development can theoretically be seen. Refer to Figure 3.4 for the ZVI.

The ZVI diagram is generated using a digital elevation model (DEM) which covers the study area. The DEM was built using publicly available ELVIS spatial data from the Foundation Spatial Data Framework. The DEM is representative of the bare earth surface and only takes into account the topography of the landscape. This does not account for any vegetation (trees), or structures (eg rural dwellings, farm sheds and agricultural infrastructure) that may screen views into the development footprint. It represents a worst-case scenario in terms of project visibility.

It is important to note that the VA Bulletin requires that vegetation (trees) and built structures not be included in the mapping. The resulting maps can therefore only show where landforms obstruct views. This can be important for viewpoints that are behind vegetation or buildings and have no or obstructed views of the proposed development yet are assessed as having a potential impact in this PVIA.

Note the following with regard to the ZVI diagram:

- The ZVI does not account for the diminishing size of project elements as the viewer moves further away. It only indicates where project elements will be visible.
- It does not indicate specifically which turbines are visible from a particular location.
- The ZVI uses colour bands to indicate the number of proposed WTGs visible. No colour within the study area would indicate locations where no turbine is predicted to be visible.



KEY

- Koorakee Energy Park
- Project study area (8 km)
- BESS and grid connection
- Willandra Lakes World Heritage Area
- Wind turbine generator (WTG)
- Site access

Sensitive receiver

- Associated residence
- Non- associated residence

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody

Visibility of wind turbines

- < 30
- 31 - 60
- 61- 90
- 91 - 120
- 121-167

Zone of visual influence

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 5 10 km

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Koorakee Energy Park - Wind Energy
Preliminary Visual Impact Assessment
Figure 3.4

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3.5.2 Summary of ZVI

The ZVI is used to select viewpoints by indicating areas that are predicted to have views into the project. Conversely, it indicates areas that are not predicted to have any views of the project. With this knowledge, viewpoints can be selected from areas where the project is visible. Areas that do not have line-of-sight to the project can be eliminated from the assessment.

The ZVI indicates:

- the topography of the region does little to limit views into the project area within the study area
    - visibility is evenly spread across the study area.
- residences around Lake Benanee have visibility into the project area
- residences in the northern portions of Euston township have visibility into the project area
- locations along Sturt Highway have opportunities to see into the project area as it passes near the southern boundary.

The ZVI is a tool to help identify the WTG's visibility from the surrounding landscape. The extent of the project's visibility and the potential for impacts on visual amenity is verified by field work and photographic evidence.

3.6 Viewpoint identification

The final step in the PVIA is to identify the private receivers and the public viewpoints that would have line of sight to the project infrastructure. These are the viewpoints that will be assessed in detail during the EIS stage of the project.

For the purposes of the preliminary assessment, there are two types of viewpoints. These are:

- Private viewpoints – locations that are not accessible to the public (mainly residences) and have views into the development site. These views are limited to the 8 km study area.
- Public viewpoints – locations that are publicly accessible (roads, parks, trails, tourist areas) and offer views into the development site. These views are limited to the 8 km study area.

The selection of the viewpoints is based on the locations of residences and public areas. This was overlaid with the viewshed mapping to determine which locations had the potential for visual impacts from the project. Viewpoints selected satisfy both criteria; falling within the affected ZVI and required by the preliminary assessment tools.

3.6.1 Private receivers

Private receivers are primarily residences and land held by private individuals. Access to these locations is typically restricted, limiting the number of people who are impacted by a project. However, these are locations where people spend most of their time. Therefore duration of a visual impact is substantial for those living there.

Private receivers are assessed in one of two ways.

- Residences near the project that are likely to have significant visual impacts area assessed individually. These are likely to require detailed assessments in the LVIA. During the LVIA process, photographs will be taken from the residence, in a location that captures views from important rooms in the house.

- Residences further away from the project are assessed in groups. Typically, a viewpoint is selected to represent a cluster of residences. The viewpoint is chosen where the impact is likely to be greatest for that group of residences. Photographs that represent a cluster of residences are usually taken from the roadway or common drive.

The residences identified with potential visual impacts are shown in Table 3.1.

Table 3.1 lists the viewpoints selected for the private receivers for this assessment and the rational for the selection. Figure 3.3 illustrates where the viewpoints are located.

Table 3.1 Selected viewpoints for private receivers

Viewpoint reference - Residences	Viewpoint type	Location	Below black line	Below blue line	Number of sectors	Requires further assessment
SH041	Private	50541 Sturt Highway, Euston	No	Yes	3	Yes
SH035	Private	50557 Sturt Highway, Euston	No	No	3	Yes
SH055	Private	50577 Sturt Highway, Euston	No	Yes	3	Yes
DLR001	Private	50777 Sturt Highway, Euston	No	Yes	3	Yes
DLR004	Private	50775 Sturt Highway, Euston	No	Yes	3	Yes
DLR014	Private	96 Dry Lake Road, Euston	No	Yes	3	Yes
DLR007	Private	134 Dry Lake Road, Euston	No	Yes	3	Yes
DLR009	Private	164 Dry Lake Road, Euston	No	No	3	Yes
DLR012	Private	188 Dry Lake Road, Euston	No	No	3	Yes
DLR011	Private	228 Dry Lake Road, Euston	No	No	3	Yes
SH032	Private	50985 Sturt Highway, Euston	No	Yes	3	Yes
SH027	Private	51425 Sturt Highway, Euston	No	No	2	No
SH029	Private	Sturt Highway, Euston	No	No	2	No
LD24	Private	Leslie Drive, Euston	No	No	2	No
LD26	Private	Leslie Drive, Euston	No	No	2	No
LD027	Private	Leslie Drive, Euston	No	No	2	No
LD030	Private	285 Leslie Drive, Euston	No	No	2	No
GR001	Private	1667 Gulthul Road, Euston	No	No	2	No
GR002	Private	Gulthul Road, Euston	No	No	2	No
PMR010	Private	4747 Prungle Mail Road, Euston	No	Yes	2	Yes

3.6.2 Public viewpoints

Public viewpoints represent various types of locations. The types of locations include public gathering areas like parks, sporting fields and walking trails in the surrounding community. They also include roads, trails, scenic viewpoints and campsites that are located within regional, state and national parks, reserves and forests. Tourist attractions, heritage sites and public buildings can also be included in this category.

The public areas located near the study area include:

- Mallee Cliffs National Park (not represented by a viewpoint due to distance from the study area and restricted access)
- Euston State Forest (not represented by a viewpoint due to distance from the study area)
- Benanee Lake rest area (viewpoint PU 1)
- Willandra Lakes World Heritage Site (viewpoint PU 11).

The roads near the project with potential views into the project are:

- Sturt Highway
- Euston Prungle Road
- Benanee Road
- Thompson Road
- Mengler Road
- Meilman Road.

The public viewpoints used for this PVIA are selected from the public areas and roads identified above. Only locations within the public viewpoint study area are selected, and therefore not all of the public areas will be represented by viewpoints. The selected public viewpoints are listed in Table 3.2.

Table 3.2 lists the viewpoints selected for public viewpoints. Figure 3.3 illustrates their locations.

Table 3.2 Selected public viewpoints

Viewpoint reference - Residences	Viewpoint type	Location	Below black line	Below blue line	Number of sectors	Requires further assessment
PU-01	Public	Sturt Highway, Euston	No	Yes	3	Yes
PU-02	Public	Sturt Highway, Euston	No	Yes	3	Yes
PU-03	Public	Meilman Road, Euston	No	No	2	No
PU-04	Public	Sturt Highway, Euston	No	Yes	3	Yes
PU-05	Public	Benanee Road, Euston	No	Yes	3	Yes
PU-06	Public	Euston Prungle Road, Euston	No	Yes	3	Yes
PU-07	Public	Benanee Road at Thompson Road	Yes	Yes	4	Yes

Table 3.2 Selected public viewpoints

Viewpoint reference - Residences	Viewpoint type	Location	Below black line	Below blue line	Number of sectors	Requires further assessment
PU-08	Public	48615 Sturt Highway, Balranald	No	No	2	No
PU-09	Public	Sturt Highway at Euston Prungle Road	No	No	2	No
PU-10	Public	Prungle Marma Road, Euston	No	No	2	No
PU-11	Public	Prungle Mail Road, Euston	No	No	2	No

4 Conclusion

4.1 Landscape character

The landscape within and surrounding the study area can be described as low rolling terrain with large swathes of it covered with Mallee woodland and scrubland. Land in the southwestern portion of the study area has been cleared for agricultural cropping and grazing. The Mallee woodland and scrubland remains intact across much of the northeastern area of the project investigation area.

The PVIA provides a preliminary assessment of the existing landscape within the project area and surrounding it. In doing so, it identified four landscape character categories that will be refined and characterised in greater detail in the EIS stage of the Project. The categories identified are:

- Murray River corridor – The major landscape feature defining the region
- Arumpo Creek corridor – A water course with a unique landscape and vegetation
- Agricultural pastures – Cleared lands for grazing and cropping
- Mallee woodlands and shrublands – Native woodlands surrounding the project area.

4.2 Preliminary assessment summary

The preliminary assessment is a tool to help identify viewpoints with potential visual impacts from the project. These viewpoints will be further evaluated and assessed in the detailed LVIA during the EIS.

This preliminary assessment identified 12 private viewpoints and 6 public viewpoints in the community and landscape surrounding the project.

References

Balranald Shire Council (2010), *Balranald Local Environment Plan 2010*

Landscape Institute and Institute of Environmental Management and Assessment (2013), *Guidelines for Landscape and Visual Impact Assessment* (GLVIA) Third Edition.

Moir Landscape Architects (2023), *Euston Wind Farm Preliminary Visual Impact Assessment*. Prepared for DP Energy Australia.

NSW Department of Planning and Environment (2016), *Wind Energy: Visual Assessment Bulletin*.

NSW Department of Planning and Environment (2023), *Draft Wind Energy Guideline*.

NSW Department of Planning and Environment (2023), *Draft Wind Energy Guideline: Technical Supplement for Landscape and Visual Impact Assessment*.

NSW Department of Planning and Environment (2022), *eSPADE Spatial Viewer: https://www.environment.nsw.gov.au/eSpade2WebApp*.

Transport for NSW, Centre for Urban Design (2020), *Guideline for Landscape Character and Visual Impact Assessment, EIA-N04*, Version 2.2.

Tudor, Christine 2019, *An approach to landscape sensitivity assessment – to inform spatial planning and land management*. Natural England.

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Appendix E

Preliminary Visual Impact Assessment - Solar

EMM
creating opportunities

Koorakee Energy Park

Solar Energy Preliminary Visual Impact Assessment

Prepared for Squadron Energy

May 2024

Koorakee Energy Park

Solar Energy Preliminary Visual Impact Assessment

Squadron Energy

E230637 RP05a

May 2024

Version	Date	Prepared by	Approved by	Comments
1	23/01/2024	Tadd Andersen	Christopher Holloway	For client review
2	8/03/2024	Tadd Andersen	Christopher Holloway	Reissued for client review
3	1/05/2024	Mark Trudgett	Christopher Holloway	Final

Approved by

Christopher Holloway
Associate Director
1 May 2024

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1 Introduction

Squadron Energy proposes to develop Koorakee Energy Park (the project), a large-scale grid connected solar, wind and battery energy storage system (BESS) along with associated infrastructure approximately 12 km north-east of Euston, NSW. Figure 1.1 shows the regional context of the project.

The project is within the South West Renewable Energy Zone (REZ), which has been formally declared by the NSW Minister for Energy under Section 19(1) of the NSW Electricity Infrastructure Investment Act 2020. The Riverina region of NSW has been selected by the NSW Government for the development of the South West REZ due to its abundance of high-quality wind and solar energy potential.

Visual impacts from solar projects (including the associated BESS) are assessed using the *Large-Scale Solar Energy Guideline* (2022) and visual impacts from wind energy projects are assessed using the *Draft Wind Energy Guideline* (2023). The two guidelines require different assessment methodology and criteria, and therefore a separate approach. The project includes both solar and wind and as such, separate Preliminary Visual Impact Assessment (PVIA) reports have been prepared. This PVIA describes elements of the overall project for context, but only addresses the potential visual impacts of solar and BESS components, with the wind generating portion of the project addressed in a separate PVIA report.

1.1 Project overview

The project will include energy generation through both wind turbines generators (WTGs) and solar photovoltaic (PV) panels, as well as battery storage, transmission, ancillary and temporary infrastructure. The project will have an installed capacity of up to approximately 2 GW, comprising approximately 1 GW of installed capacity from each of the wind and solar components. The BESS will have a capacity of up to approximately 1 GW and will have provision for up to 12 hours of storage (12 GWh).

Project infrastructure will be contained within the development corridor, the area within which infrastructure, including PV generation equipment, will be placed. The corridor provides the necessary flexibility for further detailed design (i.e. micro-siting) whilst also allowing for a detailed environmental assessment process to be completed.

The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of stakeholder engagement, engineering assessments and design of project infrastructure. It is noted that the proposed development corridor is a conservative area for early assessment purposes and the proposed disturbance area will likely be significantly smaller.

A summary of the project elements is provided in Table 1.1.

Table 1.1 Indicative project summary

Project element	Details	Quantity
Overview (overall project)		
Project site	Approximately 58,000 ha	
Development corridor	Approximately 13,700 ha (subject to further design refinement as the project progresses)	
Land tenure	The land is Crown Lands within the Western Lands region where landholders hold perpetual leases with Crown Lands. Squadron Energy holds 7 licences with landholders for further investigations and is working with landholders and Crown Lands on licensing and land tenure arrangements.	

Table 1.1 Indicative project summary

Project element	Details	Quantity
Project capacity	Up to 2 GW (up to 1 GW wind and 1 GW solar)	
Solar PV		
Solar PV generation area	Approximately 3,500 ha	
Number of PV modules	Approximately 2.2 million	
Battery storage		**Quantity**
Battery storage	Up to 1 GW for 12 hours (12 GWh)	
Battery storage compound	Up to 1.1 km x 1.1 km	1
Ancillary Infrastructure		**Quantity**
Operations and maintenance compounds	150 m x 150 m	
Grid connection	In the southern part of the site, the project will connect to the existing 220 kV transmission line or the future 330 kV Project EnergyConnect transmission line.	
Temporary construction facilities		
Ancillary sites	Approximately 500 m x 500 m	Up to 5
Concrete (or asphalt) batching plants and crushing facilities	Approximately 50 m x 100 m	Up to 5
Stockpiles and materials storage compounds/laydowns	Subject to construction requirements	
Roads		
Site access	Access will be primarily from the Sturt Highway to the south of the project site. From the Sturt Highway, both Euston Prungle Road and Benanee Road would be used to access the project site.	
Internal roads and drainage	Approximately 5.5 m wide unsealed private roads (excluding batters)	

1.1.1 Solar photovoltaic panels

A solar farm with PV panels is proposed with a generation capacity of up to 1 GW. The project will include the installation of PV modules mounted on single-axis tracking systems that will be configured in rows positioned to maximise the use of the available solar resource. PV modules will be fixed to and supported by ground-mounted framing.

The PV modules will be up to 2.5 m from the ground when in the horizontal position, while the lower edge of each PV module will be no less than 0.3 m from the ground or above the flood depth level at the maximum tilt angle. The maximum height of the modules to the higher edge from ground level at the maximum tilt angle is expected to be approximately 4.7 m, which is assuming a '2 in portrait' (2P) configuration (ie worst case assumption for visual impact assessment).

As detailed in Figure 1.2, it is anticipated that PV modules will be installed in the southern section of the project site, adjacent to the grid connection switch, which would reduce electrical losses. The PV modules will be installed in parallel rows within each section, with an indicative spacing of approximately 5–10 m between each row. The

rows of PV modules will be aligned in a north-south direction, allowing the modules to rotate from east to west during the day, tracking the sun's movement.

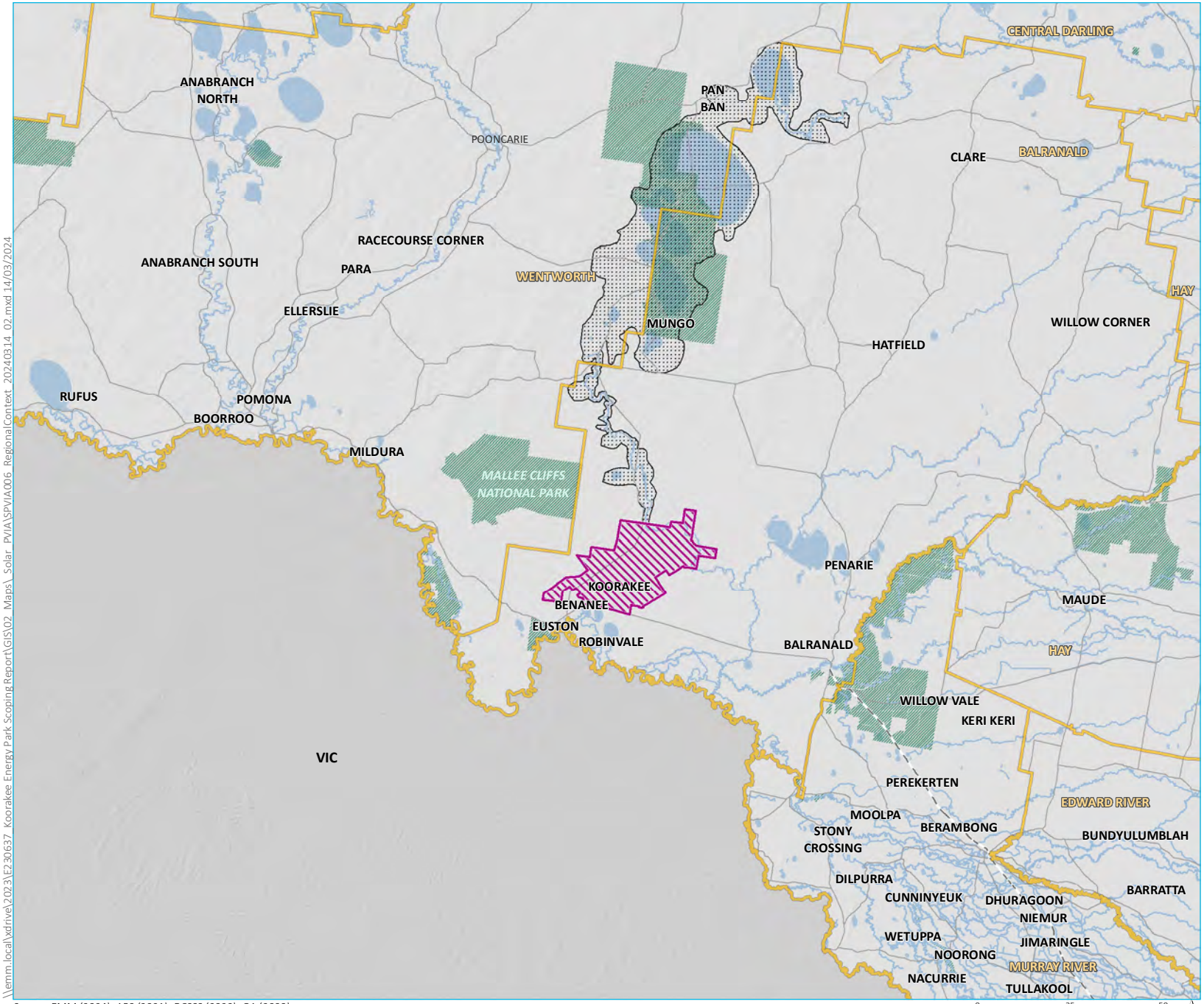
Initial investigations indicate approximately 2.2 million PV modules can be installed for the project; however, the final design will depend on a range of factors including module technology, available grid capacity, economies of scale, grid connection and environmental constraints.

Direct current (DC) cables will be strung underneath the PV modules, housed in cable trays, or be passed through the tracker tubes before being connected to the power conversion units (PCUs). The PCUs convert the DC electricity generated by the PV modules into alternating current (AC) form, which is compatible with the electricity grid. The exact dimensions and configuration of the PCUs will be determined during detailed design.

1.1.2 Battery energy storage system

A BESS is proposed that will have a capacity of up to 1 GW and provision for up to 12 hours of storage (12 GWh). The BESS will provide both storage as well as firming capacity to the National Electricity Market (NEM) and assist in grid stability by providing frequency control ancillary services.

A range of technologies are being considered, including lithium-ion, lead acid, sodium sulphur, sodium or nickel 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.



KEY

- Koorakee Energy Park
- Willandra Lakes World Heritage Area
- LGA boundary

Existing environment

- Major road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Regional context

Koorakee Energy Park - Solar Energy
Preliminary Visual Impact Assessment
Figure 1.1

EMM creating opportunities

Source: EMM (2024); ABS (2021); DCSSS (2023); GA (2009)

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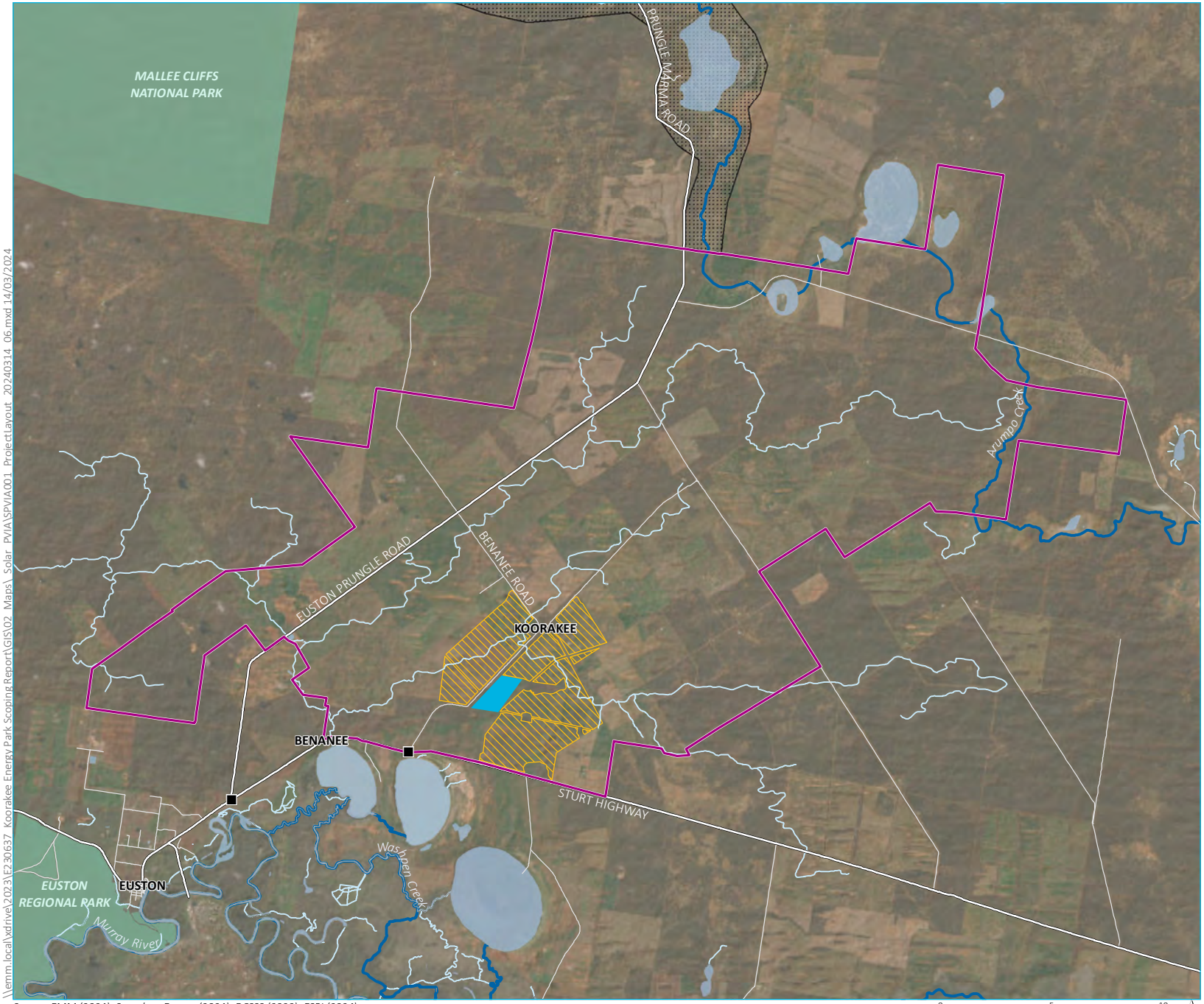

KEY

- Koorakee Energy Park
- Willandra Lakes World Heritage Area
- Photovoltaic (PV) layout
- BESS and grid connection
- Site access

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody
- NPWS reserve

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 5 10 km

GDA 1994 MGA Zone 54

N

Project overview

Koorakee Energy Park - Solar Energy
Preliminary Visual Impact Assessment
Figure 1.2

EMM
creating opportunities

1.2 Site context

The project is within the Balranald Shire Council local government area (LGA), approximately 700 km west of Sydney and 400 km north of Melbourne. The Sturt Highway, directly south of the project area, connects the region to major population centres in NSW, Victoria and South Australia. The Balranald Shire Council LGA encompass an area of approximately 21,693 square kilometres (km^2) and forms part of the NSW Riverina region. The Riverina region is one of the most productive farming regions in Australia producing rice, citrus, grapes and wool.

The project is located within the South West Renewable Energy Zone (South West REZ). The existing 220kV Buronga/Balranald Transgrid transmission line traverses the southern section of the project site and the proposed Project EnergyConnect 330kV transmission line will be constructed within the existing Buronga/Balranald 220kV easement.

There are also a number of other State Significant Development (SSD) and SSD modification projects within the South West REZ, the Balranald LGA and the neighbouring Wentworth LGA. Of note, the Euston Wind Farm (SSD-62466963), currently preparing an Environmental Impact Statement (EIS), is located immediately to the west of the proposed project.

The project is located about 70 km south-east from Mildura (Figure 1.1), a regional centre with a population of about 34,000. A range of services to the region are located in Mildura including an airport, a hospital and other health services and a university.

There are also small townships in the vicinity of the project site. Euston is approximately 12 km south west of the project and has a population of around 800 people. Robinvale (approximately 10 km south-west) is located in Victoria, east of Euston and just south of the Murray River and has a population of approximately 3500 people. Development in and around the project site is largely related to cropping and grazing and includes rural residences.

1.2.1 Land use

The project area is zoned RU1 Primary Production under the *Balranald Local Environment Plan 2010* (Balranald LEP). The majority of the land within the solar project site is currently used for grazing or cropping, with scattered rural residences and agricultural structures. The solar project site predominately consists of pasture with scattered paddock trees. Sections of the site contain intact native vegetation (woodland and grasses) in good condition, which has been avoided where possible in the development of the indicative project layout.

The project site is directly south of the Willandra Lakes World Heritage Area (WHA). The WHA contains important natural and cultural features including exceptional examples of past human civilization.

1.2.2 Existing landscape

The landscape within the solar project area is mostly clear and flat expanses used for grazing or cropping. Arumpo Creek runs to the north of the site and a number of other unnamed tributaries run throughout the site.

Elevation across the solar project site is fairly constant, ranging from approximately 55 m to 70 m AHD. The Arumpo Creek drains the northern portion of the site. The southern portion drains into Dry Lake via a number of unnamed water courses.

Photograph 1.1 shows the landscape of the project site.

Photograph 1.1 Landscape of the project site

1.2.3 Landscape character

The landscape of the solar project site and its surrounds can be characterised into three broad categories. These are defined by the vegetation, land form, land use and presence of water.

i Murray River corridor

The Murray River is a significant feature in the landscape as it winds its way from east to west, south of the project area. The river influences wide swathes of the landscape on either side of the waterway. These lands are subject to flooding and contain lakes and smaller waterways that connect the water bodies.

The river is controlled by a series of locks/weirs and used for irrigation for the surrounding agricultural lands. The river is also used for recreational boating and fishing. A photograph of the Murray River nearby to the project is shown in Photograph 1.2.

Photograph 1.2 Murray River

ii Agricultural pastures

The agricultural pastures make up the majority of the landscape across the solar project site. The woodland has been cleared to provide pastures for grazing and fields for dry cropping and irrigated crops. The topography is fairly flat with low rises divided by water courses.

There are occasional corridors of remnant woodland along watercourses, roads, and property boundaries. Visually, the pastures are vast, flat fields of crops that are punctuated by remnant trees.

Photograph 1.3 shows the open agricultural plains in the western part of the project site.

Photograph 1.3 Agricultural pastures landscape

iii Mallee woodlands and shrublands

The Mallee woodlands and shrublands occur in semi-arid landscapes around the solar project site. It is dominated by low, multi-stemmed eucalyptus (Mallee) that rarely grow taller than six metres. The understorey can be made up of shrubs or grasses, depending on the rainfall, soil and fire history.

Visually, the Mallee woodlands and shrublands creates a uniform landscape with sculptural multi-stemmed trees of similar size. This is in sharp contrasted with adjacent cleared paddocks and roadways that cut through the woodlands.

Photograph 1.4 depicts the woodland around the project site.

Photograph 1.4 Mallee woodlands and shrublands landscape

1.2.4 Sensitive receivers

Sensitive receivers refer to people who have potential views of the solar project. They are represented and assessed using the locations of dwellings that surround the project area. The Solar Guideline limits the assessment of sensitive receivers to a distance of 4 km from the project boundaries. Therefore, only dwellings that are located within the 4 km distance of the solar components are considered in this PVIA.

There are three non-associated residences within 4 km of the solar project area. The closest is approximately 2.75 km from the solar project area. Figure 1.3 shows the sensitive residential receivers (associated and non-associated with the project) who are considered in this PVIA.

The Balranald LEP lists three items near the project area. These are:

- Lake Benanee Burial Ground (Balranald LEP listing I7). This is located in the Lake Benanee rest area.
- Euston Courthouse (Balranald LEP listing I6)
- Euston Lock and Weir 15 (Balranald LEP listing I5).

Only the Lake Benanee Burial Ground is located within the 4 km distance that is assessed in this PVIA, and therefore the only heritage item that is included in the assessment.

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

Sensitive receivers

Koorakee Energy Park - Solar Energy
Preliminary Visual Impact Assessment
Figure 1.3

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2 Assessment approach

The purpose of the PVIA is to identify locations around the solar components of the project that have the potential for visual impacts. Visual impacts are changes to the existing landscape that can be seen by people. These potential impacts must be assessed and assigned a rating of high, moderate, low, or negligible. To make an assessment, a specific location must be used so the scale of change can be measured. These specific locations are viewpoints, and each viewpoint represents the views from the general area in which it is located.

The PVIA evaluates the surrounding residences, roads, rails and other publicly accessible places to identify locations that will be visually impacted by the project. These locations become viewpoints that will be assessed in detail in later chapters of this report.

This PVIA is a requirement of the *Large-Scale Solar Energy Guideline* (2022) implemented by the NSW Department of Planning, Housing and Infrastructure (DPHI), formerly Department of Planning and Environment (DPE). The assessment is undertaken with reference to:

- *Large-Scale Solar Energy Guideline* (DPE 2022) (the Guideline)
- *Technical Supplement – Landscape and Visual Impact Assessment* (DPE 2022) (Technical Supplement).

2.1 Viewpoint selection

An initial step of the assessment is to identify the viewpoints that will be analysed. For the PVIA, viewpoints are limited by distance to the proposed development. The Technical Supplement requires the assessment to "identify all viewpoints from public roads and rail lines within 2.5 km of the proposed development" and "other public and private viewpoints within 4 km of the proposed development". These distances are calculated from the nearest point of the development to the viewpoint.

The number of viewpoints can be refined where there is an excessive number of potential viewpoints. Representative viewpoints may be selected and assessed in lieu of dwellings that are clustered together in residential areas, villages and urban areas.

2.2 Field of view

The PVIA relies on the relative size of the project when compared to the observer's field of view (FOV). It assumes an item taking up more of the FOV will have more of a visual impact than an item that takes up a smaller portion of the FOV. For example, a solar farm that occupies 10% of the FOV will have more of a visual impact than if it occupied 4% of the FOV.

Based on the above criteria, the preliminary assessment first identifies viewpoints from which the project will be visible. It then calculates the relative size of the project vertically in the FOV and repeats the relative size calculation horizontally in the FOV.

Finally, the vertical and horizontal relative sizes are combined using the preliminary assessment tool to rate the potential impact and determine whether a detailed assessment is required for that viewpoint. The detailed assessments for viewpoints identified will be performed in the Landscape and Visual Impact Assessment during the EIS stage of the project.

2.2.1 Vertical field of view

This portion of the assessment requires the vertical FOV to be calculated for each viewpoint. The calculations for this assessment are based on the project area, which is the area occupied by solar modules and other project infrastructure.

