Intended for

ACEN Australia Pty Ltd

Date

July 2023

Narragamba Solar

Renewable Energy from ACEN

Scoping Report

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Narragamba Solar
Renewable Energy from ACEN

Narragamba Solar Project
Scoping Report

Project name	**Narragamba Solar Project**
Project no.	**318001722**
Recipient	**ACEN Australia Pty Ltd**
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5	18/07/23	HW	BS	JW	Final for formal submission to DPE

Ramboll Australia Pty Ltd.
ACN 095 437 442
ABN 49 095 437 442

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Acknowledgment of Country

Aboriginal people have had a continuous association with the region for thousands of years. We would like to acknowledge and pay respects to the Traditional Owners of the Country which is encompassed by the project, the Wiradjuri.

Prepared by

Ramboll Australia Pty Ltd

Applicant

ACEN Australia Pty Ltd

Executive Summary

ACEN Australia Pty Ltd is proposing to construct and operate the Narragamba Solar Project (the project), within the Central-West Orana Renewable Energy Zone of New South Wales. The proposed solar project would be located in the Mid-Western Regional local government area, approximately 15 kilometres north of Gulgong and 25 kilometres southeast of Dunedoo.

The project would include the construction, operation and decommissioning of an approximately 320-megawatt (AC) solar project. The project would supply electricity to the national electricity market via the Merotherie energy hub via a dedicated 330 kilovolt transmission line proposed by Energy Corporation of NSW on behalf of the Network Operator.

The project is expected to require up to 400 full-time employees during peak construction and up to 10 full-time employees during operation and ongoing maintenance of the solar project.

The operational lifespan of the project is indicatively 25 years, with potential for upgrades, including repowering in consultation with associated residences. At the end of its operational life, the project would be decommissioned and land that is impacted by the project would be appropriately rehabilitated in consultation with the affected landholders.

The objectives of the project are to:

- produce electricity from a clean and renewable source and assist in meeting energy demand and improving energy security for New South Wales
- support Australia's commitments to reduce greenhouse gases and contribute to New South Wales achieving net-zero emissions by 2050 as set out in the New South Wales Climate Change Policy Framework, and help deliver on commitments in the Federal Government's Renewable Energy Target Scheme
- develop an energy generation project which minimises impacts to the environment and local community to the extent possible
- develop a trusted relationship and provide for positive outcomes for the communities affected by the project
- create job opportunities and economic benefits for the region.

The capital investment value of the project is valued at over $30 million, and the project is therefore considered State Significant Development under Part 4 of the *Environmental Planning and Assessment Act 1979* and the *State Environmental Planning Policy (Planning Systems 2021)*.

A referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water for potential impacts to Matters of National Environmental Significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* would be required for potential impacts to critically endangered ecological communities (Box Gum Woodland) and endangered ecological communities (Grey Box Woodland). Should the project be determined to be a controlled action under Section 75 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the project would require assessment and approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

It is anticipated that potential impacts to Matters of National Environmental Significance would be assessed in accordance with the NSW Assessment Bilateral Agreement, which allows the NSW Department of Planning and the Environment to manage the assessment of the project on behalf of the Commonwealth, including the issuing of the assessment requirements for the environmental impact statement.

The scoping report has identified the key environmental matters identified that would be considered in the environmental impact statement. These include:

- biodiversity
- landscape character and visual
- Aboriginal heritage
- traffic and access
- noise and vibration
- social
- land
- hazards and risks.

Other matters that would be considered include water, historic heritage, economic, air, and waste and resources. Cumulative impacts with other projects (both existing and proposed) would also be considered and assessed.

Ongoing refinement of the proposed layout and technology would continue throughout the environmental impact statement process in response to engineering design refinements, landholder negotiations and outcomes of environmental and social assessments, to minimise potential impacts where possible.

ACEN Australia Pty Ltd has commenced consultation and engagement with landowners, near neighbours and the wider community, government agencies, and other relevant stakeholders. Overall, there has been a generally positive or neutral response from stakeholders and community members and it is evident that there is a high level of awareness in the community about the pace of renewables development in the Central West region. ACEN Australia Pty Ltd would continue to engage with key stakeholders including the broader community throughout the project approvals phase and over the life of the project.

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Glossary

Term	Definition
ACEN Australia	ACEN Australia Pty Ltd
Alternating current	Alternating current (abbreviated to AC). The type of current that reverses its direction many times a second at regular intervals
Array	A collection of connected solar panels that work together
Associated residences	A residence on privately-owned land in respect of which the owner has reached an agreement with the applicant in relation to the development and management of impacts
Biodiversity study area	The area assessed as part of the preliminary biodiversity assessment undertaken by EcoLogical Australia (abbreviated to ELA). The biodiversity study area includes both the study area for the solar project and the Merotherie Road study area (refer to definition as per this table)
Bioregion	Land areas characterised by broad, landscape-scale natural features and environmental processes
Box Gum Woodland	BC Act *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* and/or EPBC Act *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*
CWO-REZ Transmission Project	The construction and operation of the Central-West Orana Renewable Energy Zone Transmission Project (abbreviated to CWO-REZ Transmission Project), which includes new high voltage electricity transmission, energy hubs and switching stations being sought by the Energy Corporation of NSW (abbreviated to EnergyCo). Refer to: https://www.planningportal.nsw.gov.au/major-projects/projects/central-west-orana-rez-transmission
Development footprint	The maximum extent of ground disturbing work associated with construction and operation of the project
Direct current	Direct current (abbreviated to DC). An electric current that flows in one direction only
EnergyCo	Energy Corporation of NSW
Excess Stubbo land	An approximate 159-hectare portion of land approved under the development consent for the Stubbo Solar and Battery Project which will be included within the project