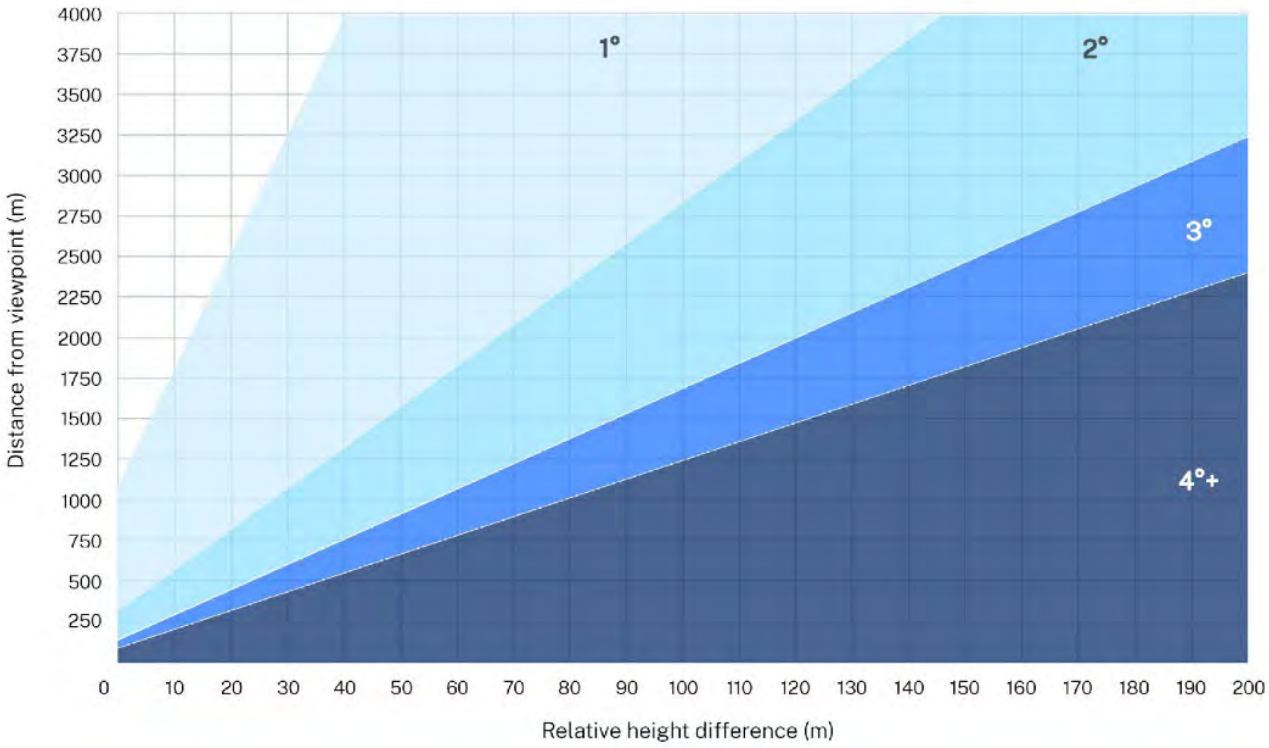
Determining the vertical FOV requires that a relative height difference be calculated. There are three methods to calculate the height difference depending on the elevation of the viewpoint relative to the solar modules.

1. Project is located above and below the viewpoint – subtract the lowest point of the development from the highest point of the development.

2. Project is located above the viewpoint – subtract the viewpoint height from the highest point of the development.

3. Project is located below the viewpoint – subtract the lowest point of the development from the viewpoint elevation.

The resulting height difference for each viewpoint is plotted against the distance of the viewpoint from the development. Figure 2.1 provides the assessment tool for the vertical FOV.



Source: Technical Supplement – Landscape and Visual Impact Assessment.

Figure 2.1 Vertical field of view assessment tool

The resulting indicative vertical FOV determined by the assessment tool is expressed as either 1, 2, 3 or 4+ degrees. This result for each viewpoint is assessed against the horizontal FOV in Table 2.1.

2.2.2 Horizontal field of view

The horizontal FOV is measured by mapping the project and calculating the extent of the development (in degrees) in relation to the viewpoint. The Technical Supplement requirement is to "measure the worst-case horizontal field of view of the project from each viewpoint (not considering topography or vegetation)." This calculation is performed by drawing lines from the extents of the solar modules to the viewpoint and measuring the angle formed by the two lines. The result is assessed in the preliminary assessment tool in Table 2.1.

2.2.3 Preliminary assessment tool

The preliminary assessment tool is used to determine if a viewpoint needs to be assessed in detail during the EIS stage of the project. It is designed to eliminate the need to assess viewpoints that are likely to experience very low impacts. It combines the horizontal FOV with the vertical FOV to determine if further assessment is required.

Table 2.1 Preliminary assessment requirements tool

Horizontal FOV of project	1^{O} vertical FOV	2^{O} vertical FOV	3^{O} vertical FOV	4+^{O} vertical FOV
1-10^{O}	No assessment required	No assessment required	No assessment required	No assessment required
11-20^{O}	No assessment required	No assessment required	No assessment required	Assessment required
21-30^{O}	No assessment required	No assessment required	Assessment required for all viewpoints except rail/road	Assessment required
31-40^{O}	No assessment required	Assessment required for all viewpoints except rail/road	Assessment required for all viewpoints except rail/road	Assessment required
41-50^{O}	No assessment required	Assessment required for all viewpoints except rail/road	Assessment required	Assessment required
51-60^{O}	No assessment required	Assessment required for all viewpoints except rail/road	Assessment required	Assessment required
61-70^{O}	No assessment required	Assessment required	Assessment required	Assessment required
71-130^{O}	Assessment required for all viewpoints except rail/road	Assessment required	Assessment required	Assessment required
130^{O}+	Assessment required	Assessment required	Assessment required	Assessment required

Source: Technical Supplement – Landscape and Visual Impact Assessment.

2.3 Viewshed mapping

Viewshed mapping is used to supplement the FOV assessment. It illustrates the area in the surrounding landscape from which the project may be visible. It also indicates areas that have intervening hills or other landforms that block views.

This study uses a Zone of Visual Influence (ZVI) to map the viewshed (refer to Section 3.3). It is generated using geographic information system (GIS) and is used to simulate the project's visibility from the surrounding landscape. The ZVI has been restricted to a 4 km distance from the project as this is the distance specified in the Technical Supplement.

It is important to note that the Technical Supplement requires that vegetation (trees) and built structures not be included in the mapping. The resulting maps can therefore only show where landforms obstruct views. This can be significant for viewpoints that are located behind vegetation or buildings and have no views of the proposed development yet are assessed as having a potential impact in this PVIA.

3 Preliminary assessment

3.1 Viewpoint identification

For the purposes of the preliminary assessment, there are three types of viewpoints. These are:

- Roads and rail viewpoints – locations along roads and rail lines that have views into the solar project site. The technical supplement limits these viewpoints to within 2.5 km of the development.
- Public viewpoints – locations that are publicly accessible (parks, trails, shopping areas) and offer views into the solar project site. These views are limited to a 4 km distance from the development.
- Private viewpoints – locations that are not accessible to the public (mainly residences) and have views into the solar project site. These views are limited to a 4 km distance from the development.

3.1.1 Roads and rail viewpoints

Roads and rail carry a large number of people who have the potential for visual impacts if the road is located near the project site. However, due to the transitory nature of the view as travellers move through the landscape, the visual impact is reduced when compared to a stationary viewer.

The roads near the project with potential views into the solar components of the project are:

- Sturt Highway
- Euston Prungle Road
- Benanee Road
- Thompson Road
- Mengler Road
- Meilman Road.

There are no railways near the project area.

3.1.2 Public viewpoints

Public viewpoints include a number of various types of locations. They include public gathering areas like parks, sporting fields and walking trails in the surrounding community. They also include trails, scenic viewpoints and campsites that are located within regional, state and national parks, reserves and forests. Tourist attractions, heritage sites and public buildings can also be included in this category.

The only public area near to the solar project with potential views into the project is the Lake Benanee rest area.

3.1.3 Private viewpoints

Private viewpoints are primarily residences and land held by private individuals. Access to these locations is typically restricted, limiting the number of people who are impacted by a project. However, these are locations where people spend most of their time. Therefore duration of a visual impact is substantial for those living there.

Private viewpoints are assessed in one of two ways.

- Residences near the project that are likely to have significant visual impacts area assessed individually. These are likely to require detailed assessments in the Landscape and Visual Impact Assessment (LVIA) in the EIS. During the LVIA process, photographs will be taken from the residence, in a location that captures views from important rooms in the house.
- Residences further away from the project are assessed in groups. Typically, a viewpoint is selected to represent a cluster of residences. The viewpoint is chosen where the impact is likely to be greatest for that group of residences. Photographs that represent a cluster of residences are usually taken from the roadway or common drive.

The residences identified with potential visual impacts are shown in Table 3.1.

3.1.4 Selected viewpoints

The selection of the viewpoints is based on the locations of residences, public areas and roads / rail. This was overlaid with the viewshed mapping to determine which locations had the potential for visual impacts from the project. Viewpoints selected satisfy both criteria; falling within the affected ZVI and characterised as a private, public or road / rail viewpoint.

This assessment also uses representative viewpoints that combine a number of viewpoints that are clustered together and have similar views of the project. This allows a reduction in the number of viewpoints while maintaining representation for each residence, public area and roadway. Table 3.1 lists the viewpoints selected for this assessment and the rational for the selection. Figure 3.1 illustrates where the viewpoints are located.

Table 3.1 Selected viewpoints for assessment

Viewpoint reference	Viewpoint type	Location	Representative receptors	Rationale for selection
SH041	Private	50541 Sturt Highway, Euston	SH041	Residence within 4 km
SH035	Private	50557 Sturt Highway, Euston	SH035	Residence within 4 km
SH055	Private	50557 Sturt Highway, Euston	SH055	Residence within 4 km
PU-01	Public	Benanee Road, Euston	Motorists	Road location with representative views from residences and a rest area.
PU-02	Public	Sturt Highway, Balranald	Motorists	Rest area on Sturt Highway
PU-03	Public	Meilman Road, Euston	Motorists	Road location with views from the south
PU-04	Public	Benanee Road, Euston	Motorists	Roadway approaching the project area
PU-05	Public	1989 Euston Prungle Road, Euston	Motorists	Roadway approaching the project area
PU-06	Public	Benanee Road at Thompson Road	Motorists	Heritage item (Koorakee railway station)

KEY

- Koorakee Energy Park
- Photovoltaic (PV) layout
- PV public viewpoint study area (2.5 km)
- PV sensitive receiver study area (4 km)
- Public viewpoint

Sensitive receiver

- Associated residence
- Non- associated residence

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

0 2.5 5 km

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Viewpoint locations and receptors

Koorakee Energy Park - Solar Energy
Preliminary Visual Impact Assessment
Figure 3.1

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3.2 Preliminary assessment

The preliminary assessment tools specified by the Technical Supplement have been applied to each selected viewpoint. The assessment criteria and results are listed in Table 3.2.

Table 3.2 Preliminary viewpoint assessment

Viewpoint reference	Viewpoint type	Distance to solar project (m)	Relative height difference (m)	Vertical FOV (degrees)	Horizontal FOV (degrees)	Detailed assessment required
SH041	Private	2720	15	0	91	No
SH035	Private	3400	15	0	90	No
SH055	Private	3600	15	0	88	No
PU-01	Public	2060	15	0	72	No
PU-02	Public	150	15	4	157	Yes
PU-03	Public	2300	15	0	60	No
PU-04	Public	350	15	3	184	Yes
PU-05	Public	1890	15	1	70	No
PU-06	Public	570	15	2	190	Yes

The preliminary assessment indicates that none of the 3 private viewpoints, and 3 of the 6 road / public viewpoints need to be further assessed in the EIS stage of the project.

It is worth noting that some viewpoints that are close together may also be combined and represented with a representative viewpoint. Also, some of the viewpoints identified for detailed assessment may not have visibility or visual impacts from the project. This preliminary assessment does not take into account any vegetation or structures that may screen views into the project. Each of the viewpoints will need on-site verification with photographic evidence of potential visual impacts. This verification will take place during the preparation of the detailed LVIA.

3.3 Summary of ZVI

The ZVI is used to select viewpoints by indicating areas that are predicted to have views into the solar and BESS project. Conversely, it indicates areas that are not predicted to have any views of the solar project. With this knowledge, viewpoints can be selected from areas where the project is visible. Areas that do not have line-of-sight to the project can be eliminated from the assessment. The ZVI is shown in Figure 3.2.

The ZVI illustrates:

- the topography of the region does little to limit views into the solar project area within 2 – 3 km of the boundary of the solar components. Beyond this distance, views of the project area fall off significantly.
    - Areas immediately to the north-east of the solar extents are predicted to have the highest visibility of the solar components
    - Locations to the south-west and west of the solar extents are predicted to have the lowest visibility of the solar components.

- residences around Lake Benanee have low levels of visibility of the solar and BESS components
- travellers along Euston Prungle Road are expected to have low levels of visibility of the solar components
- locations along Sturt Highway have opportunities to see the solar components as it passes near the southern boundary. This location is closest to the BESS compound.

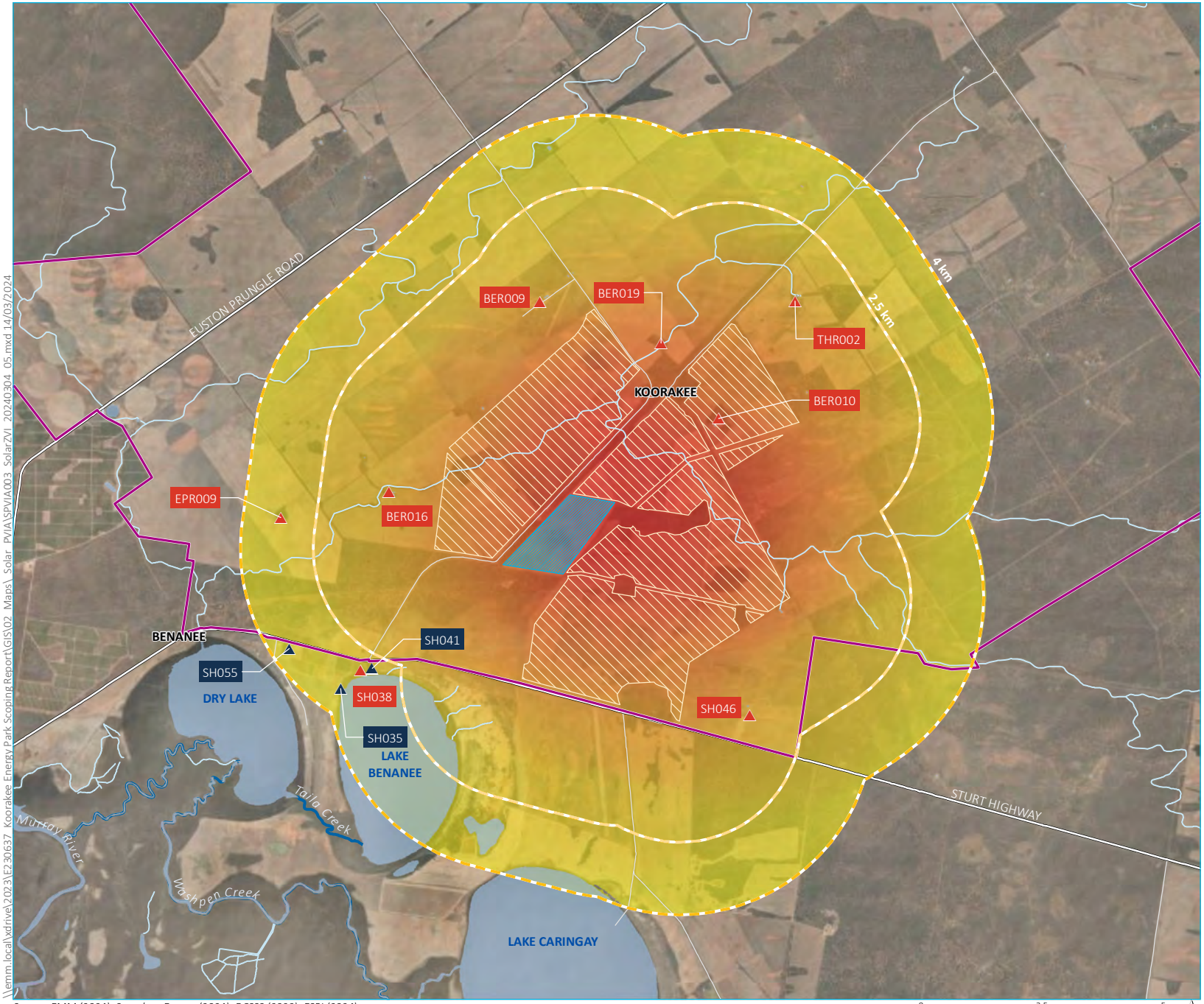
The ZVI is a tool to help identify the project's visibility from the surrounding landscape. The extent of the project's visibility and the potential for impacts on visual amenity is verified by field work and photographic evidence.

3.3.1 Reverse viewshed

Figure 3.3 is the reverse viewshed for the solar components of the project. It illustrates areas within the solar components that can be seen by the largest number of receivers. It takes into account the dwellings located within 4 km of the solar project. The reverse viewshed also represents a bare-ground scenario by not taking into account the vegetation cover or structures in the landscape.

The reverse viewshed indicates:

- The northeastern portion of the solar extents is likely to be visible to the highest number of dwellings
- The southern edge of the solar extents, along Sturt Highway, is also visible to a high number of dwellings.



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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

Zone of visual influence

Koorakee Energy Park - Solar Energy
Preliminary Visual Impact Assessment
Figure 3.2

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Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

Reverse viewshed

Koorakee Energy Park - Solar Energy
Preliminary Visual Impact Assessment
Figure 3.3

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4 Conclusion

4.1 Landscape character

The landscape within and surrounding the study area can be described as low rolling terrain. Land within the solar project area is mostly cleared of native vegetation and used for grazing and cropping. Native woodland is visible surrounding the study area.

The PVIA provides a preliminary assessment of the existing landscape within and surrounding the solar project area. In doing so, it identified three landscape character categories that will be refined and characterised in greater detail in the EIS stage of the project. The categories identified are:

- Murray River corridor – The major landscape feature defining the region
- Agricultural pastures – Cleared lands for grazing and cropping
- Mallee woodlands and shrublands – Native woodlands surrounding the project area.

4.2 Preliminary assessment summary

The preliminary assessment is a tool to help identify viewpoints with potential visual impacts from a solar component of the project. It offers a structured process to identify potential viewpoints and evaluate whether a viewpoint needs further assessment.

This preliminary assessment identified 3 private viewpoints and 6 road / public viewpoints in the community and landscape surrounding the project. After applying the preliminary assessment tools, only 3 road / public viewpoints were identified as needing further assessment as part of the EIS.

References

Australian Bureau of Statistics 2021, https://abs.gov.au.

Donaldson, Joseph J. 2019, *Mitigating Visual Impacts of Utility-Scale Energy Projects*, Visual Resource Stewardship Conference Proceedings.

Landscape Institute and Institute of Environmental Management and Assessment (2013), *Guidelines for Landscape and Visual Impact Assessment* (GLVIA) Third Edition.

NSW Department of Planning and Environment 2022, *Large-Scale Solar Energy Guideline*.

NSW Department of Planning and Environment 2022, *Technical Supplement – Landscape and Visual Impact Assessment, Large-Scale Solar Energy Guideline*.

NSW Department of Planning and Environment (2022), *eSPADE Spatial Viewer: https://www.environment.nsw.gov.au/eSpade2WebApp*.

Transport for NSW, Centre for Urban Design (2020), *Guideline for Landscape Character and Visual Impact Assessment, EIA-N04*, Version 2.2.

Tudor, Christine 2019, *An approach to landscape sensitivity assessment – to inform spatial planning and land management*. Natural England.

Balranald Shire Council (2010), *Balranald Local Environment Plan 2010.*

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Appendix F
Preliminary Noise Assessment

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Koorakee Energy Park

Preliminary Noise Impact Assessment

Prepared for Squadron Energy

May 2024

Koorakee Energy Park

Preliminary Noise Impact Assessment

Squadron Energy

E230637 RP#06

May 2024

Version	Date	Prepared by	Approved by	Comments
1	18 January 2024	Rick Scully	Alex Dundon	Issued to client
2	8 February 2024	Rick Scully	Alex Dundon	Revised issue to client
3	1 May 2024	Mark Trudgett	Christopher Holloway	Final

Approved by

Christopher Holloway
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1 Introduction

The Koorakee Energy Park (KEP) project includes the installation, operation and maintenance and decommissioning of approximately 167 WTGs, a large-scale solar PV generation facility, as well as a BESS and associated infrastructure. The project will have an installed capacity of up to 2 GW, comprising up to 1 GW of generation capacity from each of the wind and solar components. The BESS will have a capacity of up to 1 GW and will have provision for up to 12 hours of storage (12 GWh).

Project infrastructure will be contained within the development corridor, the area within which infrastructure, including WTGs and PV generation equipment, will be placed, providing the necessary flexibility for further detailed design (i.e. micro-siting) whilst also allowing a detailed environmental assessment process to be completed.

The final layout and capacity of the project will be selected on the basis of environmental constraints identification, outcomes of stakeholder engagement, engineering assessments and design of project infrastructure. It is noted that the proposed development corridor is a conservative area for early assessment purposes and the proposed disturbance area will likely be significantly smaller.

This Preliminary Noise Impact Assessment (PNIA) has been developed to provide an initial prediction of noise levels from the wind farm within the proposed development corridor at surrounding land uses. This initial assessment will be expanded on with a detail noise impact assessment in the Environmental Impact Statement (EIS) phase.

2 Modelling inputs

2.1 Wind turbines

As the final wind turbines are not known for the project, EMM has assumed the sound power level from the General Electric ('GE') GE 6.0 164-50Hz wind turbine which would be a candidate turbine for a project of this size. The final selection would include a range of agreed performance conditions, including sound power levels and compliance with noise limits and nearby sensitive receivers.

The proposed hub height for the wind turbines is approximately 160m, with a rotor diameter of up to 185m. The sound power level (Lw) for the proposed wind turbines is 107.0 dBA.

Given the potential for wind turbine models to change, an adjustment for uncertainty was not incorporated into this assessment. As the design progresses into the EIS phase and the current candidate turbines are considered for this Project, the applicability of an adjustment to sound power levels to account for uncertainty will be considered. The results of this assessment will be incorporated into the Noise and Vibration Impact Assessment report, which will support the EIS.

Spectral data used in the modelling is shown in Table 2.1 Limited information on tonal audibility was provided at this stage. The need for adjustments to account for tonality will be considered in the Noise and Vibration Impact Assessment during EIS phase.

Table 2.1 Modelled turbine sound power level – GE 6.0 164-50Hz

A weighted octave band sound power level, dBA										Overall, dBA
16 Hz	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
65.2	78.8	88.1	93.6	98.1	100.7	102.3	100.1	92.6	76.8	107.0

2.2 Modelling process

At this preliminary stage of assessment, operational wind farm noise levels have been predicted using SoundPLAN version 8.2 software. The method used to predict A-weighted noise levels at nearby sensitive receivers is International Standard ISO 9613-2: 1996 *Acoustics—Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2). This algorithm is consistent with the guidance provided by the South Australian *Wind Farm Environmental Noise Guidelines* referenced by the Noise Assessment Bulletin.

Adjustments to this methodology have been made on the basis of international research and guidance. These are contained in the UK Institute of Acoustics *A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise* (IOA Good Practice Guide). These adjustments include application of terrain screening and ground effects to ensure consistency with research findings regarding validity of modelling.

3 Noise criteria

3.1 Noise Assessment Bulletin

The Noise Assessment Bulletin provides guidance for how noise impacts should be assessed for large-scale wind energy development projects classified as State Significant Development. The Noise Assessment Bulletin adopts the South Australian EPA publication *Wind Farms Environmental Noise Guidelines* (Guidelines) to be used as the relevant assessment standard, subject to some variations applicable to assessment of projects within NSW. These variations are related to noise limits, special noise characteristics and noise monitoring.

While the Guidelines generally uses a 40 dB baseline criterion for most projects (except in areas zoned for Rural Living), the Noise Assessment Bulletin sets a baseline of 35 dB(A). Noise criteria are defined within the Noise Assessment Bulletin as follows:

> The predicted equivalent noise level (LAeq,10 minute) adjusted for tonality and low frequency noise in accordance with these guidelines, should not exceed 35 dB(A) or the background noise (LA90(10minute)) 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.

An outcome of this preliminary noise assessment is to identify locations at which the 35 dB(A) baseline limit may be exceeded, and therefore where background noise monitoring should be completed in order to determine background noise levels in accordance with the Noise Assessment Bulletin. The outcomes of this background noise monitoring will be used to derive wind farm noise criteria at each integer wind speed.

3.2 Associated receivers

The noise criteria above apply to noise sensitive locations that are non-associated residences (refer to Glossary for definition). The Noise Assessment Bulletin addresses associated receivers as follows:

> 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.

The Guidelines suggest a level of 45 dB L_{Aeq} should be considered as a base criterion for financial stakeholders. However, this level is not considered a limit, and noise levels at these properties would generally be controlled through commercial agreement between the wind farm developer and property owners.

3.3 Draft guideline update

In November 2023, the Department of Planning, Housing and Infrastructure (DPHI) (formerly Department of Planning and Environment (DPE)), released the *Draft Energy Policy Framework* (DEPF). This includes updates to the noise impact assessment methodology to align with the updates to the South Australian wind farm noise guidelines (2021) (these updates do not change the noise criteria and would not materially change modelling results). Additionally, the policy adopts a new noise criterion of 50dBA for passive recreation areas within National Parks to minimise land use conflicts.

These updates to assessment methodology will need to be incorporated in the detailed noise impact assessment conducted as part of the EIS phase of works, should these changes be adopted by DPHI.

3.4 Ancillary infrastructure

Operational noise from ancillary infrastructure (transformers, inverters, cooling equipment, batteries) are to be assessed in accordance with the NSW EPA's *Noise Policy for Industry* (NPFI). Under the NPFI, project noise trigger levels (PNTLs) are derived as noise criteria for the Project. Derivation of PNTLs and a detailed assessment under NPFI will be completed as part of the Noise and Vibration Impact Assessment during the EIS phase.

4 Assessment results

4.1 Predicted noise levels

The noise model described in previous sections was used to predict resultant noise levels from the proposed WTG locations. In almost all scenarios, noise levels are rounded to the nearest whole integer. However, in the case of wind farm developments, it is routine to report predicted levels to the nearest tenth of a decibel. This is as a result of noise criteria being statistically determined, and changes in WTG locations generally leading to very minor changes in predicted noise levels given typical receiver to turbine distances.

These predictions were carried out on the basis of a 107.0 dBA sound power level, corresponding to a hub height wind speed of 9 m/s.

4.1.1 Non-associated receivers

Predicted noise levels at all non-associated receiver locations were below 30 dBA. Table 4.1 presents the predicted noise levels for all non-associated receivers within 5km of the proposed wind farm. Tabulated values of all non-associated receivers are provided in Appendix A.

Table 4.1 Predicted noise levels – non-associated receivers

Receiver ID	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level	Minimum noise criteria, dB $L_{Aeq,10min}$
DLR001	669708	6178868	4336	13.9	35
DLR004	669849	6178761	4445	13.6	35
SH032	668294	6179000	4433	13.6	35

All of the predicted non-associated receivers comply with the base limit of 35 dB, with all predicted noise levels being below 30 dBA. These predictions indicate that the Project can be designed and operated in compliance with the Bulletin. Predicted noise contours are presented in Figure 4.1.

4.1.2 Associated receivers

Table 4.2 provide the results for all associated receivers with predicted noise levels greater than 30 dBA. Tabulated values of associated receivers are provided in Appendix A.

Table 4.2 Predicted noise levels – associated receivers

Receiver ID	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level
EPR013	672113	6188710	1762	35.8
EPR015	676036	6190940	1754	35.6
BER009	675551	6186106	1610	34.1
THR002	680817	6186133	1940	33.3
BER016	672434	6182186	1671	31.0

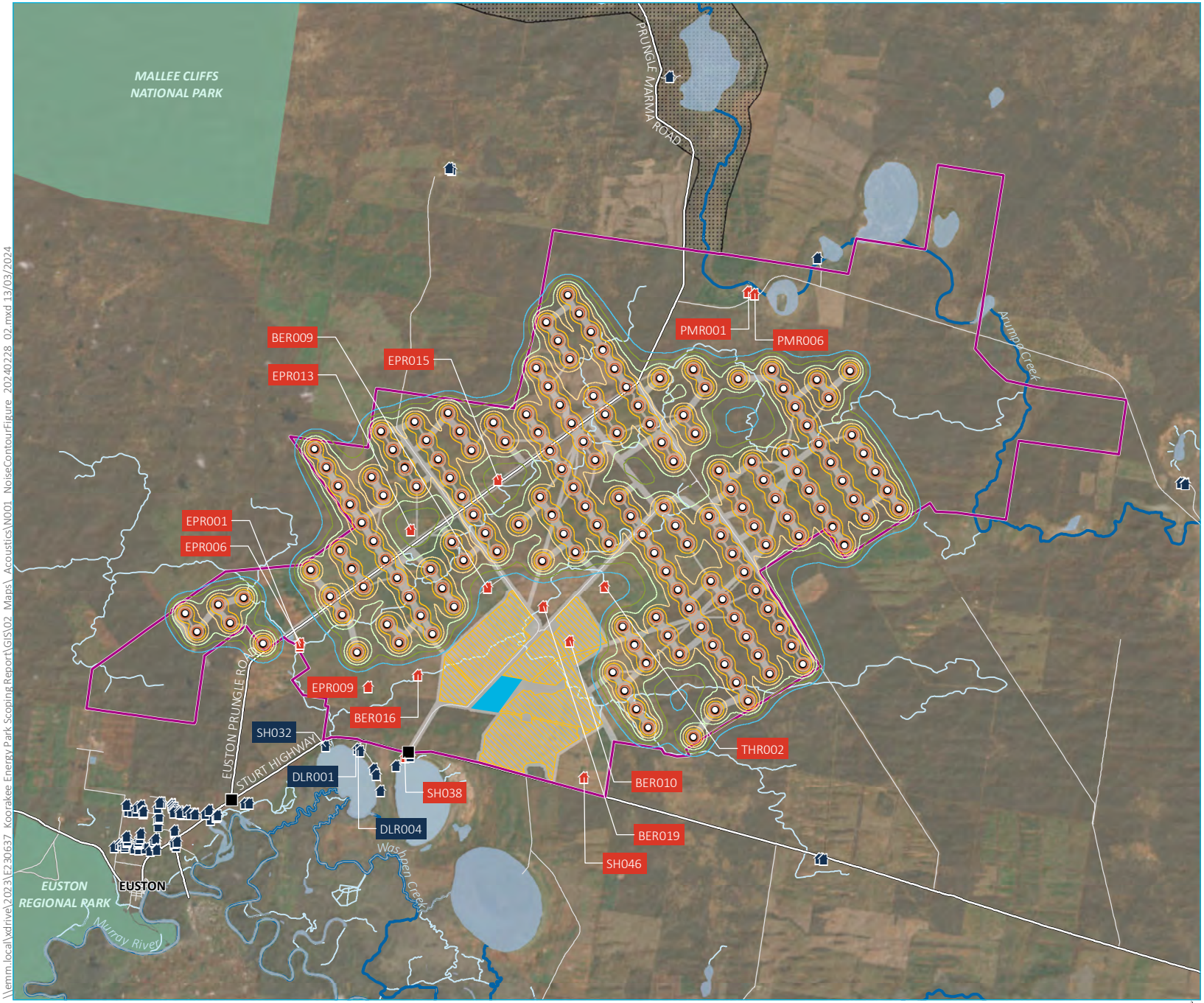
Table 4.2 Predicted noise levels – associated receivers

Receiver ID	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level
EPR006	667156	6183601	1662	31.0
EPR001	667136	6183447	1648	30.8

All of the predicted associated receivers comply with the recommended base criterion of 45 dBA.

4.2 Cumulative noise impacts

Cumulative noise impacts from the other components of the Koorakee Energy Park and other nearby developments will be addressed during the detailed EIS assessment, based on available public information.



KEY

- Koorakee Energy Park
- Photovoltaic (PV) layout
- Development corridor
- BESS and grid connection
- Wind turbine generator
- Site access

Sensitive receiver

- Associated residence
- Non-associated residence

Operational noise contour

- 35 dB
- 37 dB
- 39 dB
- 41 dB
- 43 dB
- 45 dB
- 47 dB
- 49 dB
- 51 dB

Existing environment

- Major road
- Minor road
- Named watercourse
- Unnamed watercourse/drainage line
- Waterbody
- NPWS reserve
- Willandra Lakes World Heritage Area

Source: EMM (2024); Squadron Energy (2024); DCSSS (2023); ESRI (2024)

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Operational noise contours

Koorakee Energy Park
Preliminary Noise Impact Assessment
Figure 4.1

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5 Detailed noise and vibration assessment

As part of the EIS for this Project, a detailed noise and vibration assessment will be conducted. This assessment will focus on:

- construction noise and vibration
- traffic noise assessment due to construction traffic
- operational wind farm noise
- operational noise from ancillary equipment.

At this stage of the Project design phase, there is insufficient detail to assess the above items. Construction noise and vibration impacts will be assessed against ICNG and *Assessing vibration*. Once construction schedules are developed and traffic impacts understood, an assessment of road traffic noise arising from haul routes and construction worker traffic will be conducted against the Road Noise Policy.

Ancillary equipment for the wind farm may include various size transformers, associated HVAC equipment and potentially battery storage. At this stage, there is no firm design information to conduct a detailed assessment. A detailed assessment will be conducted against environmental noise requirements of NPFI.

As more information becomes available during the design process, and turbine technology is selected, a detailed assessment at all hub height wind speeds will be conducted to confirm compliance with the NSW Noise Assessment Bulletin for the final design and selected technology. The results of these assessments will be incorporated into the Noise and Vibration Impact Assessment which will support the EIS for this Project.

6 Conclusion

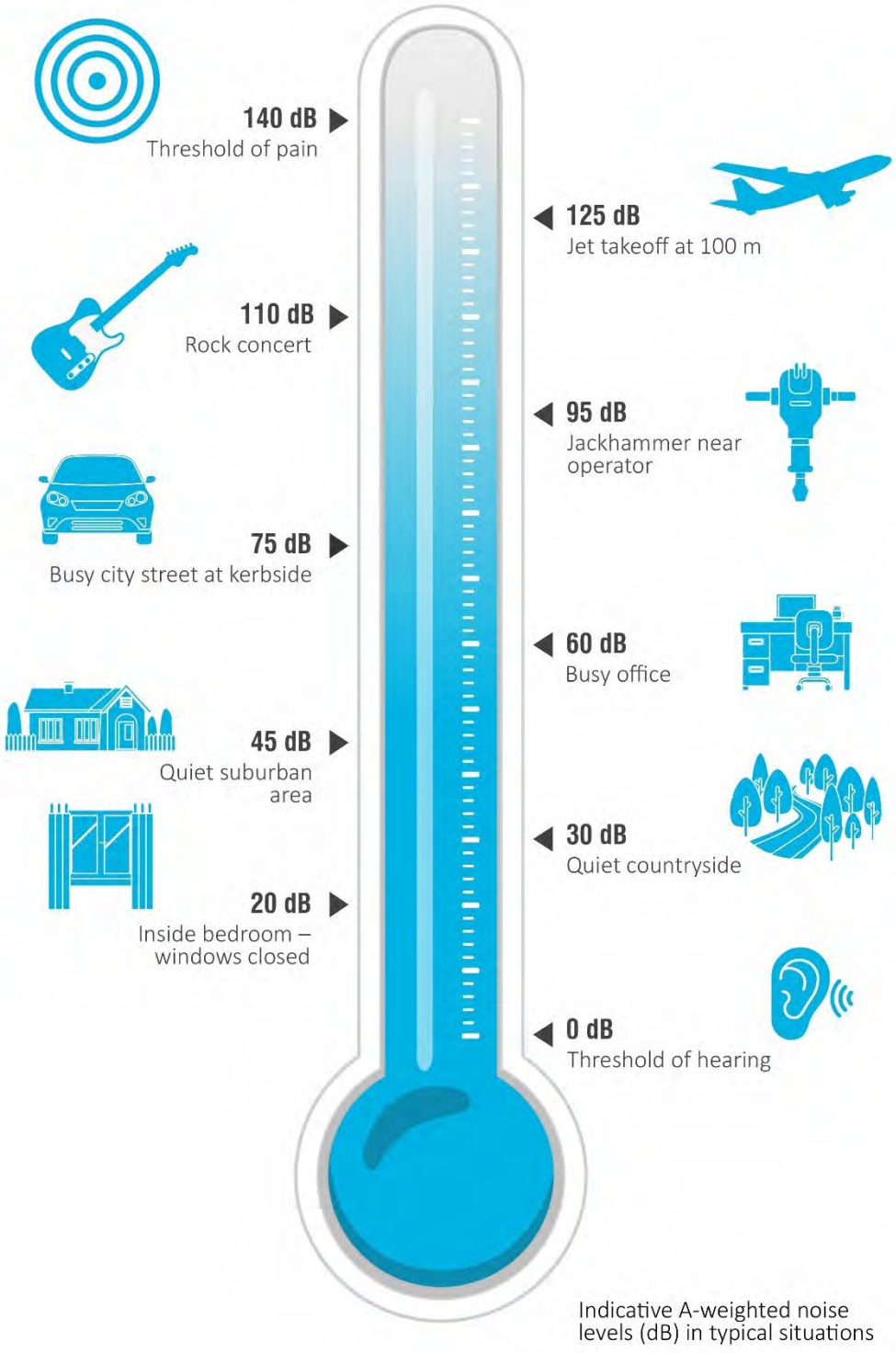
A preliminary assessment has been conducted for operational wind turbine noise for the proposed Project in accordance with the NSW Noise Assessment Bulletin demonstrating that for the proposed wind turbine technology and turbine locations, the minimum threshold target of 35 dBA would be achieved at all of the non-associated landowners under circumstances of maximum emissions.

Glossary

The key terminology used throughout this report is summarised in Table G1.

Table G1 Key project terminology

Area	Meaning
Noise	
A-weighting	There are several different weightings utilised for describing noise, the most common being the 'A-weighting'. This attempts to closely approximate the frequency response of the human ear.
dB	Noise is measured in units called decibels (dB).
L_{A1}	The A-weighted noise level exceeded for 1% of the time.
L_{A10}	The A-weighted noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
L_{A90}	The A-weighted noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
L_{Aeq}	The A-weighted energy average noise level. This is the equivalent continuous sound pressure level over a given period. The $L_{Aeq,10min}$ descriptor refers to an LAeq noise level measured over a 10 minute period.
L_{Amax}	The maximum A-weighted sound pressure level received during a measurement interval.
Sound power level (Lw)	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Residences	
Associated residence	A residence on privately-owned or leasehold land, in respect of which the owner has reached an agreement with the Applicant in relation to the development and management of impacts. Note, this includes rented residences that are owned by an associated landowner.
Non-associated residence	• a residence on privately-owned or leasehold land, in respect of which the owner has not reached an agreement with the Applicant in relation to the development; or • a residence on privately-owned or leasehold land, in respect of which the owner has reached an agreement with the Applicant in relation to the development, but the agreement does not cover the relevant impact; or • the performance measure for such impact under that agreement has been exceeded.



Source: Road Noise Policy (DECCW 2011)

Figure G1 Common sources of noise with levels

Appendix A

Tabulated receiver predicted values

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A.1 Predicted noise levels

Table A.1 Predicted noise levels – all receivers

Receiver ID	Receiver type (associated or non-associated)	Easting	Northing	Distance to nearest turbine (m)	Predicted operational noise level
EPR013	Associated	672113	6188710	1762	35.8
EPR015	Associated	676036	6190940	1754	35.6
BER009	Associated	675551	6186106	1610	34.1
THR002	Associated	680817	6186133	1940	33.3
BER016	Associated	672434	6182186	1671	31.0
EPR006	Associated	667156	6183601	1662	31.0
EPR001	Associated	667136	6183447	1648	30.8
EPR009	Associated	670205	6181661	1623	29.6
BER019	Associated	678052	6185260	2028	29.1
BER010	Associated	679240	6183701	2389	28.4
PMR006	Associated	687539	6199275	3490	22.3
PMR001	Associated	687248	6199379	3664	21.5
SH046	Associated	679886	6177576	3648	20.8
DLR001	Non-Associated	669708	6178868	4336	13.9
DLR004	Non-Associated	669849	6178761	4445	13.6
SH032	Non-Associated	668294	6179000	4433	13.6

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Appendix G
Social Impact Scoping Report

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Koorakee Energy Park

Social Impact Scoping Report

Prepared for Squadron Energy

May 2024

Koorakee Energy Park

Social Impact Scoping Report

Squadron Energy

E230637 RP#08

May 2024

Version	Date	Prepared by	Reviewed by	Comments
1	1 February 2024	Emma Barrie and Caroline Wilkins	Chris Mahoney	For client review
2	8 March 2024	Emma Barrie and Caroline Wilkins	Chris Mahoney	For client review
3	1 May 2024	Mark Trudgett	Christopher Holloway	Final

Approved by

Christopher Holloway
Associate Director
1 May 2024

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Appendices

Tables

Figures

1 Introduction

Squadron Energy proposes to develop the Koorakee Energy Park (KEP, the project) in the Far West region of New South Wales (NSW). The project comprises the generation of energy through both wind turbine generators (WTGs) and solar photovoltaic (PV) panels, as well as battery storage, transmission, ancillary and temporary infrastructure. The overall project site is approximately 58,000 hectares (ha). This encompasses a development corridor of 13,700 ha, the area within which infrastructure, including WTGs and PV generation equipment, will be placed, providing the necessary flexibility for further detailed design (i.e. micro-siting) whilst also allowing a detailed environmental assessment process to be completed.

The project site is situated approximately 12 kilometres (km) north-east of Euston within the Balranald Council Local Government Area (LGA). The project will have an indicative generation capacity of around 2 gigawatts (GW). The battery energy storage system (BESS) will have a capacity of up to approximately 1 GW and provision for up to 12 hours of storage (12 GWh).

The location of the project is shown in Figure 1.1.

The project is State significant development (SSD) pursuant to State Environmental Planning Policy (Planning Systems) 2021, with approval required under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). An SSD application for the project is to be accompanied by an Environmental Impact Statement (EIS).

A Scoping Report has been prepared by EMM Consulting Pty Limited (EMM) on behalf of Squadron Energy to support a request to the NSW Department of Planning, Housing and Infrastructure (DPHI) for Secretary's Environmental Assessment Requirements (SEARs) for the project. The SEARs will identify the matters to be assessed in the EIS and the level of assessment required.

This Social Impact Assessment Scoping Report ('SIA Scoping Report') has been prepared to support the Scoping Report, and was developed in accordance with the *Social Impact Assessment Guideline for State Significant Projects* (the 'SIA Guideline 2023') (DPE, 2023a) and the *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects* (the 'SIA Technical Supplement 2023') (DPE, 2023b).

This SIA scoping report documents the process and outcomes of the scoping phase of the SIA that will accompany the EIS. Scoping is an evaluation procedure which serves to define the scope (i.e. scale and extent) of the SIA and ensure that proportionate emphasis and focus is provided to respective social impacts.

1.1 The applicant

The applicant for the project is Squadron Energy.

Table 1.1 Applicant details

Requirement	Detail
Applicant	Squadron Energy Pty Ltd
ABN	13 615 221 559
Applicant address	55 Market St, Sydney NSW 2000
Contact	David Stanke
Contact details	david.stanke@squadronenergy.com

Squadron Energy is an experienced renewable energy developer and currently generates enough renewable energy to power 1.35 million homes. These projects have created over 1,900 direct jobs and invested $200 million in regional economies.

1.2 The project

1.2.1 Overview

The key components of the project are:

- approximately 167 wind turbine generators (WTGs) with a tip height of approximately 270 metres (m) and an installed generating capacity of up to 1 GW
- approximately 2.2 million solar panels with a generating capacity of up to 1 GW
- battery storage with a capacity of up to 1 GW and a storage duration of up to 12 hours (12 GWh)
- electrical connections between the WTGs and substations – consisting of a combination of underground cables and overhead powerlines
- substations and transmission connections to connect the project to a hub or transmission line
- infrastructure including private access roads and tracks, operations and maintenance buildings and construction facilities
- earthworks
- temporary on-site facilities including site offices and compounds, rock crushing facilities, concrete batching plants, stockpiles and materials storage compounds, and temporary laydown areas and meteorological masts during the construction phase of the project
- public road upgrades to facilitate safe site access, and targeted road network upgrades to facilitate delivery of wind turbine components to the site.

A workforce of approximately 300–400 full time equivalent (FTE) personnel will be required on-site during peak construction. The construction workforce will be sourced from the local area as far as practicable, noting the remote nature of the project and distance to key populated centres. There would likely be the requirement for non-local construction labour. Due to close proximity, it is assumed that accommodation would be sourced in the city of Mildura-Buronga.

The on-site collector substations will be constructed within the development corridor to convert the on-site AC reticulated electricity to 220 kilovolt (kV) for export to the existing grid, or 330 kV to the future grid following Project EnergyConnect completion. Electricity generated by the project will then be exported to the grid via a high voltage overhead line network connection and grid connection switch, located adjacent to the existing high voltage powerline at the south of the project site.

The project is being developed through a comprehensive process that incorporates community and stakeholder feedback to maximise positive social, economic and environmental outcomes, while minimising adverse impacts and unintended consequences. To date, Squadron Energy has engaged with residents within the project site, nearby neighbours, the wider local community, Balranald Council, relevant government agencies and other stakeholders. Engagement will continue throughout the project planning and assessment process.

1.2.2 Project site

The project is located within Balranald LGA in the Far West region of NSW. The project site is located on Crown Land managed under the Western Lands Lease arrangement. The land is predominantly used for agricultural purposes. The project area is zoned RU1 Primary Production under the *Balranald Local Environment Plan 2010* (Balranald LEP). Surrounding land uses include agricultural operations (livestock grazing as well as discrete areas for cropping) as well as scattered rural residential properties.

The project site is predominantly bordered by the Sturt Highway to the south and traversed by Euston-Prungle Road. An existing 220 kV transmission line traverses the southern section of the project site.

The project site shares a border with the Willandra Lakes World Heritage Area to the north. The Murray River is approximately 5 km south-west from the project site. The Mallee Cliffs National Park is approximately 10 km to the west of the project site.

The landscape within the project area is mostly clear, flat land used for grazing or cropping. Arumpo Creek runs through the north of the site and a number of other unnamed tributaries run throughout the site. Nearby natural features include:

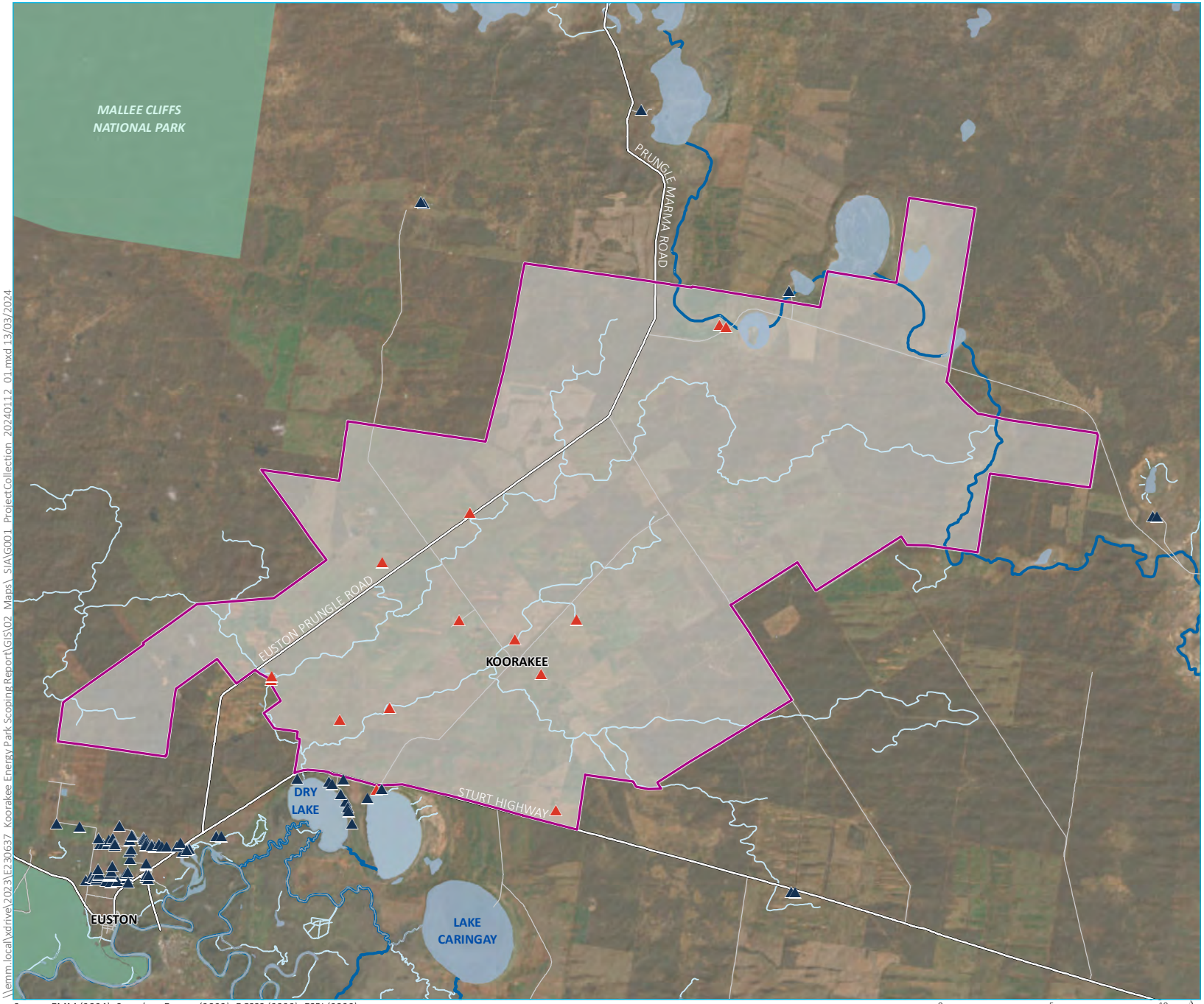
- Arumpo Creek
- various unnamed waterways
- Willandra Lakes World Heritage Area
- Mallee Cliffs National Park
- Dry Lake, Lake Benanee and Lake Caringay and associated wetland areas.

1.2.3 Project objectives

The South West region has been selected by the NSW Government for the development of renewable energy projects due to its natural energy resources (NSW Government, 2023). The project is within the South West Renewable Energy Zone (REZ), which was formally declared by the NSW Minister for Energy under Section 19(1) of the *Electricity Infrastructure Investment Act 2022* (NSW). The NSW Government intends that the South West REZ will have a network capacity of 2.5 GW (NSW Government, 2023).

The project will strengthen and reinforce the electricity grid in the South West region, helping to ensure that power from the South West REZ can be reliably moved into the grid and to consumers.

The project is consistent with NSW government policy for development of electricity infrastructure. It will assist in meeting NSWs energy generation and storage requirements, as well as the NSW and Australian Government emissions reduction targets.



KEY

- Koorakee Energy Park
- Nearby residence
  - Associated
  - Non-associated
- Existing environment
  - Major road
  - Minor road
  - Named watercourse
  - Watercourse/drainage line
  - Waterbody
  - NPWS reserve

Source: EMM (2024); Squadron Energy (2023); DCSSS (2023); ESRI (2023)

0 5 10 km

GDA 1994 MGA Zone 54

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Project location and nearby landowners

Koorakee Energy Park
Social Impact Scoping Report
Figure 1.1

EMM creating opportunities

2 Methodology

SIA is a process for analysing, monitoring, and managing the social consequences of a development (Vanclay, Esteves, Aucamp, & Franks, 2015). Social impact scoping is an exercise to determine the main issues of concern and the interested affected parties for a particular planned intervention (Vanclay, Esteves, Aucamp, & Franks, 2015). As such, scoping forms an essential element of the SIA process.

This section describes the methodology that has been used to complete social impact scoping and initial assessment. The methodology aligns with the *Social impact assessment guideline for State significant projects*, (SIA Guideline 2023), (DPE 2023a) and the International Association for Impact Assessment's *SIA guidance for assessing and managing the social impacts of projects* (Vanclay, Esteves, Aucamp, & Franks, 2015).

As outlined in the SIA Guideline 2023, the SIA process involves three distinct but iterative phases:

- Phase 1: social impact scoping and initial assessment
- Phase 2: social impact assessment
- Phase 3: social impact management and monitoring.

Each phase is underpinned with objectives and key tasks to generate deliverables as detailed in Table 2.1.

Table 2.1 Phases of the SIA process

	Phase 1: social impact scoping and initial assessment	Phase 2: social impact assessment	Phase 3: social impact management and monitoring
Objective	Ensure that proportionate depth and scope is given to potentially significant social impacts of the project	Identify, describe and assess the social impacts which may occur in local and regional communities as a result of the project and propose responses to the identified social impacts	Outline how social impacts associated with the project will be managed, monitored and adapted
Key tasks/elements	• Defining the project's social locality • Initial analysis of the social baseline • Preliminary identification and evaluation of social impacts • Considering and articulating project refinements • Community and stakeholder engagement	• Summarising outcomes of scoping • Detailed social baseline analysis • Predict and analyse the extent and nature of likely social impacts • Develop responses (avoidance, mitigation and enhancement measures) to social impacts • Identify and explain residual social impacts • Community and stakeholder engagement	• Program to monitor predicted social impacts against actual impacts • Program for the ongoing analysis of social risks and opportunities • Process to release monitoring results • Ongoing community and stakeholder engagement
Deliverable	Social impact scoping report (including SIA Scoping Worksheet)	Social impact assessment report	Social impact management plan (if required)

As defined in the SIA Guideline 2023, Phase 1 determines the extent and scale of likely social impacts of the project which defines the scope of the SIA (DPE, 2023a).

Outcomes of social impact scoping and initial assessment are presented in a social impact scoping report (this report) to support the EIS scoping report. The EIS scoping report will form a request to DPHI for the SEARs for the project, which will define the matters to be considered in the EIS. The SIA report completed in Phase 2 will summarise the scoping and initial assessment undertaken in Phase 1.

The key tasks undertaken during social impact scoping and initial assessment are:

- defining the project's social locality
- initial social baseline analysis
- community and stakeholder engagement
- preliminary identification and evaluation of social impacts.

These key tasks are described below.

2.1 Defining the social locality

As outlined in the SIA Guideline 2023 (DPE, 2023a), the term 'social locality' is also referred to as 'area of social influence' or 'SIA study area'.

Identifying the social locality begins with understanding the scale and nature of the project, the characteristics of affected communities and how positive and negative impacts may be reasonably perceived or experienced by different stakeholders (DPE, 2023a).

Defining the social locality for a project is informed by:

- describing the local setting of the project site, including land uses, nearby built or natural features, and access and connectivity
- understanding key project activities and the potential changes they might generate on the social environment to identify the geographic extent of change which may be experienced by stakeholders at a local, regional, or state-wide level
- identifying who may be affected by the project and how they may be affected, through stakeholder profiling and analysis
- understanding the regional development context and other proposed and existing projects in the region.

Outcomes of the above activities informed definition of the social locality adopted for the SIA. To enable social baseline data collection and analysis, the Australian Bureau of Statistics (ABS) Australian Statistical Geography Standard (ASGS) was also referenced in defining the social locality.

2.2 Initial social baseline analysis

Initial analysis of the social baseline serves to build an understanding of the socio-economic characteristics of the communities within the project's social locality.

The initial social baseline analysis is tailored to the project context and only includes the indicators and information relevant to the scoping and preliminary evaluation of impacts in the social locality.

The initial social baseline analysis draws on a range of primary and secondary information sources to obtain both qualitative and quantitative data.

Quantitative data sources include:

- ABS, including Census and population data
- DPHI population projections
- the Australian Government's Labour Market Portal unemployment and labour force participation data
- the Australian Institute of Health and Welfare, including health and wellbeing data.

Qualitative data sources include:

- outcomes of stakeholder and community engagement, for qualitative data on community values, capacities and challenges associated with social infrastructure and community facilities, and to verify quantitative data
- review of literature, including:
  - peer-reviewed academic journal articles
  - industry-commissioned surveys and research reports
  - government policy and publications
- desktop review of mapping tools, including:
  - the location of social infrastructure
  - areas and elements of social interest
  - other major projects.

The social baseline will be further refined during Phase 2 social impact assessment. The initial social baseline analysis for the project is provided in Chapter 4.

2.3 Community and stakeholder engagement

SIA is participatory and involves understanding impacts from the perspectives of those affected by a project activity. SIA scoping involves drawing upon community and stakeholder input to identify potential social impacts. This facilitates consideration of the concerns of the potentially affected communities and stakeholders early in the EIS process.

Engagement undertaken specifically to inform social impact scoping of the project included a community survey that was open from November 2023 to January 2024. Engagement notes completed by Squadron Energy from 2021 were also analysed.

The feedback generated through community and stakeholder engagement directly informs preparation of the initial social baseline analysis and the preliminary identification of social impacts and benefits.

2.4 Preliminary identification and evaluation of social impacts

The preliminary identification and evaluation of social impacts for different groups in the social locality is completed to determine the level at which these impacts need to be assessed in the SIA.

The initial identification and evaluation of social impacts is facilitated through completion of the SIA scoping worksheet (DPE, 2023a). This decision support tool is used to consider the social impacts of a project. It is used to demonstrate how issues from scoping informs the level of assessment undertaken for each identified impact in the SIA (Phase 2).

Quantitative and qualitative information is compiled and analysed to identify potential perceived social impacts associated with the project, from the perspective of affected parties, and informs preliminary evaluation of social impacts.

Social impacts are considered across eight categories in accordance with the SIA Guideline 2023 (DPE, 2023a) (Table 2.2).

Table 2.2 Social impact categories

Impact category	Description
Way of life	How people live, how they get around, how they work, how they play, and how they interact each day
Community	Composition, cohesion, character, how the community functions, resilience and people's sense of place
Accessibility	How people access and use infrastructure, services and facilities, whether provided by a public, private, or not-for-profit organisation
Culture	Both Aboriginal and non-Aboriginal, including shared beliefs, customs, practices, obligations, values and stories, and connections to Country, land, waterways, places and buildings
Health and wellbeing	Physical and mental health especially for people vulnerable to social exclusion or substantial change, psychological stress resulting from financial or other pressures, access to open space and effects on public health
Surroundings	Ecosystem services such as shade, pollution control, erosion control, public safety and security, access to and use of the natural and built environment, and aesthetic value and amenity
Livelihoods	People's capacity to sustain themselves through employment or business
Decision-making systems	Extent to which people can have a say in decisions that affect their lives, and have access to complaint, remedy and grievance mechanisms

Some projects may generate impacts across all these categories, whilst others may only generate impacts in a few categories. In accordance with the SIA Scoping Tool (DPE, 2023c), each project activity is assessed according its potential to impact on people; whether previous investigations of the impact have been undertaken; the potential for cumulative impacts; and possible mitigation or enhancement measures to reduce negative impacts and enhance positive impacts. Social impact characteristics that have been considered include:

- extent
- duration
- intensity/scale
- sensitivity/importance
- level of concern/interest.

Based on the assessment of these impact characteristics, the likelihood and magnitude of the potential impact (positive or negative) and their occurrence across differing stakeholder groups is determined through application of the impact significance matrix provided in the SIA Guideline 2023 (DPE, 2023a) (Figure 2.1).

		Magnitude level				
		1	2	3	4	5
Likelihood level		Minimal	Minor	Moderate	Major	Transformational
A	Almost certain	Low	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

Source: DPE (2023b)

Figure 2.1 Social impact significance matrix

Definition of the levels of likelihood and magnitude are provided in Table 2.3.

Table 2.3 Defining livelihood and magnitude levels of social impacts

Level	Meaning
Likelihood criteria	
Almost certain	Definite or almost definitely expected (e.g. has happened on similar projects)
Likely	High probability
Possible	Medium probability
Unlikely	Low probability
Very unlikely	Improbable or remote probability
Magnitude criteria	
Transformational	Substantial change experienced in community wellbeing, livelihood, infrastructure, services, health and/or heritage values; permanent displacement or addition of at least 20% of a community
Major	Substantial deterioration/improvement to something that people value highly, either lasting for an indefinite time, or affecting many people in a widespread area
Moderate	Noticeable deterioration/improvement to something that people value highly, either lasting for an extensive time, or affecting a group of people
Minor	Mild deterioration/improvement, for a reasonably short time, for a small number of people who are generally adaptable and not vulnerable
Minimal	Little noticeable change experienced by people in the locality

Source: DPE (2021b)

The ascribed significance of social impact determines the required level of assessment. As outlined in the SIA Guideline 2023 (DPE, 2023a), there are four assessment levels:

- Detailed: the Project may result in significant social impacts, including cumulative impacts.
- Standard: the project is unlikely to result in significant social impacts, including cumulative impacts.
- Minor: the project may result in minor social impacts.
- Not relevant: the project will have no social impact, or the social impacts of the project will be so small that they do not warrant consideration.

The assessment levels determine the scope and detail required for the SIA (Phase 2).

2.5 Limitations

This SIA Scoping Report has been based on the currently available project information, including the current project design. The design may be refined during preparation of the SIA and EIS. Further assumptions and limitations of the research include:

- a key source of data describing social conditions is the ABS Census of Population and Housing, the latest of which was in 2021. There may have been changes to social characteristics since this census event. Another consideration is that the 2021 Census occurred during the height of COVID epidemic restrictions which may have impacted upon socio-economic trends and characteristics as recorded
- during stakeholder interactions undertaken by Squadron Energy, data was recorded in note form by the team and as such, comments and quotes in this report are summarised as accurately as possible but may not be verbatim.

3 The social locality

This section describes how the project's social locality was defined. Identifying the social locality begins with understanding the scale and nature of the project, the characteristics of affected communities and how positive and negative impacts may be reasonably perceived or experienced by different people (DPE, 2023a).

3.1 Key project activities

The social locality for a project is informed by an appreciation of key project activities and the potential changes they might generate on the social environment to identify the geographic extent of change which may be experienced by stakeholders at a local, regional, or state-wide level.

An overview of key project activities, the potential change to the social environment, the potential geographical extent of the social change, and relevant baseline indicators are outlined in Table 3.1.

Table 3.1 Key project activities and potential change to social environment

Key project activity	Potential change to social environment	Stakeholder affected	Geographical extent of social change	Relevant baseline indicator
Generation of employment opportunities during construction and operation	• Change in supply and demand for labour	• Local communities	Regional	• Labour force participation. • Unemployment rates • Key industries of employment
	• Change in population dynamics	• Local communities • Social infrastructure providers and community services	Regional	• Population trends • Capacity of social infrastructure and services
	• Change to supply and demand for housing and short-term accommodation	• Accommodation providers • Vulnerable groups • Local government	Regional	• Housing availability and affordability • Capacity of short-term accommodation providers
Generation of business opportunities during construction and operation	• Change in supply and demand for goods and services	• Local economic and industry groups • Local and regional businesses	Regional	• Types and capacity of local and regional businesses
Establishment of project infrastructure	• Change to local amenity (including visual, noise, dust and lighting)	• Landholders. • Adjacent landholders	Local area	• Community values • Environmental values • Aesthetic values
	• Change to items and areas of cultural significance	• Traditional Owners and Aboriginal communities	Local area	• Cultural values
	• Increased traffic congestion from light and heavy vehicle traffic on local and regional road networks	• Local road users • Local government	Local and regional	• Access and connectivity

Table 3.1 Key project activities and potential change to social environment

Key project activity	Potential change to social environment	Stakeholder affected	Geographical extent of social change	Relevant baseline indicator
	• Changed perceptions of safety due to influx of non-local workers, increased traffic and altered traffic conditions on local roads	• Local road users • Local government	Local and regional	• Access and connectivity
Operation of project	• Change to amenity (including visual and lighting)	• Landholders • Adjacent landholders • Traditional Owners and Aboriginal communities	Local	• Community values • Environmental values • Cultural values
	• Change to perceptions of health and safety risk due to potential for blade throw, aviation incidents and bird strikes	• Landholders • Local communities	Local	• Community perceptions • Community health and wellbeing
Land use conversion	• Changes to agricultural production • Potential loss of biodiversity	• Landholders • Local communities • Regional communities	Project site	• Economic activity

3.2 Stakeholder profile

Stakeholder profiling is used to identify who may be impacted by the project and how they may be affected. Table 3.2 outlines the stakeholders who may be impacted by the project and how they may be affected with reference to the social impact categories as detailed in Section 2.4.

Table 3.2 Stakeholder profile and potential interest in social impact categories

Stakeholder group	Stakeholder	Way of life	Community	Accessibility	Culture	Health and wellbeing	Surroundings	Livelihoods	Decision-making systems
Local Government	• Balranald Regional Council	●	●	●	●	●	●	●	●
State Government	• NSW National Parks and Wildlife • Forestry Corporation • Biodiversity Conservation Service Division	●		●	●	●	●		●

Table 3.2 Stakeholder profile and potential interest in social impact categories

Stakeholder group	Stakeholder	Way of life	Community	Accessibility	Culture	Health and wellbeing	Surroundings	Livelihoods	Decision-making systems
Traditional Owners and Aboriginal communities	• Kureinji people • Barkandji/Paakantyi people • Mutthi Mutthi people • Ngiyampaa people • Other groups that may be identified in the EIS phase. • Murray Valley Aboriginal Cooperative Balranald Local Aboriginal Land Council	●			●		●	●	●
Landholders	• Landholders at project site • Adjacent and nearby landholders • Adjacent and nearby businesses	●					●	●	●
Social infrastructure providers and community services	• Euston Preschool • Euston Public School • Euston Rural Fire Service • Euston Police • Robinvale District Health Services			●		●			●
Housing and accommodation providers	• Robinvale Bridge Motel • Euston Motel • Euston Club Resort Riverside Suites & Executive Units • Robinvale Riverside Caravan Park • Euston Club Cabin Park • Riverfront Caravan Park & Café • Robinvale Golf Club Resort • Robinvale Riverside Caravan Park • Robinvale Accommodation Village • Weir Caravan Park		●	●				●	
Local communities	• Euston residents • Robinvale residents • Balranald residents	●	●	●	●	●	●	●	●
Regional communities	• Balranald LGA residents	●	●	●				●	●
Local economic and industry groups	• Robinvale Euston Business Association • Mildura Chamber of Commerce	●						●	●
Community groups	• Euston Regional Landcare • Tourism businesses			●	●	●	●		

3.3 Regional development context

There are several operating, approved and proposed major projects in the Balranald LGA and surrounds. Potential cumulative social impacts may include pressures on local housing and accommodation markets, changed traffic conditions due increased traffic on road networks, labour and skills shortages and the loss of landscape and environmental amenity.

Table C.1 (Appendix C) outlines the known details of other proposed projects and existing renewable projects within approximately 65 km of the project and the likely cumulative social impact considerations. The following projects are those most likely to contribute to cumulative social impacts:

- Euston Wind Farm – adjacent to the project site to the west.
- Project EnergyConnect (NSW – Eastern Section) - 330kV transmission line running adjacent to the southern border of the project site including the Balranald substation and construction accommodation facility.
- Euston Mineral Sands project – 4 km west of the project site.
- Balranald Mineral Sands project – 11 km north-east of the project site.
- Mallee Wind Farm – 42 km north-west of the project site.
- Atlas-Campaspe Mineral Sands Mine – 56 km to the north-west of the project site.
- Project EnergyConnect (NSW – Western Section) – including the Buronga substation and Balranald construction accommodation facility.

These proposed and existing projects within the region have potential to overlap with construction and operation of this project, thereby contributing to cumulative social impacts.

3.4 Project site and surrounds

The project is located adjacent to the Sturt Highway in the locality of Euston in NSW. It is a sparsely populated area with the nearest town being Euston, a small town on the banks of the Murray River approximately 12 km from the project site. The World Heritage listed Willandra Lakes Region is adjacent to the northern boundary of the project site, and the Mallee Cliffs National Park which is 10 km to the west of the project site. Lake Benanee and Dry Lake are within 1 km of the project site to the south.

3.5 Project social locality

The project's social locality was informed by consideration of key project activities, stakeholders likely to be affected by the project, and the regional and local development context. To enable social baseline data collection and analysis, the Australian Bureau of Statistics (ABS) Australian Statistical Geography Standard (ASGS) was also referenced in defining the social locality (ABS, 2021a). The ASGS statistical areas applied to define the social locality were:

- Suburbs and Localities (SALs) – approximate representation of the officially recognised boundaries of suburbs and localities as defined by the State and Territory governments of Australia
- Urban Centres and Localities (UCLs) – representation of areas of concentrated urban development
- Significant Urban Areas (SUAs) – representation of significant towns and cities of 10,000 persons or more

- Local Government Areas (LGAs) – approximate representation of gazetted local government boundaries as defined by each state and territory
- Statistical Area 4 (SA4) – represent the largest sub-state regions and used to understand regional data and to represent and analyse labour markets.