Term	Definition
Grey Box Woodland	BC Act *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions* and/or *EPBC Act Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*
Inverter	Converts direct current to alternating current
Merotherie Road study area	The area assessed as part of the preliminary biodiversity assessment undertaken by EcoLogical Australia (abbreviated to ELA) which may be subject to road upgrade. This area would be confirmed in the environmental impact statement.
Non-associated residences	A residence on privately-owned land in respect of which the owner has not reached an agreement with the applicant in relation to the development
Photovoltaic	Materials contained within the solar panels that generate electric current when exposed to light
Photovoltaic module	Commonly known as a solar panel, which produces direct current electric energy from the sun light
Power conversion unit	The power conversion units comprise three main components, inverters, transformers and a ring main unit, and convert the direct current electricity generated by the photovoltaic modules into alternating current form and increase the voltage of the electricity
Project	The proposed Narragamba Solar Project
Proponent	ACEN Australia Pty Ltd (abbreviated to ACEN Australia)
Renewable energy zone	Areas identified by the NSW Government as a priority area for the delivery of new renewable energy generation and storage, supported by transmission infrastructure, to facilitate the transition from an energy system dominated by large coal-fired generators
Restricted development areas	Designated restricted development areas included within the study area, intended to minimise impacts of the development in the areas of highest environmental value. Development within these areas would be restricted to the provision of access, fencing and electrical reticulation
Study area	The area assessed as part of the environmental impact assessment as indicated in **Figure 4-1**

Acronyms

Abbreviation	Definition
°C	Degrees Celsius
ABN	Australian business number
AC	Alternating current
ACHAR	Aboriginal cultural heritage assessment Report
ACHCRs	*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Department of Environment, Climate Change and Water NSW, 2010a)
ADGC	Australian Dangerous Goods Code
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BDAR	Biodiversity development assessment report
BESS	Battery and energy storage system
BoM	Bureau of Meteorology
BOS	Biodiversity offset scheme
BV Map	Biodiversity values map
CEEC	Critically endangered ecological community
CIA	Cumulative impact assessment
Code of Practice	The Department of Environment, Climate Change and Water *Code of Practice for the Investigation of Aboriginal Objects in New South Wales*
Crown Land Management Act	*Crown Land Management Act 2016*
CWO-REZ	Central-West Orana Renewable Energy Zone
DC	Direct current
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DG	Dangerous Goods
DNG	Derived native grassland
DP	Deposited plan
DPE	NSW Department of Planning and the Environment

Abbreviation	Definition
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental impact statement
ELA	EcoLogical Australia
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FM Act	*Fisheries Management Act 1994*
HBT	Hollow bearing tree
Heritage Act	*Heritage Act 1977*
IBRA	Interim Biogeographic Regionalisation of Australia
ICNG	*Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009)
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISP	Integrated System Plan
km	Kilometre
kV	Kilovolt
LALC	Local Aboriginal Land Council
LEP	Local environmental plan
LGA	Local government area
LRET	Large-Scale Renewable Energy Target
m	Metre
MNES	Matters of national environmental significance
MW	Megawatt
Native Title Act	*Native Title Act 1993*
NEM	National Electricity Market
NES	New South Wales Electricity Strategy
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
PCT	Plant community type

Abbreviation	Definition
PCU	Power conversion unit
Planning Systems SEPP	*State Environmental Planning Policy (Planning Systems 2021)*
PM	Particulate matter
PMST	Protected Matters Search Tool
POEO Act	*Protection of Environment Operations Act 1997*
RAPs	Registered Aboriginal Parties
RBL	Rating background noise level as described in detail in Noise Policy for Industry (Environment Protection Authority, 2017)
Resilience and Hazards SEPP	*State Environmental Planning Policy (Resilience and Hazards) 2021*
RET	Renewable energy target
REZ	Renewable energy zone
RFS	Rural Fire Service
SAL	Suburbs and localities
SCADA	Supervisory control and data acquisition facility
Scoping Report Guideline	*State Significant Development Guidelines – Preparing a Scoping Report (Appendix A)* (Department of Planning, Industry and Environment, 2021e)
SEARs	Secretary environmental assessment requirements
SEPP	State environmental planning policy
SIP	Social investment program
SoHI	Statement of heritage impact
SSD	State significant development
SVTM	State vegetation type map
TECs	Threatened ecological communities
Transport and Infrastructure SEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
UNFCCC	United Nations Framework Convention on Climate Change
VI	Vegetation integrity
VPA	Voluntary planning agreement
VZ	Vegetation zone
WM Act	*NSW Water Management Act 2000*

1. Introduction

ACEN Australia Pty Ltd (ACEN Australia) is proposing to construct and operate the Narragamba Solar Project (the project), within the Central-West Orana Renewable Energy Zone (CWO-REZ) of New South Wales (NSW). The proposed solar project would be located in the Mid-Western Regional local government area (LGA), approximately 15 kilometres north of Gulgong and 25 kilometres southeast of Dunedoo (refer to **Figure 1-1**).