As of the 2021 ABS Census, SAL classifications replaced the State Suburb Classification (SSC) classification however they remain comparable. This report refers to SALs when discussing the 2021 ABS Census data and, where relevant, refers to SSCs when citing ABS Census data from previous years.

The regional area represents the South West REZ. The regional area consists of the LGAs that have a portion of the respective LGA area within the REZ area. While the area of the LGAs exceed the REZ area, this is the most suitable method of social characterisation of the REZ.

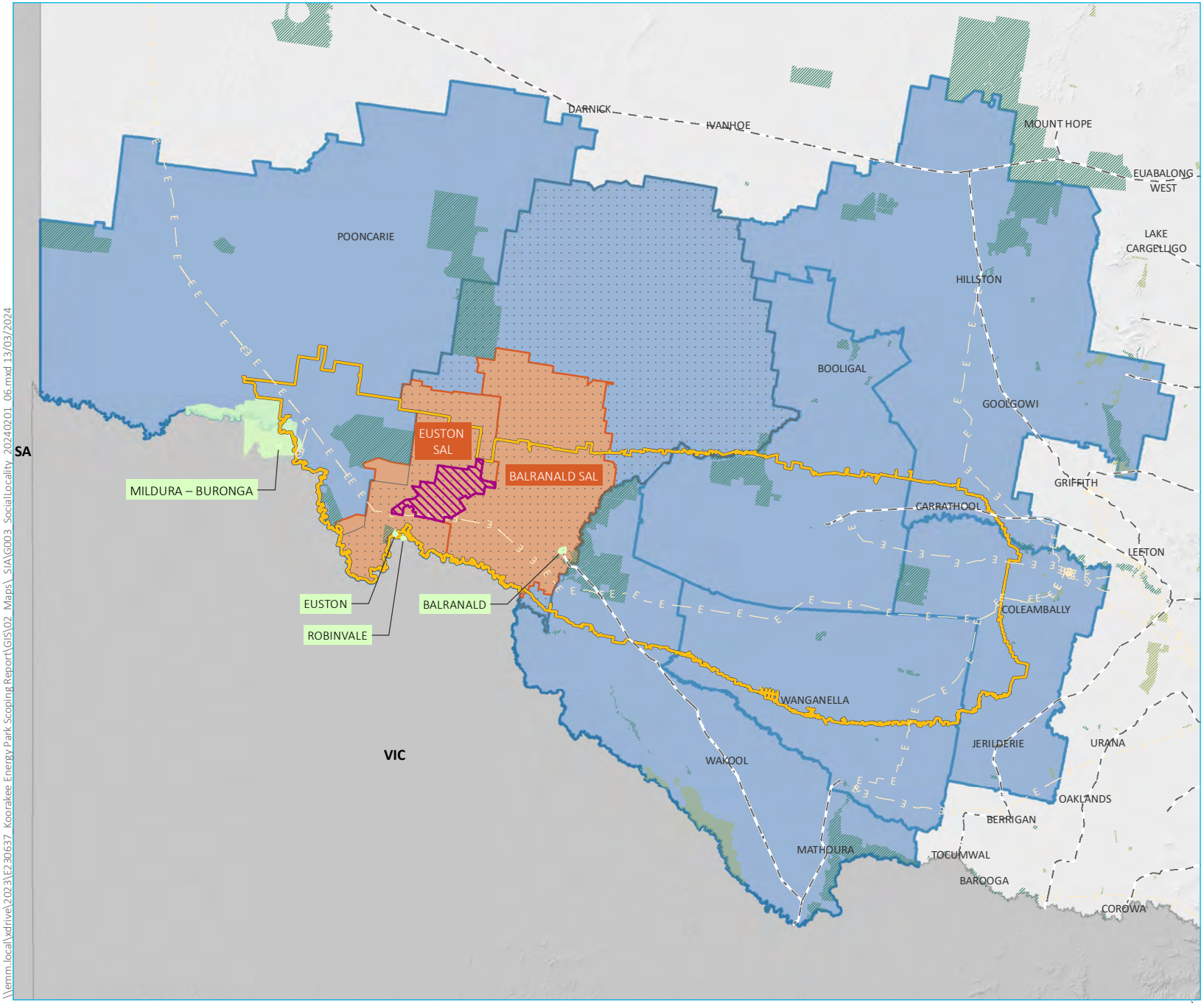
Table 3.3 details the social locality adopted for the SIA.

Table 3.3 Project social locality mapped to ASGS

Social locality	Geographic area	ASGS statistical area	Description/relevance to project
Local area	Euston	SAL 11471	The project site is located within the Euston SAL and borders the Balranald SAL. Residents of the local area are expected to experience project impacts including changes to traffic conditions on local roads including the Euston Prungle Road and Sturt Highway.
	Balranald	SAL 10169 excluding Balranald town (UCL 115005)	There are several residential dwellings and businesses located within 2 km of the project area boundary. Landholders and nearby neighbours have the potential to experience direct amenity impacts such as increased noise, vibration and dust during construction. Visual impacts for an extended duration are expected. Landholders could benefit from lease arrangement and other forms of compensatory payments
Key towns	Euston town	UCL 122054	Euston and Robinvale (twin towns) are located approximately 10 km to the south west of the project site. Balranald is around 70 km from the project site to the east. These towns may experience indirect impacts related to employment, demand for services, accommodation and amenity (traffic). The city of Mildura including the suburbs of Buronga, Gol Gol and Wentworth is the nearest regional city to the project site located approximately 90 km to the northwest. With a population of over 53,000 people, Mildura residents may experience impacts related to demand for labour, services and accommodation.
	Robinvale town	UCL 215072	
	Balranald town	UCL 115005	
	Mildura – Buronga city	SUA 2012	
Sub-regional area	Balranald LGA	LGA 10300	The project area sits within the Balranald LGA. Potential positive and negative impacts are expected to be experienced across this area, including changes to traffic conditions along the Sturt Highway.
Regional area	Wentworth	LGA 18200	The project is located within the South West REZ. There are seven LGAs that intersect with the South West REZ: Wentworth, Balranald, Murray River, Hay, Edward River, Carrathool and Murrumbidgee.
	Balranald	LGA 10300	
	Murray River	LGA 15520	
	Hay	LGA 13850	

Table 3.3 Project social locality mapped to ASGS

Social locality	Geographic area	ASGS statistical area	Description/relevance to project
	Edward River	LGA 12730	
	Carrathool	LGA 11600	
	Murrumbidgee	LGA 15560	



KEY

- Koorakee Energy Park
- South West REZ
- Regional area
- Key town
- Local area
- Sub-regional area

Existing environment

- Rail line
- Major transmission line
- NPWS reserve
- State forest

Project social locality

Koorakee Energy Park
Social Impact Scoping Report
Figure 3.1

EMM creating opportunities

Source: EMM (2024); ABS (2021); DCSSS (2023); ESRI (2024); GA (2009)

0 50 100 km

GDA 1994 MGA Zone 54

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4 Initial social baseline analysis

This section provides the initial social baseline analysis of the project's social locality. As determined in Section 3.5, the project's social locality comprise the towns of Euston and Robinvale (local area), the key regional centre of Mildura SAL, and the Balranald LGA (regional area). Relevant baseline indicators associated with key project activities were outlined in Section 3.1.

4.1 Policy and planning context

The social context relevant to the project is influenced by the policy and planning framework in which it is proposed to be developed. Table 4.1 provides an overview of the social and economic policies and strategies relevant to the project and describes how the project may contribute to, or support achievement of community goals, aspirations, or actions.

Table 4.1 Overview of policy and planning context

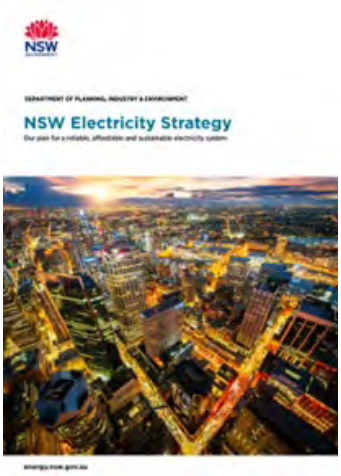
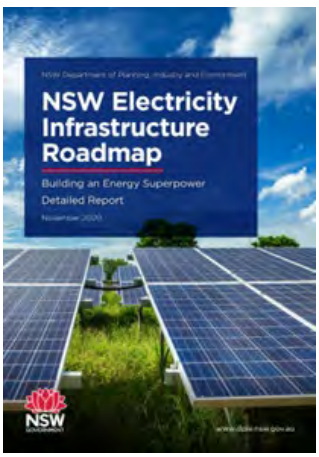
Plan, policy or strategy	Description and alignment with project
State Government	
NSW Electricity Strategy (DPIE, 2019) 	The *NSW Electricity Strategy* is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy and sets out an approach to respond to emerging challenges. The Strategy recognises that where variable generators are unable to satisfy demand, other technologies that can provide electricity on demand (such as storage) are required. Principle 1 of the *NSW Electricity Strategy* acknowledges that renewables are the lowest cost form of reliable electricity generation and calls upon investment into these technologies to reduce electricity prices and ensure network reliability. The project will contribute to the South West REZ with an intended network capacity of 2 GW. The REZ will in turn meet the aims of the Electricity Strategy by ensuring a secure, reliable energy system. This region has been formally identified as an ideal location to play a key role in renewable energy generation due to excellent renewable energy resource potential.
NSW Electricity Infrastructure Investment Roadmap (DPIE, 2020a) 	The *NSW Electricity Infrastructure Roadmap* (the Roadmap) completed in 2020 builds on the framework set out by the *NSW Electricity Strategy* (DPIE, 2019) and sets out a rationale for the policies and programs that are specifically designed to attract and secure large-scale investment in new electricity infrastructure. The Roadmap recognises the findings of AEMO's 2020 Integrated System Plan (ISP) which found that by mid-2030, NSW could need up to 2.3 GW of storage with 4 to 12 hours of duration to maintain system reliability and security under most scenarios. The project will contribute to this need for additional energy generation, providing 2 GW of generating capacity.

Table 4.1 Overview of policy and planning context

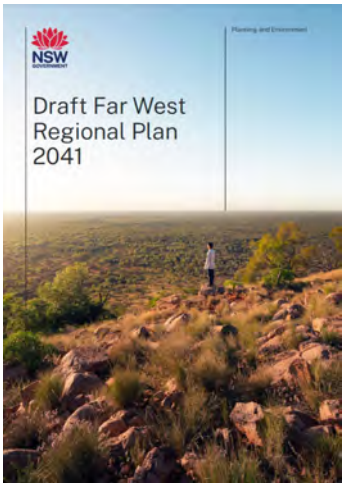
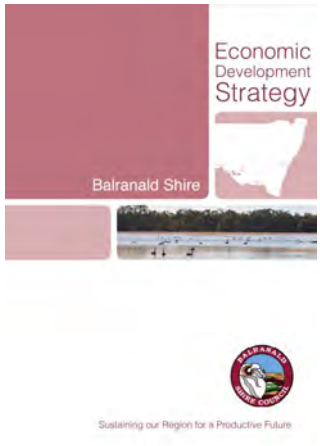
Plan, policy or strategy	Description and alignment with project
Far West Regional Plan 2036 (NSW Government, 2017) 	The *Far West Regional Plan 2036* guides land use planning priorities and decision making in the Far West region for the next two decades. The vision identifies the Far West region as a leader for sustainable and cost-effective electricity production, as well as looking to support the agricultural industry and expand the food processing sector. The plan highlights the objectives of leading renewable energy technology and investment and leveraging new and upgraded infrastructure. The project is aligned with key objectives within the plan as it will take advantage of existing infrastructure to provide more electricity capacity for new renewable energy projects.
Draft Far West Regional Plan 2041 (NSW Government, 2022) 	The *Draft Far West Regional Plan 2041* provides an update to the *Far West Regional Plan 2036*. Since the release of the previous Plan, amendments to planning legislation have elevated the importance of strategic planning and a regional and local level as it is essential in managing change in the population and economy while guiding the development of local strategic planning statements. The updated regional plan provides a targeted land use planning approach, of which the relevant priorities to the project include: • capitalising on strong agricultural, extractive resource, renewable energy, government service and visitor economy, given the expected $2.332 billion investment in construction in the next 5 years • considering the *Biodiversity Conservation Act 2016* early in the strategic planning and development process • population change and demand for different types of housing due to changing demographics, temporary workers and tourism opportunities • the opportunities of a changing regional economy and catalyst projects such as the South-West Renewable Energy Zone (South West REZ), and major renewable energy, livestock processing and mining projects • the NSW Government's commitment for net zero carbon emissions by 2050.
South West Slopes Regional Economic Development Strategy – 2023 Update 	The *South West Slopes Regional Economic Development Strategy – 2023 Update* (Department of Regional NSW) provides a revised evidence base for guiding governments in policy and investment decisions. The overall aim of the strategy is to enhance resilience in the South West Slopes region and drive sustainable, long-term economic growth. Relevant to the project, one strategy involves supporting the growth of industries including renewable energy sectors, highlighting that major investment in renewable energy generation provides opportunities for growth, specialisation and for the potential of the South West Slopes region to establish green credentials in the sector. Challenges for the region identified from community consultation include ensuring the accrual of sustained local economic benefits accrue to communities from projects, workforce shortages and managing the availability of affordable housing to meet demand of influx of temporary workers.

Table 4.1 Overview of policy and planning context

Plan, policy or strategy	Description and alignment with project
Local Government	
Balranald Shire Community Strategic Plan 2032 (Balranald Shire Council, 2022) 	The *Balranald Shire Community Strategic Plan 2032* defines the community's vision, strategic direction and outcomes for the future. The Community Strategic Plan (CSP) identified the current challenges of land constraints to growth on flood prone or agricultural land, limited and competitive rental markets, and more competition needed in the local building industry. Current values identified by the community include the neat and attractive villages, upgraded town centre, and scenic river front. Consultation outcomes with the community provided guiding principles for the following six pillars for the community: our lifestyle, our community, our economy, our infrastructure, our environment and our council. Relevant to the project, the CSP outlines that the community encourages new industries. As such, the CSP incorporates a strategy of supporting the growth of local industry sectors such as renewable energy and agriculture. The community recognised current economic challenges such as a lack of builders and tradespeople as well as pockets of underemployment in the community.
Balranald Local Strategic Planning Statement (Balranald Shire Council, 2020) 	The Balranald Local Strategic Planning Statement (LSPS) outlines the 20-year vision for the Balranald community. The plan seeks to achieve the vision of the CSP and the broader aims of the Riverina Murray Regional Plan 2036 by strengthening the economy as well as managing, enhancing and improving the natural and built environment. The LSPS explains that the largest industry in the Shire is agriculture, largely comprising of dryland cropping and grazing. High value irrigated horticultural production has begun to rapidly emerge as an important industry, underpinned by secure access to water from the Murray and Murrumbidgee rivers. As such, Balranald's southern communities are highly reliant on secure and predictable water supply. Tourism is also a growing industry in the Shire which can increase economic diversity and reduce the region's reliance on agriculture and water dependent industries. Further, developments in renewable energy projects can provide opportunities to bolster the regional economy.
Balranald Economic Development Strategy (Balranald Shire Council, 2012) 	The Balranald Economic Development Strategy (the Strategy) was developed to assist in promoting and driving economic development opportunities in the Balranald Shire. Noting the declining population in the Balranald LGA and its potential effect on business growth, the *Economic Development Strategy* outlines opportunities to support economic growth in the region. One of the key opportunities noted was investigating investment in renewable energy generation to attract businesses with a focus on sustainability.

4.2 Community profiles

Community profiles provide a qualitative description of an area or community, including a discussion of key trends and issues (Vanclay, Esteves, Aucamp, & Franks, 2015). Community profiles for the localities within the local area are provided in Section 4.2.1 and profiles for each of the key urban areas in Section 4.2.2. Key social trends and characteristics of each community are identified by comparing population, dwelling and labour force indicators to those recorded for the Balranald LGA and the Far West region.

4.2.1 Local area

The local area comprises the localities (SAL's) of Euston and Balranald. Data on population and demography, housing and labour force characteristics for the local area is provided in Table B.1 in Appendix B.

i Euston locality

Euston is a rural locality within the Balranald Local Government Area (LGA). There are at least five First Nations clans residing in the Robinvale Euston region: Tati Tati; Wiradjuri; Mutthi Mutthi; Wamba Wamba; and Latje Latje (Robinvale-Euston Visitor Centre, n.d.). A total of 4.0% of residents identify as Aboriginal and/or Torres Strait Islander compared to 6.4% in the area of reference.

The locality borders Mallee Cliffs National Park to the east. The area predominantly consists of farming operations and rural homesteads. There were a total of 822 residents recorded in the Euston area at the 2021 Census (ABS, 2021a). Over the five-year period to 2021, the number of residents in Euston declined by 2.0%. Residents with Italian ancestry make up 24.5% of the population.

Euston has a relatively young population, with a median age of 36 years and a higher proportion of youth and a lower proportion of older people (65 years and older), compared to the area of reference. Most residences are separate houses with 66.7% being owned outright or with a mortgage. There are some social housing options in the region, with 10.4% of the population accessing social housing.

There is no youth unemployment in Euston compared to 7.3% in the regional area. Agriculture, forestry and fishing is the top industry of employment employing 38% of residents. Grape growing is a key industry in the area.

ii Balranald locality

Balranald is located on the traditional country of the Mutthi Mutthi. Excluding the town of Balranald, the Balranald locality is a very sparsely populated area with 177 residents recorded (ABS, 2021a) across a land area of around 21,000 km^2. The population of Balranald declined from 2016 to 2021 by 3.8% from 184 people to 177 people. The area outside of the township predominantly consists of farming operations, rural homesteads, and national parks. The Balranald locality borders Murrumbidgee Valley National Park as well as Mungo National Park.

The population of Balranald is predominantly younger, with a relatively low proportion of elderly people (people aged 65 years or older). In terms of vulnerabilities, the Balranald locality has a higher proportion of people with a need for assistance (6.2%) compared to the area of reference (5.8%). A large proportion of Balranald residents are engaged in volunteer work (41.8%). The locality has a relatively low proportion of family households. The Balranald locality has a higher labour force participation rate compared to the area of reference (64.5% and 56.5%, respectively) as well as a slightly lower rate of unemployment. Key industries in the area includes sheep farming, woodcutting, charcoal production, and irrigated crop-growing.

4.2.2 Key towns

i Euston township

Euston is a small town of 500 people located on the Sturt Highway. The town is adjacent to Robinvale, its Victorian counterpart. Euston is a gateway to the Murray River, known for its fishing. Euston Regional Park is adjacent to the west and south of Euston town and has more than 3,200 ha of bushland.

The median age of Euston is 39 years and the area was characterised by a slightly younger population compared to the area of reference.

Euston's Aboriginal and Torres Strait Islander population is 5.4% of the total population.

In terms of dwelling structure, 90.6% were separate houses with a small proportion of apartments. Most households were owned outright or with a mortgage (65.0%). There was a higher proportion of people accessing social housing in Euston (14.3%) compared to the area of reference (11.4). Overall, Euston provides some access to social infrastructure including a preschool, primary school, police station, rural fire service, hotels, public playground and walking parks.

Labourers, managers and technicians and trades workers were the primary occupations in Euston, with grape growing and other grocery wholesaling being the largest industries of employment. Euston had a lower labour force participation rate and higher unemployment compared to the area of reference.

ii Robinvale township

Robinvale is the twin town of Euston on the south bank of the Murray River in Victoria. The town is connected to Euston by a bridge. Robinvale had a population of around 2,440 people in 2021. The area has recently experienced population growth, rising from 2,154 people in 2016 to 2,441 people in 2021 which represents a growth rate of 13.3%. The Murray Valley Highway runs through the town connecting to Swan Hill to the south-east. The Aboriginal population includes at least five indigenous clans residing in the Robinvale Euston region: Tati Tati; Wiradjuri; Mutti Mutti; Wamba Wamba; and Latje Latje (Robinvale-Euston Visitor Centre, n.d.).

The area recorded a high proportion of non-English language spoken at home compared to the rest of the study area as well as the lowest proportion of households where only English is spoken. Such multiculturalism is recognised as a source of pride for the Murray River town (Damien Peck, 2018).

Robinvale had a relatively high proportion of rented dwellings, as well as a high proportion of social housing. Health services in the town are limited to Robinvale District Health Services, a small hospital, as well as two GP clinics. There is a Recreation and Aquatic Centre in town and tourism can double the population in summer months, particularly due to water sports along the Murray River such as water skiing. Robinvale is also known for its production of grapes, olives, carrots, and almonds.

The area is serviced by the V-line train to Swan Hill and Mildura, connecting to Melbourne.

iii Balranald township

Balranald is a small town located where the Sturt Highway crosses the Murrumbidgee River, 80 km from Euston. The town has just over 1,000 residents and recorded a 8.3% decline in population in the five years to 2021 (ABS 2021a). Balranald is a service centre for the region providing social infrastructure and services such as accommodation, cultural services, sports amenities, and health services including the Balranald District Hospital. Nearby key natural features include Yanga National Park and Yanga State Conservation Area.

The median age of residents in Balranald is 49 years. Consistent with the higher median age, Balranald town has a higher proportion of adults (people aged 25 to 64 years) and elderly people (people aged 65 years or older) compared to the regional area (ABS 2021a). Balranald is located on Mutthi Mutthi country (also spelt Muthi Muthi) with 9.6% (234 people) of the population identifying as Aboriginal (ABS 2021a).

In the town of Balranald there were a relatively high proportion of unoccupied dwellings and rented dwellings, and a high proportion of lone person households compared to the area of reference. Key industries of employment included local government administration, fruit and tree nut production and education, indicative of its status as a service centre (ABS 2021a).

iv City of Mildura - Buronga

Mildura-Buronga is a significant regional centre of over 53,000 people on the southern banks of the Murray River in Victoria. The Mildura urban area also includes the towns of Buronga and Gol Gol on the northern side of the Murray River in NSW. Mildura is located on the intersection between the Sturt Highway and Calder Highway.

Mildura-Buronga's population grew by 6.7% from 50,239 people in 2016 to 53,620 people in 2021. The area has a median age of 39 years, which aligns with the NSW median age. In Mildura-Buronga, 5.4% of the population identify as Aboriginal and/or Torres Strait Islander. The area has a slightly higher proportion of youth (people aged 15-24 years) and lower proportion of elderly people (people aged 65 years and older) compared to the area of reference. Mildura – Buronga also has a higher proportion of rented dwellings and people who have a need for assistance. Median weekly rental costs were higher in Mildura – Buronga than other townships in the study area (ABS 2021a).

Horticulture, grape and orange production are major industries in the region, supplying 80% of Victoria's grapes. Other key industries of employment include healthcare, retail, social assistance, aged care and education.

4.2.3 Sub-regional area

Balranald is located 850 km south-west of Sydney and 450 km north of Melbourne. Covering an area of more than 21,000 km^2, Balranald Shire Council area has a population of 2,208 people. This decreased by 3.5% from 2016 (ABS 2021a). Natural features include the Tin Tin and Pitarpunga Lakes and the eastern portion of the Shire encompasses Murrumbidgee Valley National Park.

The median age of the region is 43 years. Balranald LGA has a higher Indigenous population of 6.4% compared to NSW. Most residents of Balranald LGA (77.8%) were born in Australia. However, the region has strong multicultural ties with 12.0% of Balranald's residents having Italian ancestry (ABS 2021a).

The region has a high proportion of rented dwellings and social housing compared to the regional area. Further, Balranald LGA has a high proportion of unoccupied houses (20.8%). The area has a lower youth unemployment rate relative to the regional area (ABS 2021a).

The Balranald Shire Council describes the region's economy as traditionally relying upon dry-land and irrigated agricultural production of grains, wool, sheep meat and beef (Balranald Shire Council, n.d.). However, the Shire is seeking to diversify primary production to encompass horticulture, viticulture, organic agriculture and the growing of fruit and nut trees. Top occupations for the region include managers, labourers and technicians and trades workers.

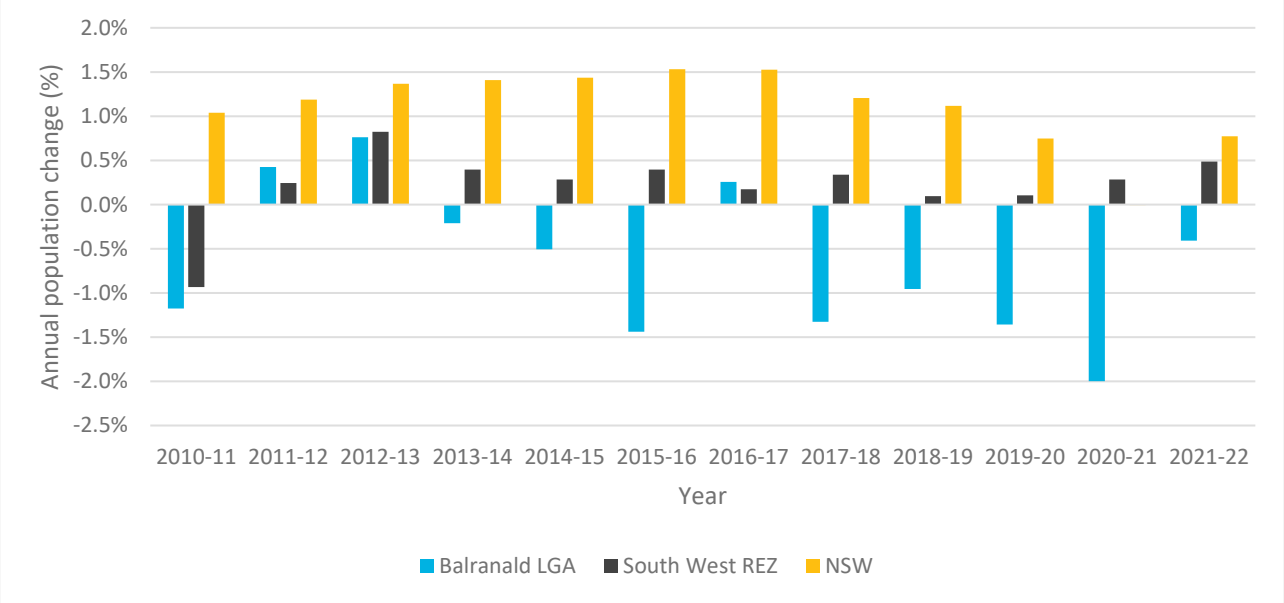
4.3 Key social trends

Key social trends in the project's social locality were identified and analysed across broad social themes, including population, housing, labour force, business and industry, and access and connectivity. Key social trends are discussed within the sub-regional area (Balranald LGA) and the regional area, with reference to trends in the local area (Euston and Balranald excluding Balranald township) and the key towns (Euston, Robinvale, Balranald and the residential area of Mildura-Buronga).

4.3.1 Population trends

Population trends differed between the sub-regional area and the regional area. In June 2022, the regional area had a population of 2,198, which constituted 5.4% of the total population of the area of reference. Population has been declining in the regional area since 2017 (Figure 4.1). Between 2017 and 2022, the regional area recorded a population loss of 138 residents, representing a 5.9% decrease.

There were an estimated 40,425 residents in the regional area, of which 32.2% resided in Murray River LGA. Population growth in the area of reference has slowly increased over the four years to 2022; however, this is comparable to population trends recorded for NSW as a whole. Slow population growth may be attributed to restrictions associated with the COVID-19 pandemic which reduced overseas migration. Within the area of reference, population growth peaked between 2012 and 2013, with the population growing by 0.8% per annum.



Source: ABS (2021c).

Figure 4.1 Annual population change, 2010 to 2021

By 2041, the population of Balranald LGA is expected to decrease by 452 people to 1,817 residents, representing a significant population decrease of 19.9% from 2021 (DPE 2022b). Factors influencing this projected population loss may include cyclical changes in industries such as agriculture and mining (NSW Government, 2022). Previous Balranald Shire Council reports have indicated demographic changes with people aged 15-24 years leaving small towns to seek jobs and excitement in the major cities and larger regional towns (Balranald Shire Council, 2014).

On the other hand, the population of the area of reference is projected to increase by 5.0%, or 2,036 residents, in 2041, with significant population growth expected for Murray River LGA by 24.4%.

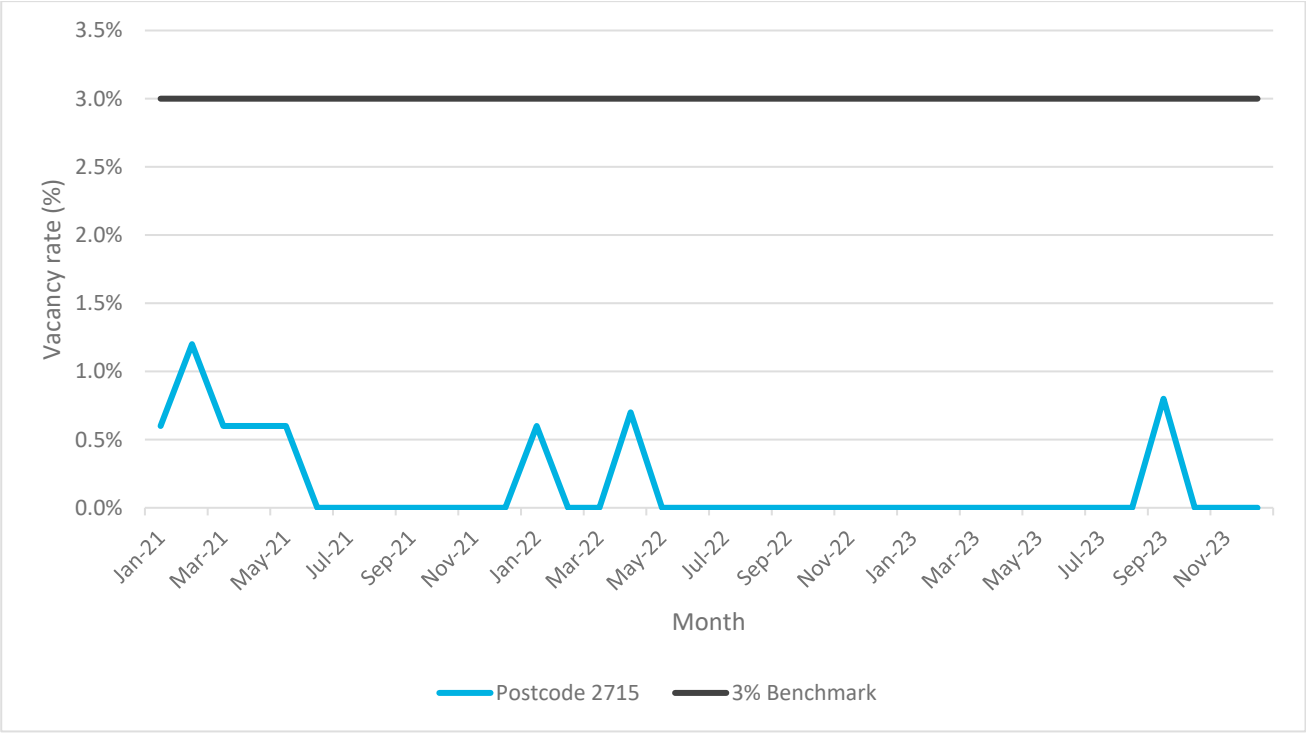
The median age of NSW is 39 years (ABS 2021b). Most of the LGAs in the area of reference have an older population, including Murray River (49 years), Hay (48 years) and Edward River (46 years). The 'youngest' LGA was Carrathool LGA with a median age of 37 years.

The sub-regional and regional area recorded a relatively high proportion of residents who identify as Aboriginal and/or Torres Strait Islander at the 2021 Census (6.4% and 6.1%, respectively). LGAs with particularly high proportions of residents who identify as Aboriginal and/or Torres Strait Islander were Carrathool (8.8%), Murrumbidgee (8.6%), Wentworth (8.3%) and Hay (8.3%), relative to NSW which recorded 3.4% of its population identifying as Aboriginal and/or Torres Strait Islander (ABS 2021b).

4.3.2 Housing and short-term accommodation

Data indicates that there is constrained supply of housing in the region. Community comments captured in the Balranald CSP indicated a lack of good quality housing which inhibits attracting people to the region (Balranald Shire Council, 2022). The *Draft Far West Regional Plan 2041* indicated a demand for different types of housing in the region due to changing demographics, temporary workers and tourism opportunity (NSW Government, 2022).

A rental vacancy rate of 3% is considered to represent a balance between supply and demand in the rental market. Housing NSW states that any vacancy rate less than 3% generally indicates a tight rental market with an undersupply of rental options (Brewsters Property Group, n.d.). Figure 4.2 shows the vacancy rates for postcode 2715, which covers most of Balranald LGA and a little of Wentworth LGA.



Source: SQM Research (2023).

Figure 4.2 Vacancy rate, postcode 2715 from January 2021 – December 2023

A vacancy rate of below 2% indicates a chronic shortage as indicated in Figure 4.2. The rental vacancy rate for the Balranald region remained below 1% from February 2021, indicating tight competition for housing. This suggests that there is an insufficient supply of rental accommodation in the Balranald region.

Low vacancy rates contribute to upward pressure on housing prices. At the 2021 Census, median weekly rent in Euston UCL and Robinvale UCL was $250 and $220 respectively, while Balranald Shire LGA's median weekly rent was $200. Robinvale had a high proportion of households renting (50.5%), compared to Euston UCL (25.2%).

The sub-regional area comprises some short-term accommodation options, including hotels, motels, caravan parks, and Airbnbs. A search on Google Travel in January 2024 identified 3 hotels/motels available and 5 vacation rentals in Euston. In Robinvale, 4 short-term accommodation options and 2 vacation rentals were available in January 2024. Available short-term accommodation is important for local and sub-regional residents to cater for tourists, temporary workers, and for people requiring crisis accommodation such as victims of domestic violence.

4.3.3 Service availability and community challenges

Understanding service availability and level of community satisfaction can assist to identify gaps in service provision, areas of higher demand, and opportunities for community investment. It also provides insight into what the key challenges, values and opportunities are within the community.

The Balranald CSP presented community feedback on perceived gaps in local infrastructure. The community identified infrastructure issues including ageing water and sewerage assets and an underfunded road network. A lack of variety of activities for young people to do as well as distance to specialist health care and poor opportunities for post-secondary education were also identified as infrastructure deficiencies.

Further community challenges identified in the Balranald CSP include:

- hard to maintain sufficient professional services
- lack of good quality housing
- limited and competitive rental markets
- lack of competition in the local building industry
- perceptions of inequity outside of Balranald township (e.g. in Euston).

4.3.4 Community values

As identified in the Balranald CSP, the community values the scenic river front and the neat, attractive village of Balranald township. Further, the Balranald community values a vibrant social life, with access to recreation and cultural activities such as public art. Finally, personal safety was highlighted by the Balranald community as it was noted that there is a low crime rate, particularly for serious crimes.

4.3.5 Access and connectivity

Major road infrastructure in the sub-regional study area includes the Sturt Highway (A20), Ivanhoe Road, and Yanga Way. Balranald Aerodrome has a small country aerodrome located approximately 1.9 km north-east of Balranald township. Currently, the Balranald aerodrome is utilised for small passenger and hobby flights (Balranald Shire Council, 2020).

Public and private transport is limited in the Balranald township. There are two daily coaches that travel to Mildura (the 725) and Cootamundra (the 726) (Transport NSW, 2023). There is also a fortnightly Community Transport bus run by the Balranald Shire Council which travels to Swan Hill and Mildura (Balranald Shire Council, 2023).

4.3.6 Local business and industry

The ABS Counts of Australian Businesses register recorded 319 registered businesses within the sub-regional study area as at June 2022 (ABS, 2022). The most prevalent industry of registered businesses was agriculture, forestry and fishing with 51.7% or 165 businesses. Relevant to the project, the next two most prevalent industry of registered businesses was the construction industry (26 businesses) and rental, hiring and real estate services (24 businesses) (ABS, 2022). These two industries are relevant to the project as they include businesses that are likely to benefit from increased contract opportunities during operation, such as equipment hiring businesses.

The majority of registered businesses within the sub-regional area were considered ‘small businesses’ (19 or fewer employees) (98.4% or 314 businesses). Small businesses often face barriers in accessing supply chains for large development projects, such as resource construction projects, due to factors such as contracting

requirements and compressed timeframes that limit the opportunity for new entrants in the supply chain (Briggs, et al., 2022).

Primary production is the main economic driver within the sub-regional area, relying upon dry-land and irrigated agricultural production of grains, wool, sheep meat and beef (Balranald Shire Council, 2023). However, primary production in the region is diversifying to include horticulture, viticulture, organic agriculture and the growing of fruit and nut trees (Balranald Shire Council, 2023). Tourism is also recognised as an important economic driver (Balranald Shire Council, 2023).

In Balranald Shire Council's CSP, the community identified that there is diversity of industry types in the region, particularly within the primary production industry with crops such as carrots, pistachios, grapes, and wheat as well as sheep. It was recognised that the energy and resources industries were growing with the development of solar and wind farms as well as mineral sands mines. Economic limitations highlighted by the Balranald community included:

- some pockets of underemployment in the community
- difficulties with staff recruitment and retention
- lack of builders and trades people
- lack of executive housing limiting recruitment of professional staff
- people drawn out of town by the high wages from solar and nut farms.

4.3.7 Summary of key social trends

Key social trends within the project's social locality include:

- liveability values in the local study area are connected to the river front lifestyle in Euston, visual amenity of Euston and the natural environment as well as a sense of neighbourhood safety
- restricted housing and accommodation availability in the sub-regional area
- declining population is a feature of the sub-regional study area, where positive rates of growth are seen in the area of reference. The sub-regional area also has a higher proportion of youth (people aged 15 to 24 years) compared to the regional area
- the Sturt Highway is a key regional connector that hosts high volumes of traffic
- infrastructure such as local roads and water and sewerage have been identified as a community challenge, as well as social infrastructure such as activities for young people, post-secondary education opportunities, and limited access to specialist health care
- the main industry of the region is agriculture and industries associated with primary production; however, tourism has been recognised as an important economic driver.

5 Community and stakeholder engagement

This section presents the preliminary identification and evaluation of social impacts associated with the project. The purpose of this preliminary evaluation is to determine the level at which these impacts need to be assessed by the subsequent SIA. The initial identification and evaluation of social impacts was facilitated through completion of the SIA scoping worksheet (DPE, 2023a). The SIA scoping worksheet is found in Appendix E.

5.1 EIS scoping report engagement

Section 5 of the EIS Scoping Report outlines the key stakeholder and community engagement completed during the scoping phase of the project. Community and stakeholder engagement data was reviewed to inform the preliminary identification of social impacts for the project. Engagement modes included meetings via telephone/teleconference and in person, and a Community Open Day.

5.1.1 Community consultation meetings

i Meetings

Since 2021 Squadron Energy has been engaging with a range of project stakeholders including landowners, local and state government and specific interest groups. Table 5.1 provides an overview of the stakeholder meetings.

Table 5.1 Stakeholder profile

Stakeholder type	Number of meetings	Timeframe
Host	23	December 2021–November 2023
Neighbour	9	October 2023–November 2023
Potential host	3	August 2022–December 2023
Willandra Lakes World Heritage Committee	1	October 2023
Crown Lands	2	September 2022 and March 2023
Biodiversity Conservation Service Division	1	November 2023
MP for Mildura	1	December 2023

A summary of the consultation meetings is provided in Table 5.2. Overall, visual amenity was raised as a key theme/issue regarding the project, particularly in relation to the visual impact of the wind turbines. Queries were also raised regarding potential impacts to the environment and natural flora and fauna in the region. This was in relation to the Willandra Lakes World Heritage Area as well as endangered species such as the Regent Parrot and Mallee Fowl. Stakeholders identified potential livelihood benefits in terms of the project helping diversify the local economy, as well as providing procurement and employment opportunities, including for Aboriginal and/or Torres Strait Islander people.

Table 5.2 Consultation meetings – summary

Theme/Issue	Notes
Project design	• Important for WTG hosts to retain "their cultivation paddocks and long tractor runs so that they can maintain efficiency in cropping activities" and that "this would mean keeping tracks from dissecting cropping land too much". • Questions "regarding the location of wind turbines and if it was possible to locate them on non-pastoral scrub lands". • Variety of sentiments around the project design – several stakeholders expressed that WTGs should be kept to fence lines, one stakeholder had a preference of a less intensive WTG spread for the layout, and another was ""shocked" with the layout, disappointed with the low number of turbines".
Community sentiment	• Positive and/or pragmatic response from neighbours – neighbours would recognise the opportunity. • Neighbours were "pro-renewables and don't want to hold up the project and work *with* renewables". • Some interviewees indicated a neutral response to the project and were not likely to object. • An incident with a neighbour who was hostile to people doing a site visit. • Does not "like change, longs for a simpler life like before (work hard, take Sunday off, know only the news in your immediate area)". • Does not "believe in climate change or renewables energy".
Economic development and opportunities	• VET options and school-based apprenticeships available – as such "most kids see themselves going into almond farms". • The "diversity of industry away from just agricultural base is good for the region". • Offers of contracting services around bulk earthworks, road construction or maintenance, bore holes etc – [local procurement] would be good for the town. • Tourism opportunity for windfarms as some tourists like viewing them – asked about the potential viewing platforms. • "Employment opportunities are often brought up by Aboriginal Groups".
Electricity supply	• Would the project "impact [the] energy supply, due to hiccups once solar went in at Robinvale across the river".
Visual amenity	• Neighbour mentioned that "they're not keen on the visual aspect" of the wind turbines. • One neighbour mentioned that "they're in important view lines to the south lakeside and don't look north as there's nothing to see". • Mention of the potential for the heat island effect from solar panels. • Expressed values for natural views – "they appreciate viewpoints of nature". • Mention made of potential change to night visual. • Query regarding potential night sky impacts and that the Civil Aviation Safety Authority (CASA) would assess each application and decide if lights need to be installed. Further, it was suggested that the project "work with CASA to design lighting to minimise impact on the ground and night sky". It was suggested that radar detection could be utilised to activate lights when aircrafts are detected. • Query regarding shadow flicker. • There is no World Heritage listing for Willandra Lake's vista of views. However, there is need to consider ground disturbance. • The predominant impact from the mine adjoining the Willandra Lakes World Heritage area was lighting (i.e. night glow) which was considered as pollution, so EPBC was required.
Noise	• Potential for traffic noise as there is currently some traffic noise impacts ("could hear trucks and Harleys down the highway") and previous experience seeing wind turbines near Ballarat left the neighbour with the impression that they're "noisy and big". • Query from neighbours on whether there would be a noise impact from the wind turbines.
Culture	• The Dark Sky is culturally important, not just the night sky. As such, the industrial glow from buildings, camps, and other site facilities needs to be managed.

Table 5.2 Consultation meetings – summary

Theme/Issue	Notes
EMF	• Enquiry into electromagnetic impacts. • Question whether the wind farm impacts on dogs in terms of frequencies.
Traffic and roads	• Discussion around access routes to the project site. • Poor condition of local roads – one neighbour mentioned that the "roads are dirt and dry weather only", with the mineral sands mine having trouble accessing the mines "for months/weeks". Roads in the local area were noted as needing an upgrade, with queries raised about the impact of project construction traffic on the condition of the roads. • Due to the condition of the Dry Lake Road Intersection, an upgrade of the road was identified as a community benefit. Current usage of the Dry Lake Road Intersection was described as needing maintenance, having "50,000 cars and 10 school kid buses" (gross exaggeration for dramatic effect).
Environment	• Feedback from Biodiversity Conservation Service Division (BCD) included that "the vegetation corridors on the road verges are critical habitat and migration routes for birds and animals". It was explained that there is an "abundance of Regent Parrots yet they only exist in this region and are endangered". • When foraging through the Mallee scrub, the BCD reported findings of "pristine Mallee trees hundreds of years old, hollow bearing branches and logs, slat bushes, native plants, and an abundance of insects". The team mentioned that it appeared the forest "had not seen fire in a long time". • Query about potential "contaminated soil being spread from construction activities". There were further comments about dust from construction works and the potential for contaminated run off entering the waterways. • Mention of potential for bird strike, particularly in terms of the Regent Parrot. The Regent Parrot and Mallee Fowl were discussed as being endangered species potentially having habitats in the surrounding region. • Advice should be provided on biodiversity value relating to agricultural lands. The project should "conduct surveys, monitoring and observation of flora and fauna within the investigation area and provide preliminary advice relating to endangered species habitats and biodiversity value within the investigation area".
Rehabilitation	• Query about the inability to recycle the wind farm components following decommissioning. • According to law, "the developer has to take the turbines away and return the land to what it was – fully restored".
Workforce	• There is "no such thing as too early to consider workforce etc." due to the geography of the project.
Housing and accommodation	• Lack of accommodation and housing stock available around the project area need to be considered early in the process. • Large projects can impact tourism by "knocking out local accommodation". • Is "the company able to consider leaving some accommodation after the project that could be used for tourism ventures". • Alternative uses for accommodation and legacy camps suggested in the form of culture camps for First Nations peoples and school camps. • Suggestion of offering shearers quarters as accommodation.
Investment scheme	• Interest in a community investment scheme as a project benefit.
Bushfire risk	• Fire implication of the project, particularly from a recent news story of batteries causing fires. They noted that the Rural Fire Service is across the road from their battery. They expressed that they would be interested in discussions about fire risk and management.
Cumulative	• The Mildura Green Hydrogen Cluster was raised as a significant project in the region. • Where does the proposed DP Energy Euston Wind Farm leave [the] project?

ii Calls

From August 2021 to December 2023, Squadron Energy completed 78 calls with local stakeholders including host landowners, potential host landowners, nearby neighbours, hosts' solicitors, government organisations and Balranald Council. The majority of these calls were related to administration or logistics. As such, five of these calls were substantive and had relevance for the SIA. Table 5.3 provides a summary of the calls conducted by Squadron Energy.

Table 5.3 Calls summary

Month/Year	Stakeholder	Notes
December 2023	Potential host, currently neighbour	• Enquired into distance between boundaries and WTGs – thinks there may be an issue with their duster and the infrastructure layout. • Asked if wind farms had an impact on the price of farming land. • Thought the solar layout was big. • Felt neutral about the project.
December 2023	Host	• Wants things to happen now.
December 2023	Neighbour, host to competitor project	• Noted the number of cumulative projects in the region and stated that connection may be hard.
October 2023	Neighbour	• Negative sentiment for the project – "can't have Squadron here, thank you, bye".
December 2021	Host	• Negative sentiment for the project – one family member was against the project and thus the family was against the project. • When asked, the caller mentioned that they "didn't like their environmental impact" – when asked to specify they mentioned "grazing land".

5.1.2 Community Open Day

Squadron Energy delivered a Community Open Day at the Robinvale Community Arts Centre on 30 November 2023 from 12 pm to 7 pm. During this event, 20 visitors participated comprising 3 nearby neighbours, 2 host landowners and 15 local community members. The event was promoted via a flyer in the local newspaper and a letter box drop to all Post Office boxes in Euston/Robinvale. Local community members mainly included Robinvale local residents.

The feedback received during this event was mostly positive and supportive. Emphasis was placed on the economic opportunity for the towns, and the valuable contribution the project would make in transitioning to renewable energy. Visitors appreciated being informed about the project. One neighbour expressed concerns regarding visual changes to landscape but was open to discussion. Local businesses were happy to assist the project and interested in knowing more.

Additional issues identified during this event included:

- Noise – Several questions about the noise output from the operational Project, particularly about how far the noise travels, the type of noise and how loud an operational project would be.
- Project layout/design – A few questions about how project infrastructure locations, WTGs, were decided and the extent to which host feedback affected these decisions. How the project would connect to the grid considering the limited nature of Project EnergyConnect (only 330 kV).
- Visual – Several questions about visual impact to neighbouring properties and how the project is navigating being in proximity to Willandra Lakes Region World Heritage Area (combination of visual and heritage).

- Biodiversity – Several visitors noted the presence of turbines within the Mallee region. Comments about the Regent Parrot and the Mallee Fowl and how the project would approach this.
- Accommodation – Numerous attendees noted that the Euston/Robinvale township is small and that there is not much accommodation. With large amounts of irrigated horticulture/agriculture in the region there is an influx of seasonal workers. Irrigated horticulture/agriculture means that the influx of workers is sustained for a longer period of time resulting in an overlap of harvest seasons. There could be opportunities to ease housing scarcity in the region. Specific reference was made to the scarcity of rental accommodation.
- Property value/use – A few questioned whether agricultural activities (cropping) would cease operation due to the project. Some asked how neighbouring property values would be impacted by the project.

5.2 SIA scoping engagement

5.2.1 Community survey

The purpose of the community survey was to gain an understanding from the broader community of the potential social impacts and benefits of the project. The survey was available for a period of approximately two months, from November 2023 to 3 January 2024. The community survey was publicised during the Community Open Day.

The community survey consisted of 12 questions, see Appendix D to view the full survey. A total of 4 responses were completed via a printed copy during the Community Open Day. Of the total responses received:

- one community member was located within the local area (Benanee)
- three community members were located within key townships (Robinvale).

Survey respondents identified as landowners a nearby neighbours.

Sentiment relating to the project was mainly positive, with three responses stating “go for it” due to the need for renewable energy generation and associated benefits. One response was neutral, citing the change to the landscape and the value of (current) isolation.

When rating perceived benefits, the most positive was renewable energy generation and employment. The most negative potential impact was access to services such as health and retail services.

6 Preliminary social impact identification and evaluation

6.1.1 Process of impact identification and evaluation

The identification of potential social impacts and benefits was an iterative process informed by:

- the review of project activities and the social effects they could generate
- analysis of existing baseline socio-economic conditions across the social locality
- stakeholder mapping and analysis of the feedback generated through stakeholder engagement.

Preliminary identification and evaluation of social impacts was further guided through application of the SIA worksheet provided as part of the SIA Guideline. The SIA scoping worksheet is a decision support tool which assists in evaluating potential social impacts in order to determine the level of assessment and effort required to address the identified impact as part of the SIA (DPE, 2023a).

As defined in the SIA Guideline 2023, the level of assessment for each social impact are:

- Detailed assessment: the project may result in significant social impacts, including cumulative impacts
- Standard assessment: the project is unlikely to result in significant social impacts, including cumulative impacts
- Minor assessment: the project may result in minor social impacts
- Not relevant: the project will have no social impacts, or the social impacts of the project will be so small that they do not warrant consideration.

To determine the level of assessment for each social impact, a preliminary impact significance evaluation is undertaken by determining the likelihood and magnitude of the potential impact. The significance levels of an impact are low, medium, high, and very high, with each impact significant rating applied to a level of assessment:

- Impacts assigned a significance rating of High or Very High require a detailed assessment.
- Impacts assigned a significance rating of Medium require a standard assessment.
- Impacts assigned a significance rating of Low require a minor assessment.

The significance ratings identified are based on preliminary investigation and current understanding of the potential social impacts, prior to any mitigation measures being applied. The impact significance ratings will be revised in the Phase 2 SIA that will accompany the EIS.

A summary of outcomes of the SIA scoping worksheet (Appendix E) is provided in Table 6.1.

Table 6.1 Preliminary social impact evaluation

Social impact	Impact category	Project phase[1]	Affected stakeholder group	Preliminary impact significance			Potential mitigation measures being considered	Phase 2 assessment level
				Likelihood	Magnitude	Impact significance		
Negative potential impacts								
Reduced sense of place and rural lifestyle values due to changes to the visual landscape and presence of WTGs.	• Community • Surroundings	C, O	• Landholders	Almost certain (A)	Moderate (3)	High (A3)	• Changes to project design and layout based on relevant feedback from early engagement with local landholders. • Screening where possible. • Consideration of incorporating viewing platforms for tourism purposes.	Detailed
Potential disruption to agricultural operations due to establishment of project infrastructure, changes to land use and changes to access.	• Surroundings • Livelihoods	C	• Landholders	Likely (B)	Moderate (3)	High (B3)	• Greater community awareness and education around how wind farms and agriculture can co-exist. • Regular updates for landholder on schedule and changes to access for landholder planning purposes. • Landholders reasonably compensated for disruptions to agricultural operations via agreements.	Detailed
Reduced agricultural productivity due to increase in biosecurity risk from introduction of weeds.	• Livelihoods	C, O	• Landholders	Possible (C)	Moderate (3)	Medium (C3)	• Complete a weed risk assessment and implement control measures relevant to risk.	Standard
Reduced rural lifestyle values due to land clearing and associated loss of fauna habitat, including habitat of endangered species.	• Community • Surroundings	C	• Landholders	Possible (C)	Moderate (3)	Medium (C3)	• Refinement to project design and layout to avoid /further minimise known habitats based on feedback from early engagement with local landholders and detailed biodiversity surveys. • Capacity-building or resourcing support for local environmental restoration and protection programs.	Standard
Deterioration of residential amenity due to the generation of noise and dust.	• Health and wellbeing	C, O, DC	• Landholders • Local communities	Almost certain (A)	Moderate (3)	High (A3)	• Ongoing engagement with local community and key stakeholders as per consultation requirements. • Refinement to project design and layout to achieve noise criteria at residences or enter into agreements. • Identify and implement dust controls relevant to risk.	Detailed
Deterioration of amenity due to night lighting, including the Willandra Lakes Region.	• Health and wellbeing	C, O	• Landholders • Local communities	Possible (C)	Minor (2)	Medium (C2)	• Refinement to project design and layout based on feedback from early engagement with local landholders, based on expert aviation consultant advice. • Screening where possible.	Standard
Increased competition for construction labour and services due to increased demand generated by the project.	• Livelihoods	C	• Local communities • Regional communities • Local government • Local economic and industry groups	Almost certain (A)	Major (4)	Very High (A4)	• Provision of employment and training opportunities for local people including young people and Aboriginal people. • Commitment to use local contractors and suppliers.	Detailed
Reduced community cohesion due to perceived inequitable distribution of project benefits.	• Community • Decision-making systems	PC, C, O	• Landholders • Local communities • Local government • Community groups	Possible (C)	Minor (2)	Medium (C2)	• Ongoing engagement with local community and key stakeholders as the project progresses. • Implementation of an Aboriginal participation plan. • Support for community events which enable interaction between community members.	Standard

[1] PC: pre-construction. C: construction. O: operations. DC: decommissioning.

Table 6.1 Preliminary social impact evaluation

Social impact	Impact category	Project phase[1]	Affected stakeholder group	Preliminary impact significance			Potential mitigation measures being considered	Phase 2 assessment level
				Likelihood	Magnitude	Impact significance		
Reduced access and connectivity on local and regional road networks due to increased heavy vehicle and workforce traffic contributing to traffic congestion and delays.	• Way of life • Accessibility • Surroundings	C	• Local communities • Regional communities	Almost certain (A)	Moderate (3)	High (A3)	• Provision of support for local road maintenance to Balranald Council through a Voluntary Planning Agreement (VPA). • Ongoing engagement with local community and key stakeholders. • SMS notifications for community members advising of road closures or traffic disruptions.	Detailed
Perceived devaluation of adjacent or nearby properties.	• Way of life • Livelihoods	PC, C, O	• Landholders • Local communities	Possible (C)	Minor (2)	Medium (C2)	• Ongoing engagement with nearby landholders including provision of property valuation data from similar projects.	Standard
Reduced community cohesion due to influx of construction workers.	• Community	C	• Local communities • Local government • Community groups	Possible (C)	Moderate (3)	Medium (C3)	• Development and effective implementation of a Community Engagement Plan including initiatives which contribute to maintaining social cohesion in the local area. • Collaborate and engage with local councils and EnergyCo to develop a suitable housing and accommodation strategy for the construction workforce.	Standard
Increased demand for social and community infrastructure and services due to influx of construction workers.	• Community • Accessibility	C	• Social infrastructure providers and community services • Local government • Local communities • Regional communities	Possible (C)	Moderate (3)	Medium (C3)	• Establishment of a community benefit plan for the project that supports community infrastructure and service provision.	Standard
Increased demand for housing (rental) and short-term accommodation due to influx of construction workers.	• Way of life • Community • Accessibility	C	• Social infrastructure providers and community services • Local government • Local communities • Regional communities • Local economic and industry groups	Likely (B)	Major (4)	High (B4)	• Collaborate and engage with local councils and EnergyCo to develop a suitable housing and accommodation strategy for the construction workforce. • Consideration of seasonal demand from agricultural workers and tourists. • Investigate temporary accommodation options.	Detailed
Diminishment of Aboriginal cultural values due to disturbance or displacement of Aboriginal heritage sites and/or artefacts.	• Culture	C	• Traditional Owners and Aboriginal communities	Likely (B)	Major (4)	High (B4)	• Map regional Aboriginal cultural heritage values. • Avoid or minimise impacts to Aboriginal cultural heritage through project design. • The effective implementation of an Aboriginal cultural heritage management plan (ACHMP) to avoid or mitigate disturbance to culturally important places, sites or artefacts.	Detailed
Diminishment of historical values due to potential amenity impacts on the Willandra Lakes Region.	• Culture	C, O	• Traditional Owners and Aboriginal communities • Tourists • Local communities • Local businesses	Possible (C)	Moderate (3)	Medium (C3)	• Map regional Aboriginal cultural heritage values. • Avoid or minimise impacts to Aboriginal cultural heritage through project design. • Collaborate and engage with tourism stakeholders.	Standard
Perceived increased risk to health and safety and distress for landholders and neighbours due to potential for blade throw, aviation incidents and bird strikes.	• Health and wellbeing • Surroundings	O	• Landholders • Local communities	Unlikely (D)	Major (4)	Medium (D4)	• Community engagement to improve community awareness and educate on blade throw, bird strikes and aviation risks, and how wind farms and agriculture can co-exist.	Standard

Table 6.1 Preliminary social impact evaluation

Social impact	Impact category	Project phase[1]	Affected stakeholder group	Preliminary impact significance			Potential mitigation measures being considered	Phase 2 assessment level
				Likelihood	Magnitude	Impact significance		
Concerns regarding waste management during decommissioning and final rehabilitation.	• Surroundings • Livelihoods	DC	• Landholders • Local communities	Possible (C)	Moderate (3)	Medium (C3)	• Make use of the latest technology available at the time of decommissioning to maximise recycling opportunities and minimise waste going to landfill in line with best practice sustainability principles.	Standard
Positive potential impacts								
Generation of employment opportunities for local and regional workers, including Aboriginal people and young people.	• Way of life • Health and wellbeing • Livelihoods	C, O	• Local communities • Regional communities • Local economic and industry groups • Traditional Owners and industry groups	Possible (C)	Moderate (3)	Medium (C3)	• Employment and training opportunities for the local and regional community including young people and Aboriginal people. • Implementation of an Aboriginal participation plan. • Provide opportunities for local workers to specialise, re-skill or upskill in collaboration with local training organisations.	Standard
Generation of supply and procurement opportunities for local and regional businesses.	• Livelihoods	C, O	• Local communities • Regional communities • Local economic and industry groups • Traditional Owners and industry groups	Possible (C)	Moderate (3)	Medium (C3)	• Commitment to use local contractors and suppliers. • Engagement with local industry for planning and readiness purposes. • Strategically target opportunities for local businesses and service providers in supplying to the project.	Standard
Enhanced opportunity for economic diversification for agricultural operations.	• Livelihoods	O	• Landholders	Possible (C)	Moderate (3)	Medium (C3)	• Agreements with host landholder confirming payment details. • Landholder education for investment opportunities.	Standard
Enhanced community wellbeing and cohesion due to project community grants which support community initiatives such as improvements to social services.	• Community • Health and wellbeing • Decision-making systems	C, O	• Local communities • Regional communities • Local government • Social infrastructure providers and community services • Community groups	Likely (B)	Major (4)	High (B4)	• Under the Community Benefit establishment of a Community Investment Scheme. • Proactive support and establishment of a community benefit plan that supports infrastructure and service provision improvements such as local roads and community facilities.	Detailed
Strengthened community cohesion due to increased interaction with neighbours.	• Community • Surroundings • Decision-making systems	PC, C, O, DC	• Landholders • Local communities	Possible (C)	Moderate (3)	Medium (C3)	• Community engagement and events to further development relations between community members.	Standard
Improved intergenerational equity through contributing to the transition to renewable energy.	• Community • Health and wellbeing	O, DC	• Global community	Possible (C)	Minor (2)	Medium (C2)	• Employment strategies to help build workforce skills for future renewable energy projects.	Standard

6.1.2 Summary of potential negative and positive social impacts

Provided in Table 6.2 is a summary of identified potential negative and positive social impacts, the level of assessment required to be completed by the SIA and the associated (SIA Guideline) social impact category, noting that some social impacts relate to multiple categories.

Table 6.2 Initial social impact identification

Potential negative and positive impacts	Assessment level	Way of life	Community	Accessibility	Culture	Health and wellbeing	Surroundings	Livelihoods	Decision-making systems
Negative potential impacts									
Reduced sense of place and rural lifestyle values due to changes to the visual landscape and presence of WTGs.	High		•				•		
Potential disruption to agricultural operations due to establishment of project infrastructure, changes to land use and changes to access.	High						•	•	
Reduced agricultural productivity due to increase in biosecurity risk from introduction of weeds.	Medium							•	
Reduced rural lifestyle values due to land clearing and associated loss of fauna habitat, including habitat of endangered species.	Medium	•	•				•		
Deterioration of residential amenity due to the generation of noise and dust.	High					•	•		
Deterioration of amenity due to night lighting, including the Willandra Lakes Region.	Medium					•	•		
Increased competition for construction labour and services due to increased demand generated by the project.	Very High							•	
Reduced community cohesion due to perceived inequitable distribution of project benefits.	Medium		•						•
Reduced access and connectivity on local and regional road networks due to increased heavy vehicle and workforce traffic contributing to traffic congestion and delays.	High	•		•			•		
Perceived devaluation of adjacent or nearby properties.	Medium	•						•	
Reduced community cohesion due to influx of construction workers.	Medium		•						
Increased demand for social and community infrastructure and services due to influx of construction workers.	Medium		•	•					

Table 6.2 Initial social impact identification

Potential negative and positive impacts	Assessment level	Way of life	Community	Accessibility	Culture	Health and wellbeing	Surroundings	Livelihoods	Decision-making systems
Increased demand for housing (rental) and short-term accommodation due to influx of construction workers.	High	•	•	•				•	
Diminishment of Aboriginal cultural values due to disturbance or displacement of Aboriginal heritage sites and/or artefacts.	High				•				
Diminishment of historical values due to potential amenity impacts on the Willandra Lakes Region.	Medium				•				
Perceived increased risk to health and safety and distress for landholders and neighbours due to potential for blade throw, aviation incidents and bird strikes.	Medium					•	•		
Concerns regarding waste management during decommissioning and rehabilitation.	Medium						•	•	
Positive potential impacts									
Generation of employment opportunities for local and regional workers, including Aboriginal people and young people.	Medium	•				•		•	
Generation of supply and procurement opportunities for local and regional businesses.	Medium							•	
Enhanced opportunity for economic diversification for agricultural operations.	Medium							•	
Enhanced community wellbeing and cohesion due to project community grants which support community initiatives such as improvements to social services.	High		•			•			•
Strengthened community cohesion due to increased interaction with neighbours.	Medium		•				•		•
Improved intergenerational equity through contributing to the transition to renewable energy.	Medium		•			•			

6.2 Preliminary mitigation and enhancement measures

As per the SIA Guideline, SIA is an iterative and adaptive process as impacts will emerge and be addressed throughout the process of project refinement and development. Preliminary measures which serve to mitigate potential project impacts and enhance potential benefits are outlined in Table 6.3. Whilst the project is in the early stages of development, there are already existing mitigation and enhancement measures- reflective of Squadron Energy being an experienced renewable energy developer. Additional potential mitigation and enhancement measures were informed by initial engagement feedback provided by stakeholders and the review of similar projects in the region.

Table 6.3 Potential and existing enhancement and mitigation measures

Existing mitigation and enhancement measures	Potential mitigation and enhancement measures being considered
• Changes to project design and layout based on feedback from early engagement with local landholders. • Host agreement developed in consultation with landholders. • Neighbour agreements developed in consultation with neighbours. • Commitment to develop Planning Agreements with host Councils. • Employment and training opportunities for local community including young people and Aboriginal people. • Commitment to use local contractors and suppliers. • Ongoing engagement with local community and key stakeholders as the project progresses.	• Establishment of a Community Benefits Plan including a Community Sponsorship Program for the project. • Proactive support and establishment of a community investment fund that supports infrastructure and service provision improvements such as local roads and community facilities. • Collaborate and engage with local governments and Energy Co to identify strategies for the housing and accommodation needs of a temporary workforce. • Enhance community awareness and education around how windfarms and agriculture can co-exist. • Capacity-building or resourcing support for local environmental restoration and protection programs, including weed control and restoration works. • Provide opportunities for local workers to specialise, re-skill or upskill in collaboration with local training organisations. • Strategically target opportunities for local businesses and service providers in supply and servicing of the project. • Establish programs and engagement strategies that support collaboration across the region to address regional impacts and priorities. • Development and implementation of a Community Engagement Plan including initiatives to contribute to maintaining social cohesion in the local area. • The effective implementation of an Aboriginal Cultural Heritage Management Plan (ACHMP) to avoid or mitigate disturbance to culturally important places, sites or artefacts. • Support for community events which enable interaction between community members. • Collaborate with Energy Co and other renewable energy developers across the REZ to ensure that cumulative negative impacts associated with concurrent ongoing and planned developments are identified and effectively mitigated. • Collaborate and engage with tourism stakeholders to avoid or mitigate business changes from potential impacts to Willandra Lakes Region. • Make use of the latest technology available at the time of decommissioning to maximise recycling opportunities and minimise waste going to landfill in line with best practice sustainability principles. • Employment strategies which help build workforce skills for future renewable energy projects.

7 Conclusion

This report has documented the SIA scoping process for the project as part of the Scoping Report that will inform the SEARs.

This report has provided an initial social baseline analysis including community profiles for the local study area, a summary of engagement, and preliminary social impact identification, evaluation, and mitigation.

This SIA scoping process identified a total of 23 potential social impacts, of which:

- eight social impacts require a detailed assessment
- fifteen social impacts require a standard level of assessment.

Key predicted negative impacts of the project include:

- changes to local amenity (visual, noise, lighting and dust)
- potential disruption to agricultural operations
- changes to traffic conditions within local and regional road network
- increased competition for construction labour and rental accommodation
- impacts on environmental values (wildlife conservation).

Key predicted positive impacts of the project include:

- Community Benefits Plan from the project supporting community initiatives and improvements to social services
- enhanced opportunity for economic diversification of agricultural operations.

The purpose of this SIA Scoping study was to inform the SEARs and the scale and scope of the SIA which is to be prepared as part of the EIS. The SIA will be completed in accordance with the requirements outlined in the SIA Guideline 2023 (DPE, 2023a) and SIA Technical Supplement 2023 (DPE, 2023b) and will involve the following key activities:

- An update of the baseline social profile to ensure that any further data relevant to the impacts identified are obtained.
- Further identification of, and consultation with, affected communities and vulnerable groups.
- A comprehensive assessment and evaluation of social impacts against existing baseline conditions having regard to technical studies on various planning and environmental aspects.
- Refinement of enhancement and mitigation measures.
- Consideration of cumulative impacts in the context of projects within the region.

Acronyms and abbreviations

Acronyms and abbreviations

Acronym/abbreviation	Meaning
ABS	Australian Bureau of Statistics
ACHMP	Aboriginal Cultural Heritage Management Plan
ASGS	Australian Statistical Georgraphy Standard
Balranald LEP	*Balranald Local Environment Plan 2010*
BCD	Biodiversity Conservation Service Division
BESS	battery energy storage system
CASA	Civil Aviation Safety Authority
CSP	Community Strategic Plan
DPHI	Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
EMM	EMM Consulting Pty Ltd
EP&A Act	*Environmental Planning and Assessment Act 1979*
FTE	full time equivalent
GW	gigawatt
GWh	gigawatt hour
h	hectare
IAIA	International Association for Impact Assessment
IEO	Index of Education and Occupation
IER	Index of Economic Resources
IRSAD	Index of Relative Socio-Economic Advantage and Disadvantage
IRSD	Index of Relative Socio-Economic Disadvantage
KEP	Koorakee Energy Park
kV	kilovolt
km	kilometre
LGA	Local Government Area
LSPS	Local Strategic Planning Statement
NSW	New South Wales
m	metres
PV	photovoltaic
REZ	Renewable Energy Zone

Acronyms and abbreviations

Acronym/abbreviation	Meaning
SAL	Suburb and Localities
SEARs	Secretary's Environmental Assessment Requirements
SEIFA	Socio-Economic Indexes for Areas
SIA	Social Impact Assessment
SIA Scoping Report	Social Impact Assessment Scoping Report
SIA Guideline 2023	Social Impact Assessment Guideline for State Significant Projects
SIA Technical Supplement 2023	Technical Supplement: Social Impact Assessment Guideline for State Significant Projects
t	tonnes
the project	Koorakee Energy Park
VNI	Victoria New South Wales Interconnector
WTG	wind turbine generator

References

ABS. (2021a). Census of Population and Housing: General Community Profiles. Australian Bureau of Statistics.

ABS. (2022, August 25). Counts of Australian Businesses, including Entries and Exits. Australian Bureau of Statistics.

Balranald Shire Council. (2012). *Balranald Shire: Economic Development Strategy.* Balranald Shire Council.

Balranald Shire Council. (2014). *Population Attraction and Retention Strategies.* Balranald Shire Council.

Balranald Shire Council. (2020). *Local Strategic Planning Statement.* Balranald Shire Council.

Balranald Shire Council. (2023). *Council Information/Profile*. Retrieved October 24, 2023, from Balranald Shire Council: https://balranald.nsw.gov.au/business/council-information-profile/

Balranald Shire Council. (2023). *Transport*. Retrieved October 24, 2023, from Balranald Shire Council: https://balranald.nsw.gov.au/community/transport/

Balranald Shire Council. (n.d.). *A Snapshot*. Retrieved November 16, 2023, from Balranald Shire Council: https://balranald.nsw.gov.au/business/council-information-profile/

Brewsters Property Group. (n.d.). *The value of vacancy rates*. Retrieved from Brewsters Property Group: https://brewsters.com.au/vacancy-rates/

Briggs, C., Gill, J., Atherton, A., Langdon, R., Jazbec, M., Walker, T., . . . Nagrath, K. (2022). *Employment, Skills and Supply Chains: Renewable Energy in NSW - Final Report.* Sydney, NSW: Sydney: University of Technology Sydney and SGS Economics and Planning.

Damien Peck. (2018, July 16). *Back Roads: Victorian town of Robinvale lays claim to being the most multicultural town in Australia*. Retrieved November 16, 2023, from ABC News: https://www.abc.net.au/news/2018-07-16/back-roads:-is-robinvale-australias-most-multicultural-town/9944608

DPE. (2023a). *Social Impact Guideline for State Significant Projects.* Retrieved from Department of Planning and Environment: https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Policy-and-legislation/Social-Impact-Assessment/SIA-Guideline.pdf

DPE. (2023b). *Technical Supplement: Social Impact Assessment Guideline for State Significant Projects.* Retrieved from Department of Planning and Environment: https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/Policy-and-legislation/Social-Impact-Assessment/SIA-Guideline---Technical-Supplement-2v7.pdf?la=en

DPE. (2023c). *SIA Scoping Worksheet.* NSW Department of Planning and Environment.

NSW Government. (2017). *Far West Regional Plan 2036.* NSW Government.

NSW Government. (2022). *Draft Far West Regional Plan 2041.* NSW Government.

NSW Government. (2023). *South West Renewable Energy Zone*. Retrieved from EnergyCo: https://www.energyco.nsw.gov.au/sw-rez

Robinvale-Euston Visitor Centre. (n.d.). *Indigenous Culture*. Retrieved October 24, 2023, from Robinvale-Euston Visitor Centre: https://www.robinvaleeuston.com/indigenous-culture/

Transport NSW. (2023). *Trip Planner*. Retrieved October 24, 2023, from Transport NSW: https://transportnsw.info/trip#/departures?depart=271512&type=platform&accessible=false&dateTime=202310250440

Vanclay, F., Esteves, A. M., Aucamp, I., & Franks, D. M. (2015). *Social Impact Assessment: Guidance for assessing and managing the social impacts of projects.* Fargo, ND: International Association for Impact Assessment.

Appendix A
Authors curriculum vitae

EMM
creating opportunities

A.1 Chris Mahoney

Chris Mahoney

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EMM Consulting Pty Limited

Professional Overview

Chris is one of Australia's most experienced social analysts. With over 25 years' professional experience, Chris has delivered social and economic assessments, social analysis and advice for a multitude of major projects and policy initiatives.

Chris focusses is on providing practical, grounded research to find solutions to complex social problems and enable social opportunities to be realised. He is highly adept at managing the interface between governments, industry and the community to derive the best possible outcomes. He has had the opportunity to work in a diverse range of social settings, having led projects throughout Australia, the Pacific and Asia. As a qualified land use and social planner Chris has contributed to major infrastructure plans, development plans and land use planning policy. Chris also maintains operation of a family farm and is passionate about social opportunities for residents of rural and regional Australia.

Chris possesses exceptional social research skills which have been refined in the course of delivering over 150 complex social impact assessments and other forms of social analysis. He brings a technically skilled yet pragmatic approach which focuses on the realisation of optimal solutions for complex social problems. Chris fosters a highly collaborative approach to development and implementation of social risk mitigation and management and the adaptive management of social risk and opportunity.

Qualifications and licences

Master of Urban and Regional Planning (Environmental Planning), Griffith University

Bachelor of International Economic Relations, Griffith University

Member of the International Association of Impact Assessment (IAIA): Social Impact Assessment Group

Member of the Planning Institute of Australia (PIA)

Specialisation

Provision of Social Performance specialist advice

Delivery of Impact Assessments (SIA) for large projects

Provision of community engagement programs

Design and delivery of community development initiatives

Representative experience

- Warragamba Dam Project, Chris was the lead author of the Socio-economic Impact Assessment (SEIA) for this contentious project. Chris designed and delivered a stakeholder engagement program to inform the SEIA involving 9 local government authorities, more than 80 different business interests and 250 representatives of community interests. The SEIA included a rigorous assessment of social vulnerability across a study area of more than 2 million people. NSW (Water Infrastructure NSW).
- The Oven Mountain Pumped Hydro Energy Storage project is situated in the New England Renewable Energy Zone and will provide reliable energy generation and storage capability with reservoirs able to store water for up to 12 hours of energy generation. Chris provided technical oversight of the Social Impact Assessment (SIA). This was informed by an extensive community and stakeholder engagement program which included two public surveys and interviews with over 50 key stakeholders. The SIA met all requirements of the NSW Social Impact Assessment Guideline (2021).
- North Coast Connect Faster Rail, Chris was the Social Technical Lead for the North Coast Connect Consortium which delivered the Business Case for a fast rail service between Brisbane and the Sunshine Coast. He was responsible for the delivery of the Service Needs and Social Risk Assessment, the Social chapter of the Feasibility Study and Business Case along with technical oversight across all social inputs to options assessments and design considerations. (NCC Consortium)
- MacIntyre Wind Farm, the MacIntyre Wind Farm is one of the largest onshore wind farms in the world. With a total investment of AU$1.96 billion, the 1,026MW MacIntyre Wind Farm Precinct is Acciona's biggest renewable energy facility. Chris was commissioned to complete a full technical review of the Social Impact Assessment and Social Impact Management Plan (SIMP) which comprised sub-plans dedicated to Workforce Management, Local Industry and Procurement, Community Health and Wellbeing, Housing and Accommodation and Community and Stakeholder Engagement. Chris also participated in the establishment of the MacIntyre Community Consultative Committee.
- ARTC Inland Rail project, provided specialist technical assessments and expert advice as lead advisor, review of social and economic impact assessments, community development and social management plans, overseeing the development of frameworks supporting the projects monitoring and evaluation program, National (ARTC)
- Salisbury to Beaudesert Corridor Protection Study, project manager for the delivery of engineering design and consultation programs to support the gazettal of a transport and infrastructure corridor of 70 km connecting Brisbane to high population growth which stretch to the south through to Beaudesert. Delivery of the project involved development of innovative engagement mechanics such as interactive web-based tools and collateral and direct engagement methods to refine project design and enable gazettal of the corridor (Department of Transport and Main Roads).

- Hunter Valley Operations (HVO) project, Chris provided technical oversight across the SIA process as part of the EIS for continued operation and expansion of Glencore's HVO mine. The SIA included extensive engagement with a broad range of stakeholders including landholders, Aboriginal groups, nearby residents, horse studs and other agricultural enterprises. To understand the social impacts which would occur if HVO were to cease operations, research was undertaken with the existing operations workforce and local and regional businesses which provide goods and services to the project. The SIA was delivered in accordance with the NSW SIA Guideline.
- Coal Infrastructure Masterplan, Chris was the author of the 'social effects' chapter in the coal infrastructure master plan, Queensland (Department of the Coordinator General).
- Cross River Rail project – community infrastructure assessments, Chris was the lead social planner advising on the community infrastructure elements of the project precincts, preparation of detailed baseline assessments and negotiation with stakeholders, Brisbane Queensland (Cross River Rail Development Authority).
- South East Queensland Priority Infrastructure Plan, preparation of policy guiding the delivery of essential infrastructure to service a region comprising 2.5 million people, involved extensive population modelling and collaborative policy development (Queensland Department of Planning).
- Valeria project, Chris provided technical oversight of the social impact assessment and associated social impact management plan along with strategic communications and engagement support to the project. Completion of a detailed assessment of housing and accommodation options including potential utilization of the Glencore occupied township of Tieri. Implementation of an engagement program which included requirements for the Progressive Rehabilitation and Closure Plan (PRCP). Central Queensland (Glencore)
- Moreton Bay Regional Public Transport Strategy, Chris provided expert social opinion and advice along with facilitating workshops and other stakeholder engagement activities which informed development of the Moreton Bay Regional Public Transport Strategy (Moreton Bay Regional Council).
- Winchester South project, lead author and project manager of the social impact assessment and social impact management plan for a proposed coal project involving developing comprehensive suite of management plans relating to housing and accommodation, workforce management, local industry procurement and community health and wellbeing, Central Queensland (Whitehaven Coal).
- Meadowbrook project, lead author and project manager for delivery of the social impact assessment and social impact management plan for the underground expansion of the existing Lake Vermont coal mine. A focus of the SIA was analysis of the social opportunity cost of the project not proceeding and the subsequent closure of open cut operations. Project included a targeted program of stakeholder engagement informed the development of social commitments measures formalised through the social impact management plan, Central Queensland (Jellinbah Resources).
- Social Infrastructure Model, development of a GIS-based social infrastructure model to determine social infrastructure gaps and the prediction of social infrastructure requirements in line with growth across the Mackay Regional Council area. Included the prediction of costs and an outline of delivery options (Mackay Regional Council).
- Townsville Port Expansion, project manager for the delivery of the social impact assessment and economic impact assessment for a major port expansion project, including the development and implementation of an extensive stakeholder engagement program (North Queensland Bulk Ports).
- Lake Macdonald Dam Upgrade Project, SEQ Water, Queensland, Lead author of the Social Impact Assessment (SIA) for this complex project which involves the draining of Lake Macdonald which is a central to the community of Cooroy in Queensland in order to undertake a full upgrade so to protect community safety downstream. Also had oversight of the community and stakeholder engagement program associated with the Impact Assessment Report (IAR) process- the first to be completed in Queensland.
- Isaac Downs Coal project, author of the social impact assessment and social impact management plan in the EIS for a greenfield coal project, competed a detailed assessment of land use compatibility and potential conflict, Central Queensland (Stanmore Coal).
- Ravenswood Gold project, update and revision of the social impact management plan to align with the requirements of the Queensland Social Impact Assessment Guideline (2018) and document the current social context and community sentiment towards the project's planned transition. A primary objective was to design a SIMP which is a useable adaptive management tool, providing the rationale and schedule of delivery for investments in community infrastructure and other initiatives which serve to ensure the ongoing sustainability of the Ravenswood township, Central Queensland (Ravenswood Gold).
- Cape York Water Planning Project, delivery of a social values assessment which included engagement with 12 communities, and the development of a decision support tool to assist the government to properly consider community values in natural resource planning processes (Department of Resources).
- Telfer Mine, socio-economic baseline assessment of Traditional Owners of lands surrounding the mine which involved primary data collection in remote Aboriginal communities, included the preparation of a business development plan to assist in meeting ILUA obligations, Pilbara Region WA (Newcrest Mining).
- United Nations Development Program (UNDP), social expert responsible for completing social and environmental risk assessments for climate change projects nominated by the countries for Global Environment Fund funding, Egypt, Bangladesh and Kyrgyzstan (UNDP).
- Wafi Golpu project, lead social performance advisor for the approvals phase of the project, responsible for the delivery of the Socio-economic Baseline and Socio-economic Impact Assessment in accordance with national and international standards, development of social management plans relating to community development, in-migration management and re-settlement, Papua New Guinea (Newcrest/Harmony Gold).

- Frieda River project, social technical lead for the approvals phase for a large proposed open cut mine, delivery of the social impact assessment and social studies including resettlement, alluvial mining and in-migration management, Papua New Guinea (PanAust).
- PNG LNG Expansion project (P'nyang Project), development of a major gas field and pipeline including oversight across all social aspects of the project approvals process including socio-economic baseline, socio-economic impact assessment, stakeholder engagement program, health impact assessment and cultural heritage assessment, Western Province of PNG (Exxon Mobil).

  Waisoi Copper Project, technical oversight across all social elements of the environmental and social impact assessment, expansive fieldwork in 23 villages was undertaken to inform the ESIA and included implementation of stakeholder engagement programs involving studies on macro-economic effects, cultural heritage, traffic and land use, Fiji (Newcrest).

A.2 Caroline Wilkins

Caroline Wilkins

Associate Social Scientist
EMM Consulting Pty Limited

Professional Overview

Caroline is an Associate Social Scientist and Team Leader of the Social Assessment and Performance team at EMM. Caroline has over 20 years' experience designing, planning, implementing and evaluating major social programs in challenging operating contexts. She brings extensive knowledge and demonstrated application of social science methodologies and development strategies. Her skill set includes social impact assessment, social research, community and stakeholder engagement, monitoring and evaluation, risk management, strategic planning, project management and reporting. Caroline provides practical insightful advice to clients to support social risk mitigation and management.

Caroline has worked in a range of social settings, having led projects in Australia, Timor Leste, Indonesia, Vietnam, Southern Africa and the Pacific. Caroline is a critical thinker with highly developed problem solving skills.

Qualifications and licences

Master of Social Science (International Development), RMIT University, 2005

Bachelor of Arts/Bachelor of Commerce, Deakin University, 1998

Member, Australian Evaluation Society

Member, International Association of Impact Assessment (IAIA)

Associate Member, Australasian Institute of Mining and Metallurgy (AusIMM)

Specialisation

Social Impact Assessment

Delivery of social performance advice

Monitoring and evaluation

Representative experience

Mining

- **Wimmera critical minerals mine, Iluka Resources, VIC, Australia, 2022-current** Lead author and project manager. Caroline is leading all phases of the Social Impact Assessment for the proposed new mineral sands mine near Horsham, Victoria. Responsibilities include client liaison, planning and scheduling, preparation of the social baseline, SIA stakeholder engagement, data analysis, impact identification and risk assessment, development of social impact mitigation framework and reporting.
- **Integra Underground Mine Closure, Glencore, NSW, Australia, 2022-23.** Lead author and project manager. Caroline led all phases of the Social Impact Assessment for the closure, decommissioning and rehabilitation of the underground coal mine in the Hunter Valley region, NSW. Responsibilities including client liaison, planning and scheduling, preparation of the social baseline, gathering of primary data through the survey of mine employees and supplier businesses, stakeholder engagement, data analysis, impact identification and risk assessment, development of social impact mitigation framework and reporting. SIA is not a requirement for mine closure in NSW and is being used by the client to support mine closure planning.
- **Ok Tedi Mining Limited, Social Closure Transition Framework and Strategy, Australia, 2023.** Co-author and project manager. Caroline worked closely with the OTML Social Sustainability team to develop a social closure framework and strategy to support mine closure planning. Responsibilities included reviewing existing business frameworks, preparing a literature review, review of key documentation and conducting in-depth interviews with key stakeholders including various OTML teams, local businesses and Papua New Guinea government officials. Components include future of the mine-owned town (Tabubil), public assets and services transition plan, OTML employees and contractors transition, role of the Ok Tedi Development Foundation (OTDF), post closure environmental sustainability, community investments and trust funds, and infrastructure development/Tax Credit Scheme (TCS).
- **Sustainability Report, Ok Tedi Mining Limited,** technical assistance for Annual Sustainability Report 2021, 2022

Energy

- **Oven Mountain Pumped Hydro Energy Storage Project (OMPS), OMPS Pty Ltd, 2022-2023**. Lead author of the Social Impact Assessment (SIA). The project involves the construction of a major new pumped hydro energy storage project situated approximately 100 km south-east of Armidale, NSW. Caroline led the preparation of the Social Impact Assessment. Responsibilities included client liaison, planning, preparation of the social baseline, extensive SIA engagement including interviews with over 80 key stakeholders including Councils, landowners, nearby neighbours, local businesses, community groups and Aboriginal stakeholders. Two online community surveys were also conducted. Other responsibilities included data analysis, social impact identification and risk assessment, preparation of social impact mitigation and management framework and reporting. The SIA met all requirements of the *NSW Social Impact Assessment (SIA) Guideline* (2021).
- **Muswellbrook Solar Farm**, **ESCO Pacific, NSW 2022-2023** Lead author of the Social Impact Assessment. The project involves construction of a solar farm on the now closed Muswellbrook coal mine in Muswellbrook, NSW. Responsibilities included planning and scheduling, scoping, preparation of the social baseline, SIA stakeholder engagement, data analysis, impact identification and risk assessment, development of social impact mitigation framework and reporting. The SIA met all requirements of the *NSW Social Impact Assessment (SIA) Guideline* (2023).

- **Wellington Battery Energy Storage System (BESS),** Social Impact Assessment (AMPYR Australia) 2022

Infrastructure

- **Dungowan Dam EIS and pipeline REF, Water Infrastructure NSW, 2022** SIA technical input for the Social Impact Assessment. The project was declared Critical State Significant Infrastructure (CSSI) and included a larger new dam downstream of the existing Dungowan Dam and a replacement pipeline. The SIA included identification of potential social impacts, and mitigation approaches to inform forward project planning and construction.

Monitoring and evaluation – international projects

- **Innovation Resource Facility, DT Global, Brisbane, 2017-2021** Senior Program and Grants Manager. Senior client-facing manager providing strategic technical advice and expertise to the Australian Department of Foreign Affairs and Trade (DFAT) in support of the department's innovation agenda. Responsible for monitoring and evaluation of the $33 million grant portfolio including 86 grants across 33 countries. Conducted extensive stakeholder engagement including local government agencies, local communities and technical advisors. Caroline conducted due diligence of proposed local suppliers and community organisations to ensure compliance with local law and DFAT policies and procedures.
- **Climate resilient agriculture program, DT Global, Fiji, Tuvalu and Kiribati 2020-2021.** Program manager and monitoring and evaluation. Caroline led the design and implementation of the program in the three countries remotely during the COVID pandemic. Responsibilities included management and monitoring of local businesses and other local organisations to establish climate resilient agriculture projects in each country. Other tasks included extensive stakeholder engagement, compliance with local laws and DFAT policies and procedures, and monitoring, evaluation and reporting to Australian Department of Foreign Affairs and Trade (DFAT).
- **Cyber security cooperation program, DT Global, Solomon Islands, 2019-2020.** Program manager and monitoring and evaluation. Caroline led the design and implementation of the program remotely and in Solomon Islands. Responsibilities included assessment of grant proposals, grantee induction, extensive stakeholder engagement including with government officials and local businesses, compliance with local laws and DFAT policy and procedures, organisation of in-country workshop and industry forum and monitoring, evaluation and reporting to Australian Department of Foreign Affairs and Trade (DFAT).
- **KOMPAK Governance Program, Abt Associates, Indonesia 2015-2016** Deputy Team Leader. Caroline established and managed the Australian Department of Foreign Affairs and Trade (DFAT) funded $90M public sector decentralisation program in Indonesia. Caroline led operations teams across multiple sites, including West Papua, to establish and manage provincial operations. She developed and implemented operational policies and procedures to meet DFAT and regulatory compliance requirements and was responsible for capacity building and mentoring of locally engaged teams, and engagement with a range of stakeholders including local government officials.
- **Zimbabwe Extension Support & Training Project (ZEST), Sustainable Agriculture Technology, Zimbabwe, 2013** Research and Evaluation Manager. ZEST was an agricultural extension and market development program funded by the EU and German government (GIZ). Caroline led project monitoring and evaluation including developing research methodologies and the project monitoring framework, training local teams and implementing research tasks including field work, surveys, data analysis and reporting.

A.3 Emma Barrie

Emma Barrie

Graduate Social Planner
EMM Consulting Pty Limited

Professional Overview

Emma Barrie is a social planner with experience working in social research. Emma has been involved in projects covering a range of topics such as housing and renewable energy across the private and not-for-profit sectors. From this experience, Emma has developed her skills in compiling quantitative and qualitative data, analysing social trends, report writing, project management, collaboration, and engagement. Emma's experience in applying social impact assessment research methods stems from work across projects based in both QLD and NSW.

Qualifications and licences

Bachelor of Arts in Philosophy, minoring in History and Economics, The University of Queensland, 2022

Bachelor of Social Science in Health and Society, The University of Queensland, 2022

Specialisation

Social impact assessment for state significant projects

Social research and analysis

Policy analysis

Report writing

Representative experience

Social Planning and Impact Assessment

- Muswellbrook Solar Farm Social Impact Assessment – a proposed solar farm near Muswellbrook in the Hunter Valley, NSW. Emma was involved in quantitative and qualitative data analysis, theme and impact identification, report creation and writing (ESCO Pacific Pty Ltd.)
- Sandy Creek Solar Farm, Social Impact Assessment – social baseline study, including data analysis, creation of comprehensive community profile, literature review (Lightsourcebp Pty Ltd.)
- East Weipa and Andoom Mine Closures, pre-feasibility study on planned closure – Emma was involved with a case study analysis on mine closures in Australia as well as baseline data analysis for population, employment, local business, and housing indicators (Rio Tinto Pty Ltd.).
- Somerset Dam Improvement Project, Social Impact Evaluation – for this project, Emma provided comprehensive community profiles and assisted with the social baseline, report elements including background research, and writing and editing impacts (Seqwater Pty Ltd.).
- Cowal Gold Operations Open Cut Expansion Project, Social Impact Assessment – report elements, including background research, and writing and editing impacts (Evolution Mining (Cowal) Pty Ltd.).
- Oven Mountain PHES, Social Impact Assessment – report elements, including background research, and writing and editing impacts (OMPS Pty Ltd.).
- Oak Dam Underground Access, Social Impact Assessment – Emma assisted with baseline research and report elements including background research, and writing and editing impacts (BHP Olympic Dam Corporation Pty Ltd.).
- Integra Underground Mine Closure, Social Impact Assessment – report elements including background research, and writing and editing impacts (HK Coking Coal Pty Ltd.).
- Lake Lyell PHES, Social Impact Assessment – social baseline study, including data analysis, creation of comprehensive community profile, literature review (EnergyAustralia NSW Pty Ltd.).
- Birriwa Solar and Battery Project Workforce Accommodation Amendment report, Social Impact Assessment – baseline update and analysis, engagement organisation, and report elements including background research, and writing and editing impacts (ACEN Australia Pty Ltd.).
- Upgrade to Line 965, Social Impact Assessment scoping report – Emma assisted with preliminary study area identification and baseline, as well as scoping report elements including background research and report writing (NSW Electricity Networks Operations Pty Ltd.).
- Belhaven BESS, Social Impact Assessment – comprehensive community profiles, social baseline, engagement organisation, Social Impact Assessment report elements including background research, and writing and editing impacts (Vena Energy Services (Australia)) Pty Ltd.).
- GCAA Social Needs Assessment – baseline analysis, literature review, and assisted with the assessment of social needs in terms of community health and wellbeing, education, First Nations, environment, and disaster resilience for LGAs hosting Glencore Mining projects (Glencore Pty Ltd.).
- Kemps Creek Industrial Estate Warehouse and Distribution Centre, Social Impact Assessment – social baseline study, including data analysis, creation of comprehensive community profile, literature review as well as report writing elements including the description and assessment of social impacts (Fife Land 2 Pty Ltd.).
- Epping Aquatic Centre, Social Impact Assessment – the project examined the redevelopment of Epping Aquatic and Leisure Centre in Parramatta LGA, Sydney. This included the preparation of a Social Impact Assessment which included social locality identification, comprehensive community profiles and baseline analysis, mapping of social infrastructure and writing with the impact assessment including the description and analysis of social impacts (City of Parramatta Council).

Other research experience

- Social research experience during a work-integrated university course, completed a year-long project on housing impacts from mega-events in a South East Queensland setting.
- Data cleaning and analysis for a report investigating rental affordability in South East Queensland and Australia.
- Survey coordinator for a creek catchment group regarding membership and events (a volunteer role).

Appendix B
Detailed baseline data

EMM
creating opportunities

B.1 Baseline indicators for community profiles (local area)

Table B.1 Population, dwelling and labour force indicators – local area

Indicator	Year and data source	Euston SAL	Balranald SAL excl. Balranald UCL	Regional Area	Comparison of rates Regional Area[2]	
					Euston SAL	Balranald SAL excl. Balranald UCL
Population and socio-cultural indicators						
Population (#)	2021, ABS	822	177	40,068	-	-
	2016, ABS	839	184	39,113	-	-
Population change over 5 years to 2021 (%)	2016 and 2021, ABS	-2.0%	-3.8%	2.4%	v	v
Identify as Aboriginal and/or Torres Strait Islander (#)	2021, ABS	33	8	2,446	-	-
Identify as Aboriginal and/or Torres Strait Islander (%)	2021, ABS	4.0%	4.5%	6.1%	v	v
Males (%)	2021, ABS	50.4%	53.1%	50.6%	v	^
Females (%)	2021, ABS	49.4%	42.9%	49.4%	=	v
Median age (#)	2021, ABS	36	-	-	-	-
	2016, ABS	35	-	-	-	-
Aged 14 years or younger (children) (%)	2021, ABS	21.8%	19.8%	17.8%	^	^
Aged 15 to 24 years (youth) (%)	2021, ABS	11.4%	11.3%	9.8%	^	^
Aged 25 to 64 years (adults) (%)	2021, ABS	40.4%	45.2%	43.0%	v	^

[2] v denotes area recorded lower proportion. ^ denotes area recorded higher proportion.

Table B.1 Population, dwelling and labour force indicators – local area

Indicator	Year and data source	Euston SAL	Balranald SAL excl. Balranald UCL	Regional Area	Comparison of rates Regional Area[2]	
					Euston SAL	Balranald SAL excl. Balranald UCL
Aged 65 years or older (elderly) (%)	2021, ABS	17.6%	19.8%	24.0%	V	V
Number of families (#)	2021, ABS	188	43	10,367	-	-
Has a need for assistance (%)	2021, ABS	4.1%	6.2%	5.8%	V	^
Has a long-term health condition (%)	2021, ABS	19.3%	20.9%	31.4%	V	V
Engaged in voluntary work (%)	2021, ABS	9.8%	41.8%	19.2%	V	^
Median weekly household income ($)	2021, ABS	1,612	-	-	-	-
Completed Year 12 or equivalent (%)	2021, ABS	42.2%	43.0%	40.5%	^	^
Households earning less than $650 per week (%)	2021, ABS	14.5%	22.4%	19.9%	V	^
Lone person households (%)	2021, ABS	18.3%	22.4%	29.3%	V	V
Speaks other language at home (%)	2021, ABS	11.1%	2.8%	3.8%	^	V
Housing indicators						
Number of private dwellings (#)	2021, ABS	246	68	17,577	-	-
Unoccupied dwellings (%)	2021, ABS	6.1%	23.5%	15.3%	V	^
Separate house (%)	2021, ABS	91.1%	85.7%	90.8%	^	V
Owned outright or with a mortgage (%)	2021, ABS	66.7%	48.5%	59.4%	^	V

Table B.1 Population, dwelling and labour force indicators – local area

Indicator	Year and data source	Euston SAL	Balranald SAL excl. Balranald UCL	Regional Area	Comparison of rates Regional Area[2]	
					Euston SAL	Balranald SAL excl. Balranald UCL
Rented (%)	2021, ABS	20.4%	10.2%	22.0%	v	v
Median rent ($)	2021, ABS	250	-	-		
Social housing (%)	2021, ABS	10.4%	0.0%	11.4%	v	v
Labour force indicators						
Participates in labour force (#)	2021, ABS	367	91	18619	-	-
Labour force participation rate (%)	2021, ABS	56.5%	64.5%	56.5%	=	^
Unemployed persons (#)	2021, ABS	12	3	638	-	-
Unemployment rate (%)	2021, ABS	3.3%	3.3%	3.4%	v	v
Youth unemployment rate (%)	2021, ABS	0.0%	0.0%	7.3%	v	v
Top 3 key industries of employment						
First (%)	2021, ABS	Agriculture, forestry and fishing (38.0%)	Agriculture, forestry and fishing (67.5%)	Agriculture, forestry and fishing (22.5%)	-	-
Second (%)	2021, ABS	Accommodation and food services (9.0%)	Health care and social assistance (15.7%)	Health care and social assistance (11.4%)	-	-
Thirds (%)	2021, ABS	Retail trade (7.3%)	Financial and insurance services (10.8%)	Construction (8.0%)	-	-

B.2 Baseline indicators for community profiles (key towns)

Table B.2 Population, dwelling and labour force indicators – key towns

Indicator	Year and data source	Euston UCL	Robinvale UCL	Balranald UC	Mildura SUA	Regional Area	Comparison of rates with Regional Area			
							Euston UCL	Robinvale UCL	Balranald UCL	Mildura SUA
Population and socio-cultural indicators										
Population (#)	2021, ABS	500	2441	1063	53620	40,068	-	-	-	-
	2016, ABS	510	2154	1159	50239	39,113	-	-	-	-
Population change over 5 years to 2021 (%)	2016 and 2021, ABS	-2.0%	13.3%	-8.3%	6.7%	2.4%	v	^	v	^
Identify as Aboriginal and/or Torres Strait Islander (#)	2021, ABS	27	234	102	2,881	2,446	-	-	-	-
Identify as Aboriginal and/or Torres Strait Islander (%)	2021, ABS	5.4%	9.6%	9.6%	5.4%	6.1%	v	^	^	v
Males (%)	2021, ABS	48.8%	51.2%	49.1%	49.0%	50.6%	v	^	v	v
Females (%)	2021, ABS	50.6%	48.7%	51.4%	51.0%	49.4%	^	v	^	^
Median age (#)	2021, ABS	39	36	49	40	-	-	-	-	-
	2016, ABS	36	35	46	40	-	-	-	-	-
Aged 14 years or younger (children) (%)	2021, ABS	20.4%	17.6%	18.0%	18.7%	17.8%	^	v	^	^
Aged 15 to 24 years (youth) (%)	2021, ABS	10.2%	9.5%	8.6%	11.4%	9.8%	^	v	v	^
Aged 25 to 64 years (adults) (%)	2021, ABS	38.2%	46.5%	42.9%	43.5%	43.0%	v	^	v	v
Aged 65 years or older (elderly) (%)	2021, ABS	21.2%	16.1%	24.6%	19.7%	24.0%	v	v	^	v

Table B.2 Population, dwelling and labour force indicators – key towns

Indicator	Year and data source	Euston UCL	Robinvale UCL	Balranald UC	Mildura SUA	Regional Area	Comparison of rates with Regional Area			
							Euston UCL	Robinvale UCL	Balranald UCL	Mildura SUA
Number of families (#)	2021, ABS	104	470	249	13,903	10,367	-	-	-	-
Has a need for assistance (%)	2021, ABS	4.2%	5.7%	7.2%	7.4%	5.8%	∨	∨	∧	∧
Engaged in voluntary work (%)	2021, ABS	19.6%	18.7%	30.3%	31.0%	31.4%	∨	∨	∨	∨
Long-term health conditions (%)	2021, ABS	6.3%	9.6%	25.8%	13.1%	19.2%				
Median weekly household income ($)	2021, ABS	1,281	1,196	1,166	1,352	-	-	-	-	-
Completed Year 12 or equivalent (%)	2021, ABS	37.5%	48.0%	37.5%	44.7%	40.5%	∨	∧	∨	∧
Households earning less than $650 per week (%)	2021, ABS	16.5%	23.3%	26.5%	19.3%	19.9%	∨	∧	∧	∨
Lone person households (%)	2021, ABS	22.3%	25.9%	35.5%	28.6%	29.3%	∨	∨	∧	∨
Speaks other language at home (%)	2021, ABS	9.2%	27.5%	5.9%	9.2%	3.8%	∧	∧	∧	∧
Housing indicators										
Number of private dwellings (#)	2021, ABS	140	762	538	21,911	17,577	-	-	-	-
Unoccupied dwellings (%)	2021, ABS	2.1%	8.1%	24.9%	9.1%	15.3%	∨	∨	∧	∨
Separate house (%)	2021, ABS	90.6%	84.5%	89.8%	84.8%	90.8%	∨	∨	∨	∨
Owned outright or with a mortgage (%)	2021, ABS	65.0%	40.3%	50.0%	59.1%	59.4%	∧	∨	∨	∨
Rented (%)	2021, ABS	25.2%	50.5%	29.9%	30.3%	22.0%	∧	∧	∧	∧

Table B.2 Population, dwelling and labour force indicators – key towns

Indicator	Year and data source	Euston UCL	Robinvale UCL	Balranald UC	Mildura SUA	Regional Area	Comparison of rates with Regional Area			
							Euston UCL	Robinvale UCL	Balranald UCL	Mildura SUA
Median rent ($)	2021, ABS	250	220	200	265	-				
Social housing (%) G37	2021, ABS	14.3%	35.1%	27.6%	14.5%	11.4%	^	^	^	^
Labour force indicators										
Participates in labour force (#)	2021, ABS	193	983	458	24736	18619	-	-	-	-
Labour force participation rate (%)	2021, ABS	48.4%	48.8%	52.6%	56.8%	56.5%	v	v	v	^
Unemployed persons (#)	2021, ABS	7	79	21	1291	638	-	-	-	-
Unemployment rate (%)	2021, ABS	3.6%	8.0%	4.6%	5.2%	3.4%	^	^	^	^
Youth unemployment rate (%)	2021, ABS	0.0%	6.6%	10.2%	10.3%	7.3%	v	v	^	^
Top 3 key industries of employment (%)										
First (%)	2021, ABS	Agriculture, forestry and fishing (25%)	Agriculture, forestry and fishing (36.5%)	Agriculture, forestry and fishing (16%)	Health care and social assistance (15.5%)	Agriculture, forestry and fishing (22.5%)	-	-	-	-
Second (%)	2021, ABS	Retail trade (11.7%)	Admin. and support services (8.5%)	Health care and social assistance (13.3%)	Retail trade (10.8%)	Health care and social assistance (11.4%)	-	-	-	-
Thirds (%)	2021, ABS	Accom. and food services (10.6%)	Retail trade (5.7%)	Public admin. and safety (10.3%)	Agriculture, forestry and fishing (9.4%)	Construction (8.0%)	-	-	-	-

B.3 Baseline indicators for key social trends

Table B.3 Population projections, 2021 to 2041

Locality	2021	2041	Change (#)	Change (%)
Sub-regional area				
Balranald LGA	2,269	1,817	-452	-19.9
Regional area				
Wentworth LGA	7,074	6,831	-243	-3.4
Balranald LGA	2,269	1,817	-452	-19.9
Murray River LGA	12,426	15,456	3,030	24.4
Hay LGA	2,862	2,594	-268	-9.4
Edward River LGA	9,073	9,012	-61	-0.7
Carrathool LGA	2,771	2,698	-73	-2.6
Murrumbidgee LGA	3,895	3,998	103	2.6
Total Regional area	*40,370*	*42,406*	*2,036*	*5.0*
State				
NSW	8,166,757	9,872,934	1,706,176	20.9

Source: DPE (2022b)

Table B.4 Housing affordability, 2016 and 2021

LGA	Median weekly rent			Renter households with rent payments greater than 30% of household income (%)		Owner with mortgage households with mortgage repayments greater than 30% of household income (%)	
	2016	2021	Change, 2016 to 2021	2016	2021	2016	2021
Sub-regional area							
Balranald LGA	$150	$200	$50	6.6%	22.7%	2.3%	10.2%
Regional area							
Wentworth LGA	$160	$200	$40	7.4%	28.0%	5.1%	9.7%
Balranald LGA	$150	$200	$50	6.6%	22.7%	2.3%	10.2%
Murray River LGA	$200	$260	$60	5.6%	26.7%	4.9%	10.3%
Hay LGA	$150	$175	$25	7.5%	21.7%	3.5%	6.9%
Edward River LGA	$185	$220	$35	8.8%	30.0%	3.8%	8.2%
Carrathool LGA	$105	$200	$95	3.5%	13.7%	2.6%	7.7%

Table B.4 Housing affordability, 2016 and 2021

LGA	Median weekly rent			Renter households with rent payments greater than 30% of household income (%)		Owner with mortgage households with mortgage repayments greater than 30% of household income (%)	
	2016	2021	Change, 2016 to 2021	2016	2021	2016	2021
Murrumbidgee LGA	$150	$190	$40	6.0%	13.9%	3.4%	9.1%
State							
NSW	$380	$420	$40	12.9	35.5	7.4	17.3

Source: ABS (2016); ABS (2021b)

B.4 Baseline indicators for sub-regional area and regional area

Table B.5 Population, dwelling and labour force indicators – regional area

Indicator	Year and data source	Balranald LGA	Regional area	Comparison of rates with Regional area
				Balranald LGA
Population and socio-cultural indicators				
Population (#)	2021, ABS	2,208	40,068	-
	2016, ABS	2,287	39,113	-
Population change over 5 years to 2021 (%)	2016 and 2021, ABS	-3.5%	2.4%	v
Identify as Aboriginal and/or Torres Strait Islander (#)	2021, ABS	141	2,446	-
Identify as Aboriginal and/or Torres Strait Islander (%)	2021, ABS	6.4%	6.1%	^
Males (%)	2021, ABS	50.5%	50.6%	v
Females (%)	2021, ABS	49.7%	49.4%	^
Median age (#)	2021, ABS	43	-	-
	2016, ABS	41	-	-
Aged 14 years or younger (children) (%)	2021, ABS	19.8%	17.8%	^
Aged 15 to 24 years (youth) (%)	2021, ABS	9.9%	9.8%	^
Aged 25 to 64 years (adults) (%)	2021, ABS	42.5%	43.0%	v
Aged 65 years or older (elderly) (%)	2021, ABS	20.5%	24.0%	v
Number of families (#)	2021, ABS	518	10,367	-

Table B.5 Population, dwelling and labour force indicators – regional area

Indicator	Year and data source	Balranald LGA	Regional area	Comparison of rates with Regional area
				Balranald LGA
Has a need for assistance (%)	2021, ABS	5.6%	5.8%	v
Long-term health condition (%)	2021, ABS	24.8%	31.4%	
Engaged in voluntary work (%)	2021, ABS	21.4%	19.2%	^
Median weekly household income ($)	2021, ABS	1,370	-	-
Completed Year 12 or equivalent (%)	2021, ABS	40.6%	40.5%	^
Households earning less than $650 per week (%)	2021, ABS	20.1%	19.9%	^
Lone person households (%)	2021, ABS	28.4%	29.3%	v
Speaks other language at home (%)	2021, ABS	7.0%	3.8%	^
Housing indicators				
Number of private dwellings (#)	2021, ABS	922	17,577	-
Unoccupied dwellings (%)	2021, ABS	20.8%	15.3%	^
Separate house (%)	2021, ABS	90.0%	90.8%	v
Owned outright or with a mortgage (%)	2021, ABS	53.7%	59.4%	v
Rented (%)	2021, ABS	24.0%	22.0%	^
Median rent ($)	2021, ABS	200	-	-

Table B.5 Population, dwelling and labour force indicators – regional area

Indicator	Year and data source	Balranald LGA	Regional area	Comparison of rates with Regional area
				Balranald LGA
Social housing (%)	2021, ABS	23.3%	11.4%	^
Labour force indicators				
Participates in labour force (#)	2021, ABS	1,001	18,619	-
Labour force participation rate (%)	2021, ABS	56.4%	56.5%	v
Unemployed persons (#)	2021, ABS	31	638	-
Unemployment rate (%)	2021, ABS	3.1%	3.4%	v
Youth unemployment rate (%)	2021, ABS	4.5%	7.3%	v
Top 3 key industries of employment (%)				
First (%)	2021, ABS	Agriculture, forestry and fishing (33.9%)	Agriculture, forestry and fishing (22.5%)	-
Second (%)	2021, ABS	Health care and social assistance (9.7%)	Health care and social assistance (11.4%)	-
Thirds (%)	2021, ABS	Education and training (7.7%)	Construction (8.0%)	-

Source: ABS (2016); ABS (2021b)

Table B.6 Population, dwelling and labour force indicators – regional area

Indicator	Year and data source	Wentworth LGA	Balranald LGA	Murray River LGA	Hay LGA	Edward River LGA	Carrathool LGA	Murrumbidgee LGA	Total Regional Area	New South Wales
Population and socio-cultural indicators										
Population (#)	2021, ABS	7,453	2,208	12,850	2,882	8,456	2,866	3,353	40,068	8,072,163
	2016, ABS	6,794	2,287	11,680	2,946	8,851	2,719	3,836	39,113	7,480,228
Population change over 5 years to 2021 (%)	2016 and 2021, ABS	9.7%	-3.5%	10.0%	-2.2%	-4.5%	5.4%	-12.6%	2.4%	7.9%
Identify as Aboriginal and/or Torres Strait Islander (#)	2021, ABS	622	141	492	238	410	253	290	2,446	278,043
Identify as Aboriginal and/or Torres Strait Islander (%)	2021, ABS	8.3%	6.4%	3.8%	8.3%	4.8%	8.8%	8.6%	6.1%	3.4%
Males (%)	2021, ABS	51.9%	50.5%	49.9%	50.2%	49.3%	53.3%	52.2%	50.6%	49.4%
Females (%)	2021, ABS	48.1%	49.7%	50.1%	49.8%	50.7%	46.9%	47.7%	49.4%	50.6%
Median age (#)	2021, ABS	43	43	49	48	46	37	45	-	39
	2016, ABS	44	41	49	46	45	40	41	-	38
Aged 14 years or younger (children) (%)	2021, ABS	19.2%	19.8%	16.9%	16.0%	17.5%	19.9%	17.0%	17.8%	18.2%
Aged 15 to 24 years (youth) (%)	2021, ABS	10.4%	9.9%	8.5%	10.7%	10.4%	10.5%	10.1%	9.8%	11.8%
Aged 25 to 64 years (adults) (%)	2021, ABS	44.0%	42.5%	41.1%	45.1%	42.5%	46.5%	44.5%	43.0%	45.1%
Aged 65 years or older (elderly) (%)	2021, ABS	20.8%	20.5%	28.5%	23.1%	24.9%	15.5%	21.7%	24.0%	17.6%
Number of families (#)	2021, ABS	1,912	518	3,493	742	2,160	670	872	10,367	2,135,964
Has a need for assistance (%)	2021, ABS	5.5%	5.6%	5.5%	6.2%	7.2%	4.0%	5.6%	5.8%	5.8%

Table B.6 Population, dwelling and labour force indicators – regional area

Indicator	Year and data source	Wentworth LGA	Balranald LGA	Murray River LGA	Hay LGA	Edward River LGA	Carrathool LGA	Murrumbidgee LGA	Total Regional Area	New South Wales
Long-term health condition (%)		29.2%	24.8%	32.3%	33.3%	34.2%	25.6%	33.3%	31.4%	27.0%
Engaged in voluntary work (%)	2021, ABS	16.0%	21.4%	18.2%	22.1%	20.7%	17.9%	23.3%	19.2%	13.0%
Median weekly household income ($)	2021, ABS	1,392	1,370	1,260	1,236	1,240	1,516	1,401	-	1,829
Completed Year 12 or equivalent (%)	2021, ABS	39.9%	40.6%	40.1%	41.0%	40.5%	44.5%	39.3%	40.5%	63.3%
Households earning less than $650 per week (%)	2021, ABS	18.5%	20.1%	20.4%	22.4%	21.2%	17.4%	17.3%	19.9%	15.3%
Lone person households (%)	2021, ABS	24.8%	28.4%	27.5%	33.5%	33.4%	28.7%	32.0%	29.3%	25.0%
Speaks other language at home (%)	2021, ABS	3.8%	7.0%	3.0%	3.7%	2.7%	8.4%	3.8%	3.8%	22.4%
Housing indicators										
Number of private dwellings (#)	2021, ABS	3,026	922	5,803	1,372	3,856	1,109	1,489	17,577	3,199,988
Unoccupied dwellings (%)	2021, ABS	16.0%	20.8%	16.0%	17.4%	13.6%	12.5%	12.8%	15.3%	9.4%
Separate house (%)	2021, ABS	92.2%	90.0%	89.0%	91.4%	90.0%	94.4%	93.7%	90.8%	65.6%
Owned outright or with a mortgage (%)	2021, ABS	61.2%	53.7%	62.5%	53.5%	60.5%	50.8%	56.1%	59.4%	58.0%
Rented (%)	2021, ABS	19.6%	24.0%	18.7%	26.4%	24.8%	28.0%	22.9%	22.0%	32.6%
Median rent ($)	2021, ABS	200	200	260	175	220	200	190	-	420
Social housing (%)	2021, ABS	16.0%	23.3%	7.0%	11.7%	12.7%	7.8%	9.8%	11.4%	12.8%
Labour force indicators										
Participates in labour force (#)	2021, ABS	3,317	1,001	5,834	1,337	3,918	1,514	1,698	18,619	3,874,012

Table B.6 Population, dwelling and labour force indicators – regional area

Indicator	Year and data source	Wentworth LGA	Balranald LGA	Murray River LGA	Hay LGA	Edward River LGA	Carrathool LGA	Murrumbidgee LGA	Total Regional Area	New South Wales
Labour force participation rate (%)	2021, ABS	55.0%	56.4%	54.6%	55.3%	56.2%	65.7%	61.0%	56.5%	58.7%
Unemployed persons (#)	2021, ABS	142	31	181	54	140	41	49	638	189,852
Unemployment rate (%)	2021, ABS	4.3%	3.1%	3.1%	4.0%	3.6%	2.7%	2.9%	3.4%	4.9%
Unemployment rate (%)	Sept qtr 2022, LMIP	9.7%	4.5%	6.2%	2.2%	8.7%	5.6%	9.7%	7.3%	9.8%
Youth unemployment rate (%)	2021, ABS	7,453	2,208	12,850	2,882	8,456	2,866	3,353	40,068	8,072,163

Source: ABS (2021b)

Appendix C

Nearby projects – full list

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Table C.1 Other energy infrastructure projects in within 150 km of the project site

Project	Distance from Project site	Status	Known workforce requirements		Social impact considerations	Likely contribution to Project cumulative social impacts
			Construction	Operations		
Euston Wind Farm	Adjacent to project site	Preparing EIS	18–24-month construction timeframe (start Q2 2025) 250 FTE workers	30–35-year operations (start Q2 2027) 15 FTE workers	• Housing demand • Labour demand • Access to and availability of health services • Visual amenity	Likely to contribute to cumulative amenity impacts during construction relating to traffic along common haulage routes, as well as air quality, noise and vibration.
Project EnergyConnect (NSW – Eastern Section) - 330kV transmission line and includes Balranald Substation, and Balranald construction accommodation site	Adjacent to project site	Under construction	Late 2022 18 months Peak 500 FTE workers	NA	• Housing demand • Labour demand • Access to and availability of health services • Visual amenity	Unlikely to contribute to significant Project cumulative social impacts as Project EnergyConnect (NSW – Eastern Section) is anticipated to be operational prior to project construction.
Euston Mineral Sands project	4 km W	Preparing EIS	18-month construction timeframe 250–350 FTE workers	12-year lifespan 150–250 FTE workers	• Housing demand • Labour demand • Access to and availability of health services • Visual amenity	Likely to contribute to cumulative amenity impacts during construction relating to traffic along common haulage routes, as well as air quality, noise and vibration.
Balranald Mineral Sands Mine	11 km NE	Approved	2.5 years construction timeframe 158 FTE workers	15-year lifespan 385 FTE workers	• Housing demand • Labour demand • Access to and availability of health services	Unlikely to contribute to significant project cumulative social impacts as Balranald Mineral Sands Mine is anticipated to be operational prior to Project construction.

Table C.1 Other energy infrastructure projects in within 150 km of the project site

Project	Distance from Project site	Status	Known workforce requirements		Social impact considerations	Likely contribution to Project cumulative social impacts
			Construction	Operations		
Mallee Wind Farm	42 km NW	Preparing EIS	Planned to commence in 2025 Approx. 30–36 months	Planned to commence in 2027 with full scale operations planned for 2028 Estimated operational life of 30 years	• Visual amenity • Noise and vibration • Traffic and transport • Housing demand • Hazards and risks	Likely to contribute to cumulative amenity impacts during construction relating to traffic along common haulage routes as well as demand for housing.
Limondale Solar Farm	55 km SE	Operational	12–15-month construction timeframe 200 FTE workers	30-year lifespan 4–7 FTE workers	• Housing demand • Access to and availability of health services	Unlikely to contribute to significant project cumulative social impacts as Limondale Solar Farm is anticipated to be operational prior to project construction.
Sunraysia Solar Farm	55 km SE	Operational	7-12-month construction timeframe 250 FTE workers	30-year lifespan 2 FTE workers	• Housing demand • Access to and availability of health services	Unlikely to contribute to significant project cumulative social impacts as Sunraysia Solar Farm is anticipated to be operational prior to project construction.
Atlas-Campaspe Mineral Sands Mine	56 km NW	Approved	12-month construction timeframe 300 FTE workers	20-year lifespan 200 FTE workers	• Housing demand • Access to and availability of health services	Unlikely to contribute to significant project cumulative social impacts as Atlas-Campaspe Mineral Sands Mine is anticipated to be operational prior to project construction.

Table C.1 Other energy infrastructure projects in within 150 km of the project site

Project	Distance from Project site	Status	Known workforce requirements		Social impact considerations	Likely contribution to Project cumulative social impacts
			Construction	Operations		
Project EnergyConnect (NSW – Western Section)- includes Buronga substation and Buronga accommodation site	60 km NW	Under construction	Mid-2021 18 months 400 FTE workers	Operational by mid-2023	• Housing demand • Labour demand • Intergenerational equity • Visual amenity changes • Aboriginal cultural heritage impacts	Unlikely to contribute to significant project cumulative social impacts as Project EnergyConnect (NSW – Western Section) is anticipated to be operational prior to project construction.
Buronga Landfill Expansion	63 km NW	Under construction	NA	26 FTE and estimated 50 FTE as an indirect labour force Operational life for Stage 1 is estimated to be over 70 years and for Stage 2 over 50 years	• Air quality (dust, odour, greenhouse)	Unlikely to contribute to significant project cumulative social impacts as Buronga Landfill Expansion is anticipated to be operational prior to project construction.
Junction Rivers Wind Farm (formerly Burrawong Wind Farm)	65 km SE	Preparing EIS	NA	NA	• Housing demand • Access to and availability of health services	Potential to contribute to cumulative social impacts relating to access to housing and services.
Wilan Wind Farm	83 km SE	Preparing EIS	Works expected to start late 2024 2-year duration 400 FTE workers	Expected to start late 2026 or early 2027 Operational life of 25–30 years 10–15 FTE workers	• Housing demand • Access to and availability of health services	Potential to contribute to cumulative social impacts relating to access to housing and services.
Baldon Wind Farm	100 km SE	Preparing EIS	2–3-years duration	Operational life of 30 years	• Housing demand • Access to and availability of health services	Potential to contribute to cumulative social impacts relating to access to housing and services.

Table C.1 Other energy infrastructure projects in within 150 km of the project site

Project	Distance from Project site	Status	Known workforce requirements		Social impact considerations	Likely contribution to Project cumulative social impacts
			Construction	Operations		
Tchelery Wind Farm	109 km SE	Preparing EIS	Works expected to start early 2026 3-year duration 500 FTE workers	Energy generation expected to commence in 2028 Operational life of 30 years 10–20 FTE workers	• Housing demand • Access to and availability of health services	Potential to contribute to cumulative social impacts relating to access to housing and services.
Snapper Mineral Sands Mine	120 km NW	Determination	15 months Peak 250 workers (average 200 workers)	Estimated 16-year operational period. Approx 110 employees		Unlikely to contribute to significant project cumulative social impacts as Snapper Mineral Sands Mine is anticipated to be operational prior to project construction.
Copi Mineral Sands project	138 km NW	Preparing EIS	Approx 18 months	Operational for over 30 years, followed by up to 5-year rehabilitation period	• Housing demand • Access to and availability of health services	Potential to contribute to cumulative social impacts relating to access to housing and services.

Appendix D
Community survey

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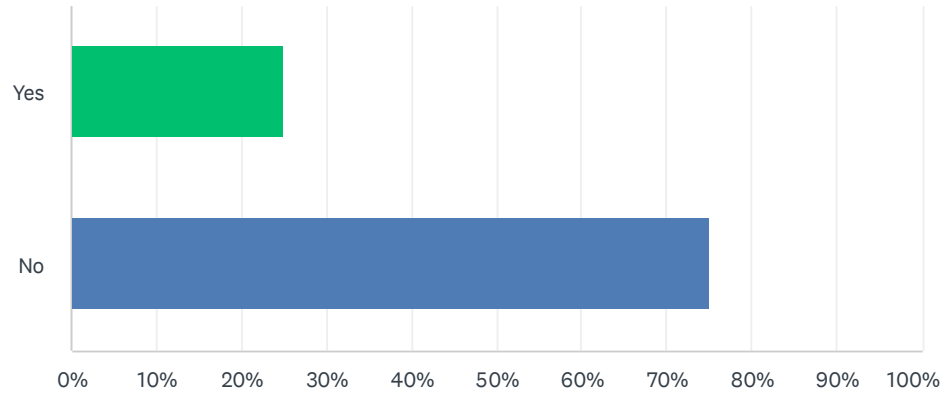
Q1 Have you had any previous communications with Squadron Energy?

Answered: 4 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	25.00%	1
No	75.00%	3
Total Respondents: 4		

Q2 Based on your awareness, what is your view of the Koorakee Energy Park Project?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	Go for it. All good	12/5/2023 5:17 PM
2	Go for it!! Now.	12/5/2023 5:15 PM
3	Change of landscape	12/5/2023 5:14 PM
4	Good stuff	12/5/2023 5:12 PM

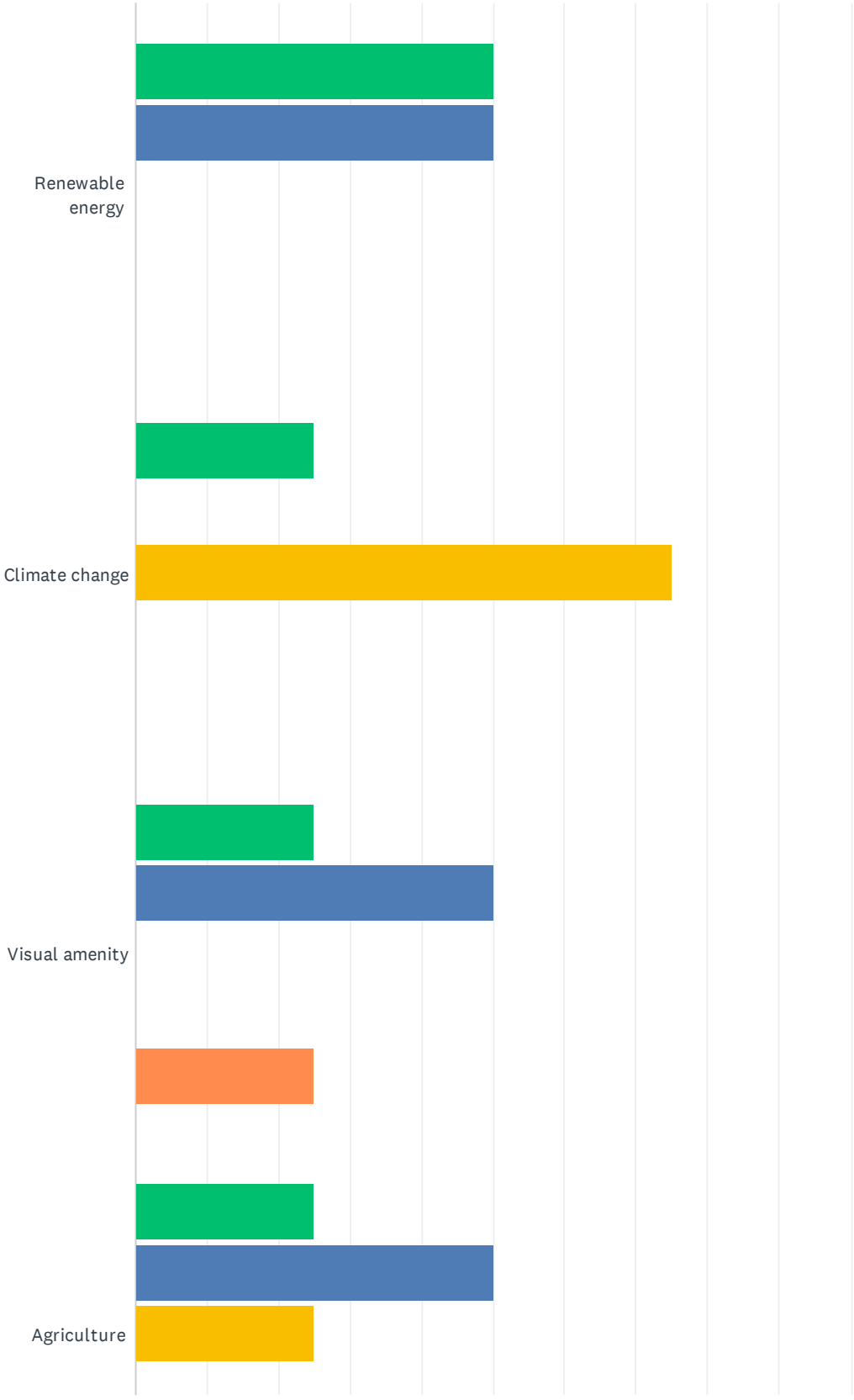
Q3 Why do you hold this view?

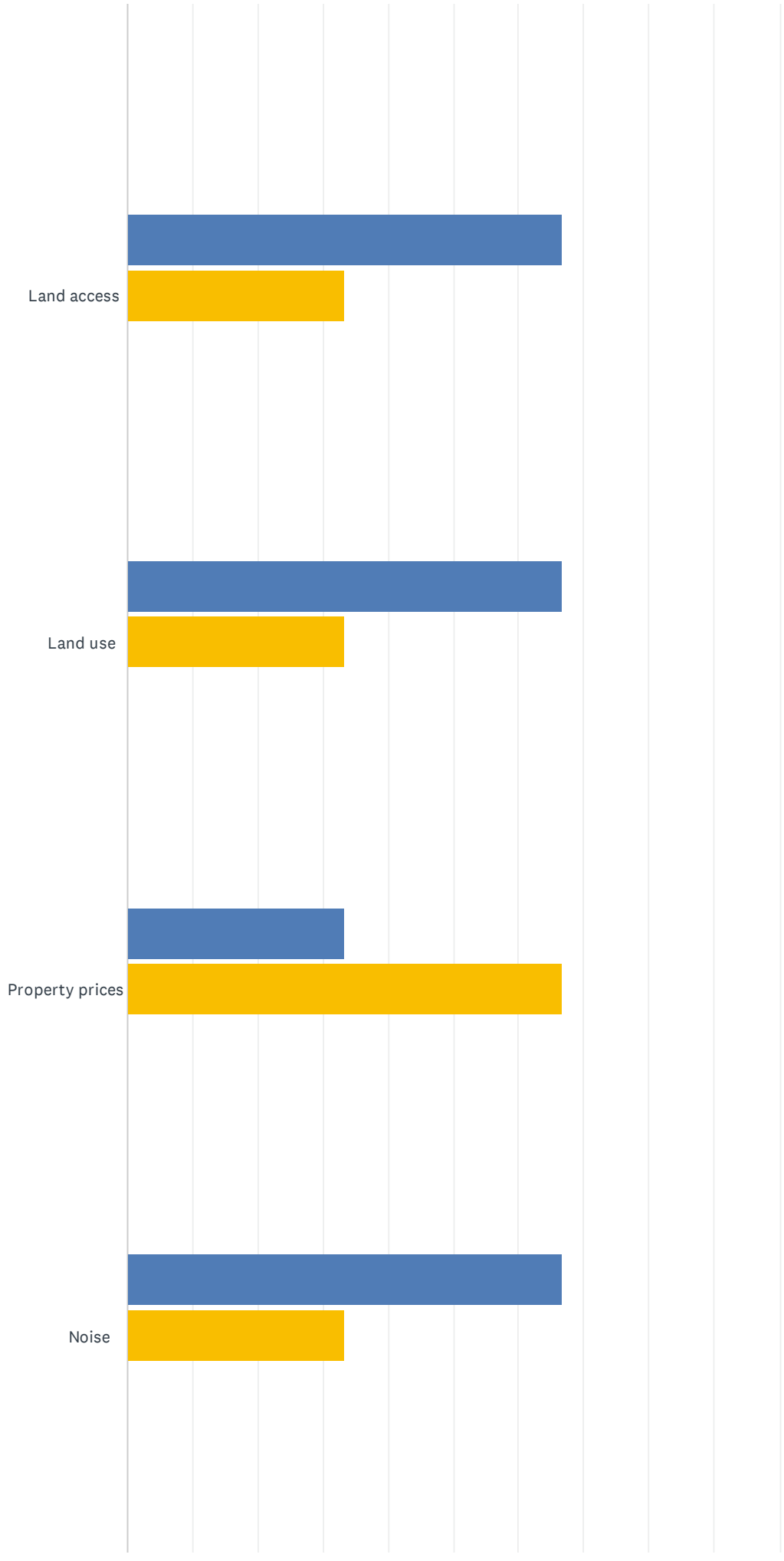
Answered: 4 Skipped: 0

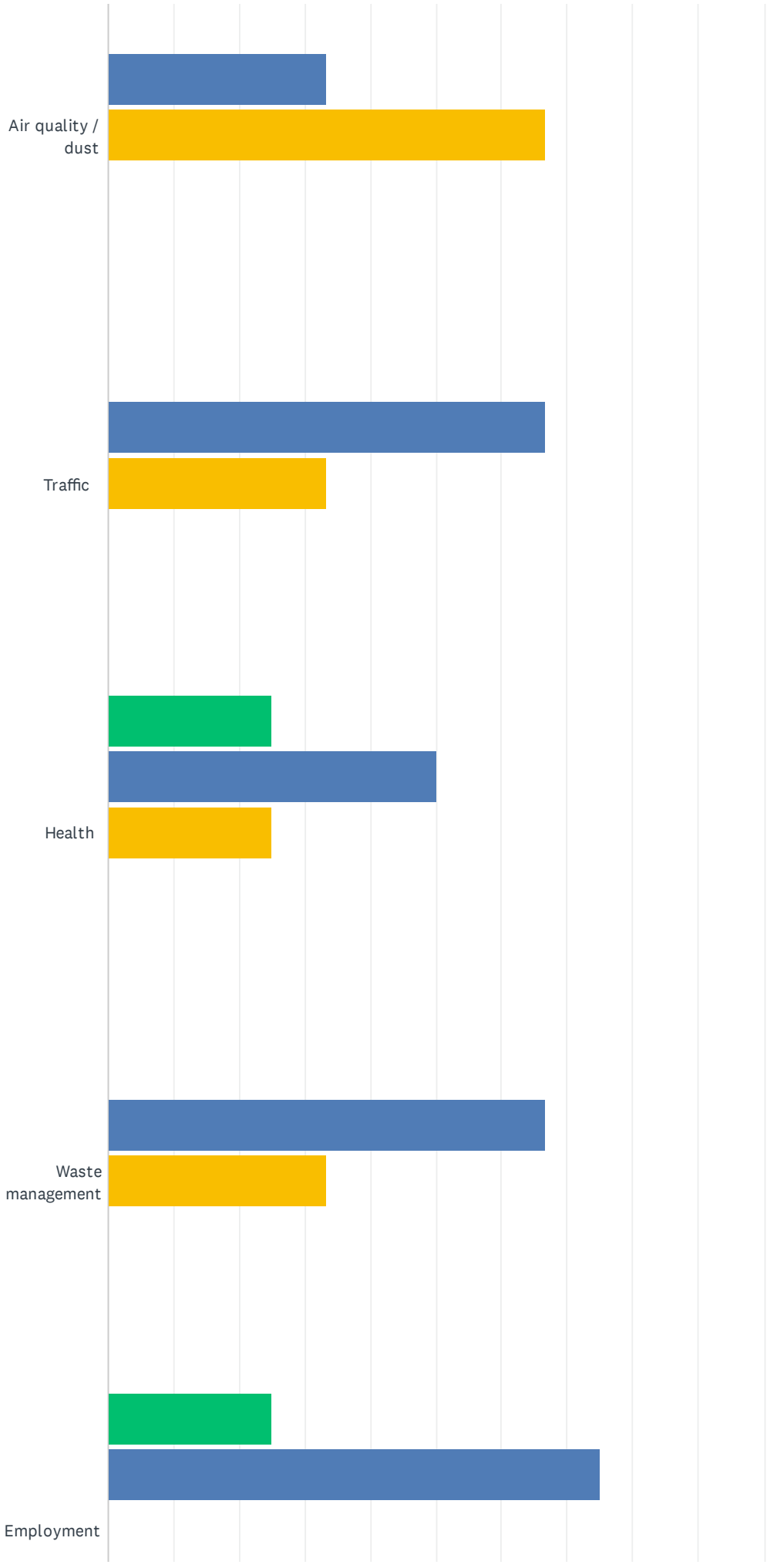
#	RESPONSES	DATE
1	The environment is important.	12/5/2023 5:17 PM
2	More renewables the better	12/5/2023 5:15 PM
3	I like isolation	12/5/2023 5:14 PM
4	Low pollution. Good.	12/5/2023 5:12 PM

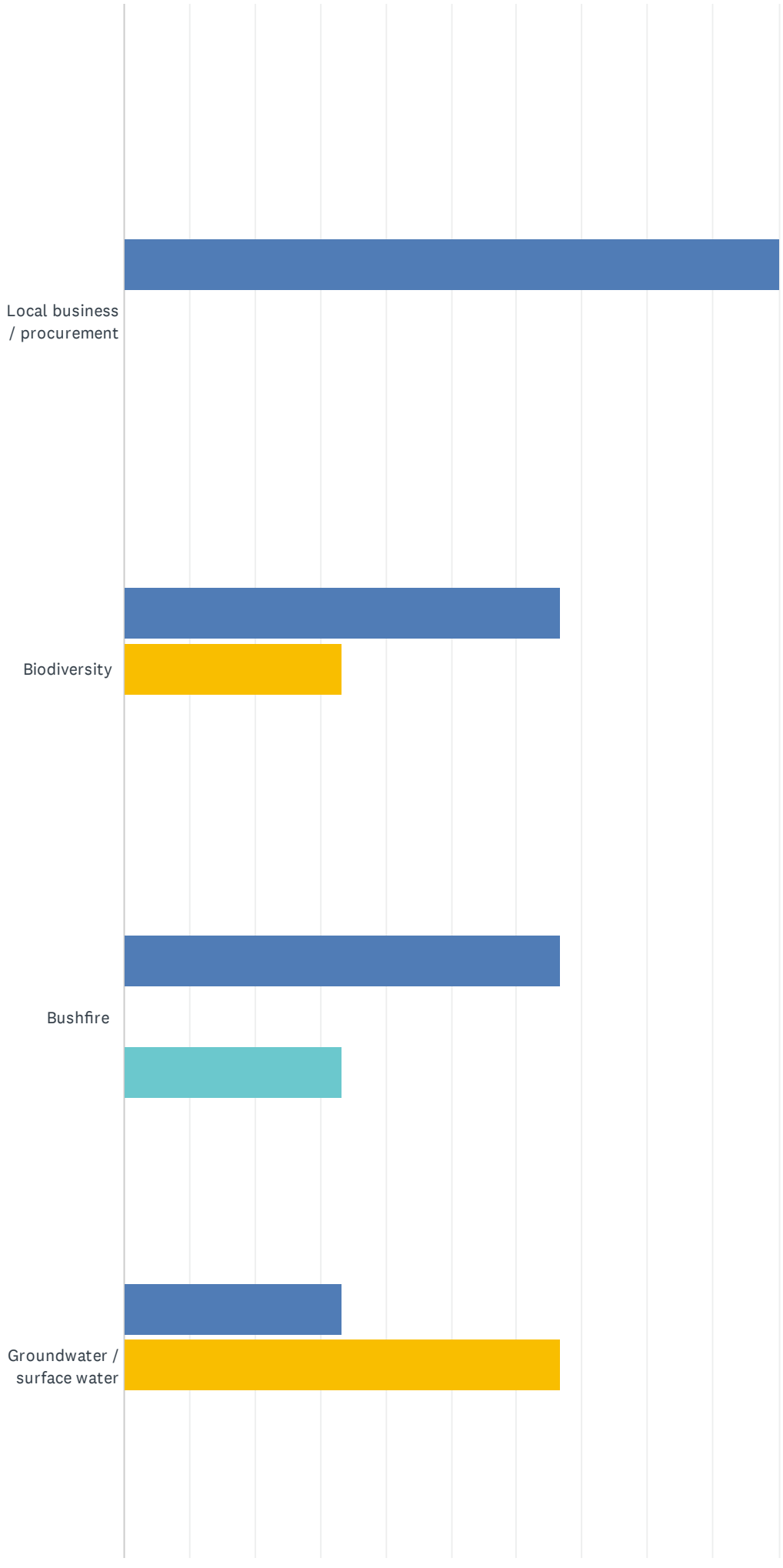
Q4 Renewable energy projects can have potential impacts and benefits.Consider how the Koorakee Energy Park Project may affect the local community and select the appropriate ranking for each potential social impact and benefit.

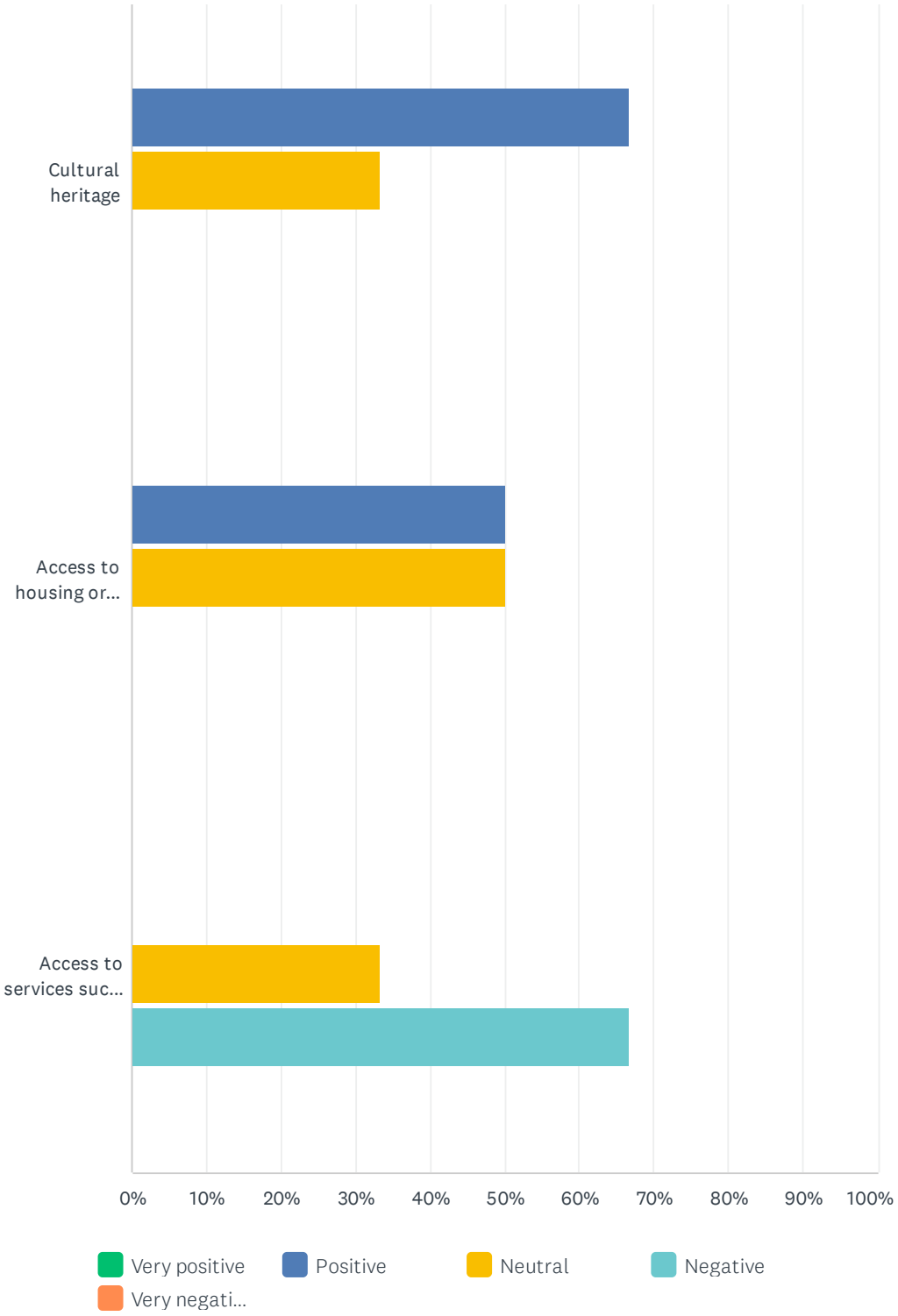
Answered: 4 Skipped: 0




Land access
Land use
Property prices
Noise


Air quality / dust
Traffic
Health
Waste management
Employment


Local business / procurement
Biodiversity
Bushfire
Groundwater / surface water


Cultural heritage
Access to housing or...
Access to services suc...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Very positive
Positive
Neutral
Negative
Very negati...

	VERY POSITIVE	POSITIVE	NEUTRAL	NEGATIVE	VERY NEGATIVE	TOTAL
Renewable energy	50.00% 2	50.00% 2	0.00% 0	0.00% 0	0.00% 0	4
Climate change	25.00% 1	0.00% 0	75.00% 3	0.00% 0	0.00% 0	4
Visual amenity	25.00% 1	50.00% 2	0.00% 0	0.00% 0	25.00% 1	4
Agriculture	25.00% 1	50.00% 2	25.00% 1	0.00% 0	0.00% 0	4
Land access	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Land use	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Property prices	0.00% 0	33.33% 1	66.67% 2	0.00% 0	0.00% 0	3
Noise	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Air quality / dust	0.00% 0	33.33% 1	66.67% 2	0.00% 0	0.00% 0	3
Traffic	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Health	25.00% 1	50.00% 2	25.00% 1	0.00% 0	0.00% 0	4
Waste management	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Employment	25.00% 1	75.00% 3	0.00% 0	0.00% 0	0.00% 0	4
Local business / procurement	0.00% 0	100.00% 3	0.00% 0	0.00% 0	0.00% 0	3
Biodiversity	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Bushfire	0.00% 0	66.67% 2	0.00% 0	33.33% 1	0.00% 0	3
Groundwater / surface water	0.00% 0	33.33% 1	66.67% 2	0.00% 0	0.00% 0	3
Cultural heritage	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3
Access to housing or short-term accommodation	0.00% 0	50.00% 1	50.00% 1	0.00% 0	0.00% 0	2
Access to services such as health and retail services	0.00% 0	0.00% 0	33.33% 1	66.67% 2	0.00% 0	3

#	ANY OTHER POTENTIAL IMPACTS OR BENEFITS NOT LISTED ABOVE:	DATE
1	Good. Reliable.	12/5/2023 5:12 PM

Q5 Would you like to elaborate on any impacts that you have rated above ?

Answered: 1 Skipped: 3

#	RESPONSES	DATE
1	Better than coal.	12/5/2023 5:12 PM

Q6 Do you have any other comments?

Answered: 2 Skipped: 2

#	RESPONSES	DATE
1	Well done, go for it!	12/5/2023 5:15 PM
2	Still better than coal or atomic.	12/5/2023 5:12 PM

Q7 What locality or suburb do you reside in ?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	Robinvale	12/5/2023 5:17 PM
2	Robinvale	12/5/2023 5:15 PM
3	Benanee	12/5/2023 5:14 PM
4	Robinvale	12/5/2023 5:12 PM

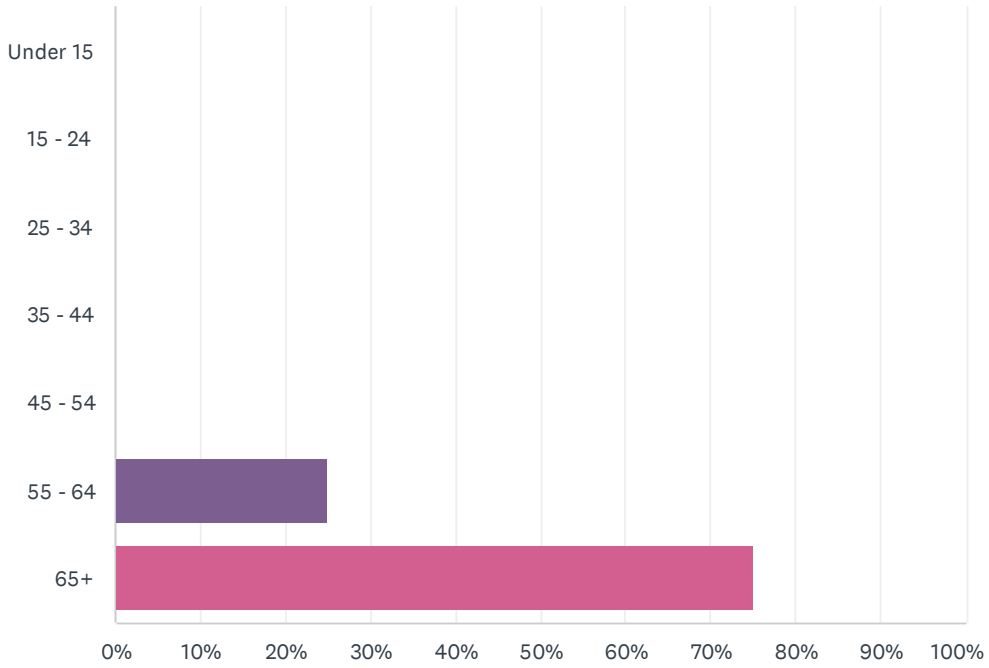
Q8 What is your postcode?

Answered: 4 Skipped: 0

#	RESPONSES	DATE
1	3549	12/5/2023 5:17 PM
2	3549	12/5/2023 5:15 PM
3	2737	12/5/2023 5:14 PM
4	3549	12/5/2023 5:12 PM

Q9 Which of the following age brackets do you fall into? (optional)

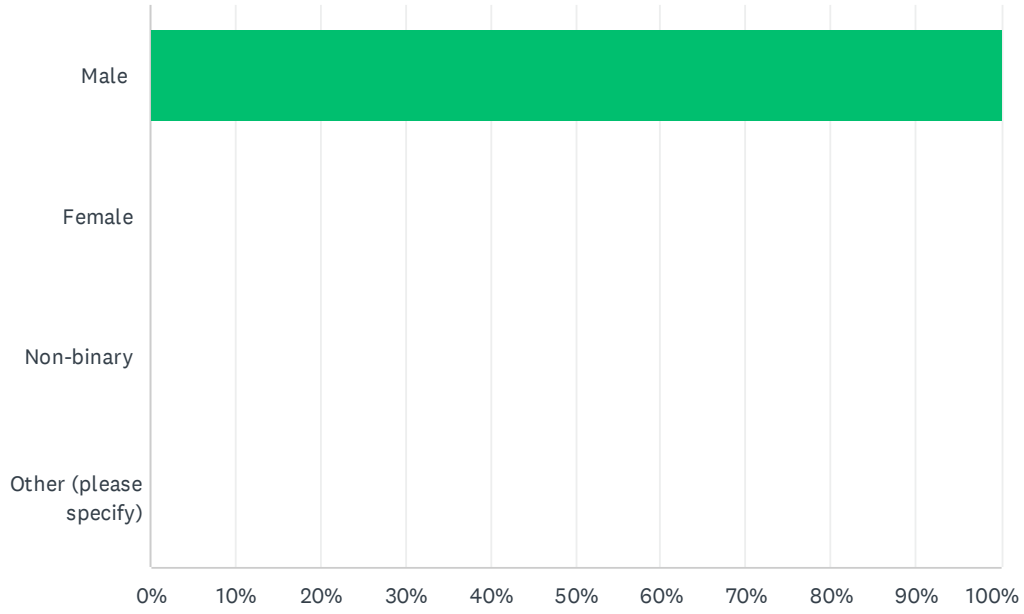
Answered: 4 Skipped: 0



ANSWER CHOICES	RESPONSES	
Under 15	0.00%	0
15 - 24	0.00%	0
25 - 34	0.00%	0
35 - 44	0.00%	0
45 - 54	0.00%	0
55 - 64	25.00%	1
65+	75.00%	3
TOTAL		4

Q10 Which of the following do you identify as? (optional)Please select all that apply to you.

Answered: 4 Skipped: 0

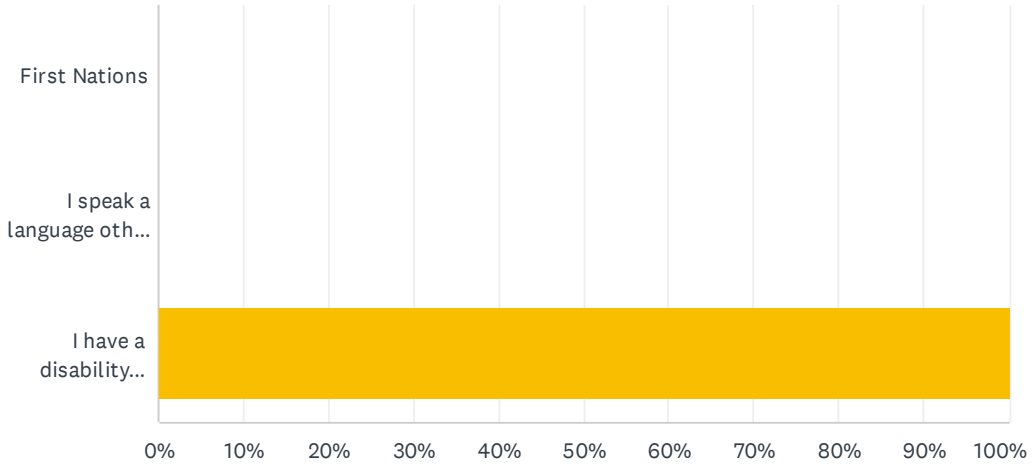


ANSWER CHOICES	RESPONSES	
Male	100.00%	4
Female	0.00%	0
Non-binary	0.00%	0
Other (please specify)	0.00%	0
Total Respondents: 4		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q11 Which of the following do you identify as? (optional)Please select all that apply to you.

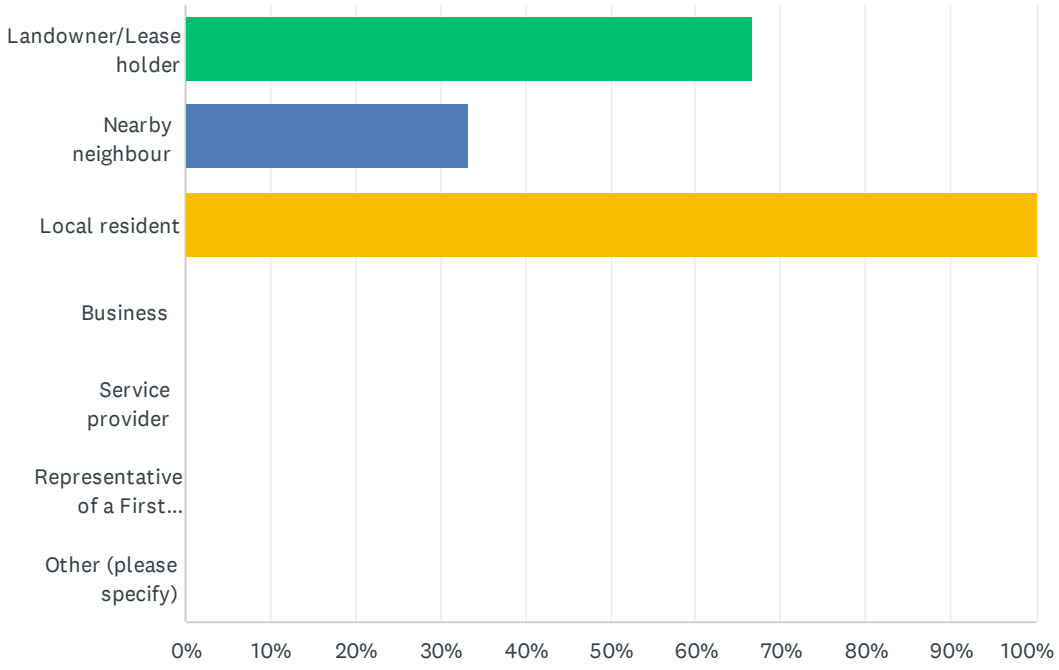
Answered: 1 Skipped: 3



ANSWER CHOICES	RESPONSES	
First Nations	0.00%	0
I speak a language other than English at home	0.00%	0
I have a disability and/or special need	100.00%	1
Total Respondents: 1		

Q12 Which of the following best describes you? Please select all that apply to you

Answered: 3 Skipped: 1



ANSWER CHOICES	RESPONSES	
Landowner/Lease holder	66.67%	2
Nearby neighbour	33.33%	1
Local resident	100.00%	3
Business	0.00%	0
Service provider	0.00%	0
Representative of a First Nations organisation	0.00%	0
Other (please specify)	0.00%	0
Total Respondents: 3		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Appendix E
SIA Scoping Worksheet

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Social Impact Assessment (SIA) Worksheet

Project name: Koorakee Energy Park

Date: January 2024

PROJECT ACTIVITIES	CATEGORIES OF SOCIAL IMPACTS	POTENTIAL IMPACTS ON PEOPLE		PREVIOUS INVESTIGATION OF IMPACT		CUMULATIVE IMPACTS	ELEMENTS OF IMPACTS - Based on preliminary investigation					ASSESSMENT LEVEL FOR EACH IMPACT				PROJECT REFINEMENT	MITIGATION / ENHANCEMENT MEASURES
Which **project activity / activities** could produce social impacts ?	what **social impact categories** could be affected by the project activities	What impacts are likely, and what concerns/aspirations have people expressed about the impact? Summarise how each relevant stakeholder group might experience the impact. NB. Where there are multiple stakeholder groups affected differently by an impact, or more than one impact from the activity, please add an additional row.	Is the impact expected to be **positive or negative**	Has this impact previously been investigated (on this or other project/s)?	If "yes - this project," briefly describe the previous investigation. If "yes - other project," identify the other project and investigation	Will this impact combine with others from this project (think about when and where), and/or with impacts from other projects (cumulative)?	If yes, identify which other impacts and/or projects	Will the project activity (without mitigation or enhancement) cause a material social impact in terms of its: You can also consider the various magnitudes of these characteristics					Level of assessment for each social impact	What methods and data sources will be used to investigate this impact?			Has the project been refined in response to preliminary impact evaluation or stakeholder feedback?	What **mitigation / enhancement measures** are being considered?
								extent i.e. number of people potentially affected?	**duration** of expected impacts? (i.e. construction vs operational phase)	**intensity** of expected impacts i.e. scale or degree of change?	**sensitivity** or vulnerability of people potentially affected?	**level of concern/interest** of people potentially affected?		Secondary data	Primary Data - Consultation	Primary Data - Research		
Construction, Operation	Community; Surroundings	**Reduced sense of place and rural lifestyle values due to changes to the visual landscape and presence of WTGs.**	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	Yes	Euston Wind Farm and Mallee Wind Farm, adjacent to Project to the west. Visual impact assessment, noise impact assessment	Yes	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	Yes	•Changes to Project design and layout based on feedback from early engagement with local landholders. •Screening where possible. •Consideration of incorporating viewing platforms for tourism purposes.
Construction	Surroundings; Livelihoods	Potential disruption to agricultural operations due to establishment of Project infrastructure, changes to land use and changes to access.	Negative	**Yes - other project**	Euston Wind Farm	No	Not required	No	Yes	No	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Greater community awareness and education around how wind farms and agriculture can co-exist. •Regular updates for landholder on schedule and changes to access for landholder planning purposes. •Landholders reasonably compensated for disruptions to agricultural operations.
Construction, Operation	Livelihoods	Reduced agricultural productivity due to increase in biosecurity risk from introduction of weeds.	Negative	**No**		No	Not required	No	Yes	No	No	No	Minor assessment of the impact	Required	Limited - if required (e.g. local council)	Not required	No	•Complete a weed risk assessment and implement control measures such as vehicle wash down protocols and facilities.
Construction	Way of life; Community; Surroundings	Reduced rural lifestyle values due to land clearing and associated loss of fauna habitat, including habitat of endangered species.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	No	Not required	No	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	**•Changes to Project design and layout to avoid known habitats based on feedback from early engagement with local landholders and biodiversity surveys.** **•Capacity-building or resourcing support for local environmental restoration and protection programs.**
Construction	Health and wellbeing	Deterioration of residential amenity due to the generation of noise and dust.	Negative	**Yes - other project**	Mallee Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Ongoing engagement with local community and key stakeholders. •Changes to Project design and layout to reduce noise levels at residences. •Ongoing monitoring and suppression of dust as required.
Construction, Operation,	Health and wellbeing	Deterioration of amenity due to night lighting, including the Willandra Lakes Region.	Negative	**Yes - other project**	Euston Wind Farm	Yes	Engagement raised current impacts with night lighting from nearby mineral sands mines.	No	No	No	**No**	**Yes**	Minor assessment of the impact	Required	Limited - if required (e.g. local council)	Not required	No	•Changes to Project design and layout based on feedback from early engagement with local landholders. •Screening where possible.
Construction	Livelihoods	Increased competition for construction labour and services due to increased demand generated by the Project.	Negative	**Yes - other project**	Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	**Yes**	**Yes**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Provision of employment and training opportunities for local people including young people and Aboriginal people. •Commitment to use local contractors and suppliers.
Pre-construction, Constru	Community; Decision-making systems	Reduced community cohesion due to perceived inequitable distribution of Project benefits.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	No	**Yes**	**Yes**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Ongoing engagement with local community and key stakeholders as the Project progresses. •Implementation of an Aboriginal participation plan. •Support for community events which enable interaction between community members.
Construction	Way of life; Accessibility; Surroundings	Reduced access and connectivity on local and regional road networks due to increased heavy vehicle and workforce traffic contributing to traffic congestion and delays.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	**Unknown**	**Unknown**	**Unknown**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Provision of support for local road maintenance to Balranald Council through a Voluntary Planning Agreement (VPA). •Ongoing engagement with local community and key stakeholders. •SMS notifications for community members advising of road closures or traffic disruptions.
Pre-construction, Constru	Way of life; Livelihoods	Perceived devaluation of adjacent or nearby properties.	Negative	**Yes - other project**	Euston Wind Farm	No	Not required	No	Unknown	Unknown	**Unknown**	**Unknown**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Ongoing engagement with nearby landholders including provision of property valuation data from similar projects.
Construction	Community	Reduced community cohesion due to influx of construction workers.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	**Yes**	**Unknown**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Development and effective implementation of a Community Engagement Plan including initiatives which contribute to maintaining social cohesion in the local area. •Collaborate and engage with local councils and EnergyCo to develop a suitable housing and accommodation strategy for the construction workforce.
Construction	Community; Accessibility	Increased demand for social and community infrastructure and services due to influx of construction workers.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	**Yes**	**Unknown**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Establishment of a community benefit plan for the Project that supports community infrastructure and service provision.
Construction	Way of life; community; accessibility	Increased demand for housing (rental) and short-term accommodation due to influx of construction workers.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	**Yes**	**Yes**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Collaborate and engage with local councils and EnergyCo to develop a suitable housing and accommodation strategy for the construction workforce. •Consideration of seasonal demand from agricultural workers and tourists.
Construction	Culture	Diminishment of Aboriginal cultural values due to disturbance or displacement of Aboriginal heritage sites and/or artefacts.	Negative	**Yes - other project**	Mallee Wind Farm, Euston Wind Farm	No	Not required	No	Yes	Unknown	**Unknown**	**Unknown**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Map regional Aboriginal cultural heritage values. •Avoid or minimise impacts to Aboriginal cultural heritage through Project design. •The effective implementation of an Aboriginal cultural heritage management plan (ACHMP) to avoid or mitigate disturbance to culturally important places, sites or artefacts.
Construction, Operation	Culture	Diminishment of historical values due to potential amenity impacts on the Willandra Lakes Region.	Negative	**No**		No	Not required											•Map regional Aboriginal cultural heritage values. •Avoid or minimise impacts to Aboriginal cultural heritage through Project design. •Collaborate and engage with tourism stakeholders.
Operation	Health and wellbeing; Surroundings	Perceived increased risk to health and safety and distress for landholders and neighbours due to potential for blade throw, aviation incidents and bird strikes.	Negative	**Yes - other project**	Mallee Wind Farm	No	Not required	No	No	Unknown	**Unknown**	**Unknown**	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Community engagement to improve community awareness and educate on blade throw, bird strikes and aviation risks, and how wind farms and agriculture can co exist.
Post-operation	Surroundings; Livelihoods	Concerns regarding waste management during decommissioning and rehabilitation.	Negative	**Yes - other project**	Mallee Wind Farm	No	Not required	No	Yes	No	**No**	**No**	Minor assessment of the impact	Required	Limited - if required (e.g. local council)	Not required	No	•Make use of the latest technology available at the time of decommissioning to maximise recycling opportunities and minimise waste going to landfill in line with best practice sustainability principles.

PROJECT ACTIVITIES	CATEGORIES OF SOCIAL IMPACTS	POTENTIAL IMPACTS ON PEOPLE		PREVIOUS INVESTIGATION OF IMPACT		CUMULATIVE IMPACTS		ELEMENTS OF IMPACTS - Based on preliminary investigation					ASSESSMENT LEVEL FOR EACH IMPACT				PROJECT REFINEMENT	MITIGATION / ENHANCEMENT MEASURES
Which **project activity / activities** could produce social impacts ?	what **social impact categories** could be affected by the project activities	What impacts are likely, and what concerns/aspirations have people expressed about the impact? Summarise how each relevant stakeholder group might experience the impact. **NB. Where there are multiple stakeholder groups affected differently by an impact, or more than one impact from the activity, please add an additional row.**	Is the impact expected to be **positive or negative**	Has this impact previously been investigated (on this or other project/s)?	If "yes - this project," briefly describe the previous investigation. If "yes - other project," identify the other project and investigation	Will this impact combine with others from this project (think about when and where), and/or with impacts from other projects (cumulative)?	If yes, identify which other impacts and/or projects	Will the project activity (without mitigation or enhancement) cause a material social impact in terms of its: You can also consider the various magnitudes of these characteristics					Level of assessment for each social impact	What methods and data sources will be used to investigate this impact?			Has the project been refined in response to preliminary impact evaluation or stakeholder feedback?	What **mitigation / enhancement measures** are being considered?
								extent i.e. number of people potentially affected?	**duration** of expected impacts? (i.e. **construction vs operational phase**)	**intensity** of expected impacts i.e. scale or degree of change?	**sensitivity or vulnerability of people potentially affected?**	**level of concern/interest of people potentially affected?**		Secondary data	Primary Data - Consultation	Primary Data - Research		
Construction, Operation	Way of life; Health and wellbeing; Livelihoods	Generation of employment opportunities for local and regional workers, including Aboriginal people and young people.	Positive	Yes - other project	Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Employment and training opportunities for the local and regional community including young people and Aboriginal people. •Implementation of an Aboriginal participation plan. •Provide opportunities for local workers to specialise, re-skill or upskill in collaboration with local training organisations.
Construction, Operation	Livelihoods	Generation of supply and procurement opportunities for local and regional businesses.	Positive	Yes - other project	Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Commitment to use local contractors and suppliers. •Engagement with local industry for planning and readiness purposes. •Strategically target opportunities for local businesses and service providers in supplying to the Project.
Operation	Livelihoods	Enhanced opportunity for economic diversification for agricultural operations.	Positive	Yes - other project	Mallee Wind Farm, Euston Wind Farm	No	Not required	No	Unknown	Unknown	Unknown	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Agreements with host landholder confirming payment details. •Landholder education for investment opportunities.
Construction, Operation	Community; Health and wellbeing; Decision-making systems	Enhanced community wellbeing and cohesion due to Project community grants which support community initiatives such as improvements to social services.	Positive	Yes - other project	Mallee Wind Farm, Euston Wind Farm	Yes	Numerous projects are anticipated to be constructed over next 10 years. Nearby projects include Euston Wind Farm and Mallee Wind Farm.	Yes	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Under the Community Benefit establishment of a Community Investment Scheme. •Proactive support and establishment of a community benefit plan that supports infrastructure and service provision improvements such as local roads and community facilities.
Pre-construction, Constru	Community; Surroundings; Decision-making systems	Strengthened community cohesion due to increased interaction with neighbours.	Positive	No		No	Not required	No	No	Unknown	Unknown	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Community engagement and events to further development relations between community members.
Operation, Post-operation	Community; Health and wellbeing	Improved intergenerational equity through contributing to the transition to renewable energy.	Positive	Yes - other project	Mallee Wind Farm, Euston Wind Farm	Yes	This Project participates in Australia's broader renewable transition	Yes	Yes	Yes	Yes	Yes	Detailed assessment of the impact	Required	Broad consultation	Targeted research	No	•Employment strategies to help build workforce skills for future renewable energy projects.

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Appendix H
Cumulative impact scoping

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H.1 Cumulative impact scoping table

Key	
Detailed assessment	The project may result in significant impacts on the matter, including cumulative impacts. Detailed assessment is characterised by: • Potential overlap in impacts between a future project and the proposed project. • Potential for significant cumulative impacts as a result of the overlap, requiring detailed technical studies to assess the impacts. • Sufficient data is available on the future project to allow a detailed assessment of cumulative impacts with the proposed project for the relevant matter. • Uncertainties exist with respect to data, mitigation, assessment methods and criteria
Standard assessment	The project is unlikely to result in significant impacts on the matter, including cumulative impacts. Standard assessments are characterised by: • Impacts are well understood. • Impacts are relatively easy to predict using standard methods. • Impacts are capable of being mitigated to comply with relevant standards or performance measures. • The assessment is unlikely to involve any significant uncertainties or require any detailed cumulative impact assessment.
N/A	No potential overlap in impacts between a future project and the proposed project that would warrant any consideration in the cumulative impact assessment.

Relevant project	Approximate distance to project	Project status	Terrestrial biodiversity	Aboriginal heritage	Amenity – visual	Amenity - noise	Social and economic	Traffic and access
Project EnergyConnect	Adjacent	Approved – under construction	Impacting similar PCTs (<50km)	Overlap in impact areas	Local visual catchment	No construction timing overlap	No construction timing overlap	No construction timing overlap
Euston Wind Farm	Adjacent	Proposed – EIS in preparation	Impacting similar PCTs + birds/bats in the locality	Adjacent impact areas	Shared visual catchment	Construction and operational noise	Construction workforce	Traffic and access
Mallee Wind Farm	42 km north west	Proposed – EIS in preparation	Impacting similar PCTs (<50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Malle Solar Farm	44 km north west	Proposed – EIS in preparation	Impacting similar PCTs (<50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Junction Rivers Wind Farm	65 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Limondale Solar Farm	55 km south east	Operational	Impacts completed	Regional context	Sufficient separation	Sufficient separation	No construction timing overlap	Sufficient separation
Sunraysia Solar Farm	55 km south east	Operational	Impacts completed	Regional context	Sufficient separation	Sufficient separation	No construction timing overlap	Sufficient separation
Keri Keri Wind Farm	90 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Keri Keri Solar Farm	90 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Baldon Wind Farm	100 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Tchelery Wind Farm	109 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Wilan Wind Farm	83 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Bullawah Wind Farm	140 km south east	Proposed – EIS in preparation	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Construction workforce	Sufficient separation
Euston Mineral Sands mine	4 km west	Proposed – EIS in preparation	Impacting similar PCTs (<50km)	Regional context	No similar WTG or solar impacts	Sufficient separation	Construction workforce	Main roads for haulage

Relevant project	Approximate distance to project	Project status	Terrestrial biodiversity	Aboriginal heritage	Amenity – visual	Amenity - noise	Social and economic	Traffic and access
Balranald Mineral Sands mine	11 km north east	Approved	Impacting similar PCTs (<50km)	Regional context	No similar WTG or solar impacts	Sufficient separation	No construction timing overlap	Main roads for haulage
Atlas-Campaspe Mineral Sands mine	56 km north west	Operational	Impacts completed	Regional context	Sufficient separation	Sufficient separation	Sufficient separation + mining project	Sufficient separation
Copi Mineral Sands project	138 km north west	Preparing EIS	Impacting similar PCTs (>50km)	Regional context	Sufficient separation	Sufficient separation	Sufficient separation + mining project	Sufficient separation

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