The capital investment value of the project is valued at over $30 million and the project is considered state significant development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *State Environmental Planning Policy (Planning Systems 2021)* (Planning Systems SEPP).

A referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for potential impacts to Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) would be required for potential impacts to critically endangered ecological communities (CEECs) (Box Gum Woodland) and endangered ecological communities (EECs) (Grey Box Woodland). Should the project be determined to be a controlled action under Section 75 of the EPBC Act, the project would require assessment and approval under the EPBC Act.

It is anticipated that potential impacts to MNES would be assessed in accordance with the NSW Assessment Bilateral Agreement, which allows the NSW Department of Planning and the Environment (DPE) to manage the assessment of the project on behalf of the Commonwealth, including the issuing of the assessment requirements for the environmental impact statement (EIS).

1.1 Introduction to the project

1.1.1 Project overview

The project would include the construction, operation and decommissioning of an approximately 320-megawatt (AC) solar project. The project would supply electricity to the national electricity market (NEM) via the Merotherie energy hub proposed by Energy Corporation of NSW (EnergyCo) on behalf of the Network Operator.

The project would include the following key components:

- approximately 832,000 photovoltaic modules (solar panels) using a single axis tracker racking system
- electrical infrastructure including:
  - approximately 55 power conversion units (PCUs) which include inverters for converting direct current (DC) power to alternating current (AC)
  - onsite substation containing main transformers and associated switchgear
  - overhead and underground electrical reticulation connecting the solar project elements
  - connection from the onsite substation to the Merotherie Hub proposed by EnergyCo. The transmission infrastructure (330 kilovolt line) to connect the project to the Merotherie Hub would form part of the CWO-REZ Transmission Project.
  - potential battery energy storage system (BESS), which may be distributed amongst the solar array area (if DC coupled) or co-located in an area near the substation (if AC coupled). This would be confirmed in the environmental impact statement (EIS)
- other permanent onsite ancillary infrastructure including:
  - operational and maintenance facility

  - a temperature-controlled spare parts storage facility
  - supervisory control and data acquisition (SCADA) facilities for remote monitoring of the solar project
  - a workshop and associated infrastructure
  - access roads, both to the project and internal access roads
  - carparking area
  - security fencing and landscaping
- temporary construction ancillary infrastructure including:
  - construction compounds
  - laydown areas
  - parking areas
  - access tracks and associated infrastructure, including gates and fencing
  - concrete batching plant
  - potential temporary workers accommodation camp (refer to discussion in **Section 1.1.5.2**).

The project is expected to require up to 400 full-time employees during peak construction and up to 10 full-time employees during operation and ongoing maintenance of the solar project.

The site would be accessed from Merotherie Road via the Golden Highway. Access would likely be from the northwest corner of the study area, however, would be confirmed in the EIS. Some public road upgrades would likely be required to facilitate construction traffic. These would be confirmed during the EIS following the detailed traffic and transport assessment. It is expected that these would include upgrades of Merotherie Road from its intersection with the Golden highway to the project site access. It is noted that some road upgrades in the CWO-REZ are to be delivered by EnergyCo as part of the CWO-REZ Transmission Project (refer to discussion in **Section 1.1.5.3).** ACEN would continue to consult with EnergyCo, and the EIS would clearly define the extent of road upgrades to be delivered by EnergyCo, and those to be delivered as part of the project. Any road upgrades required as part of the project would be included in the final development footprint and assessed in the specialist studies for the EIS including biodiversity, heritage, and construction noise.

The operational lifespan of the project is indicatively 25 years, with potential for upgrades, including repowering in consultation with associated residences. At the end of its operational life, the project would be decommissioned and land that is impacted by the project would be appropriately rehabilitated in consultation with the affected landholders.

Ongoing refinement of the proposed layout and technology would continue throughout the EIS process in response to engineering design refinements, landholder negotiations and outcomes of environmental and social assessments, to minimise potential impacts where possible.

1.1.2 Site information

The following key terms are used to describe the site:

Study area	The study area represents the area assessed as part of the environmental impact assessment which is subject to agreement with the associated landholders. The study area is shown in **Figure 4-1** and currently comprises a total of 1,033.97 hectares.

Restricted development areas	Designated restricted development areas have been included within the study area, intended to minimise impacts in the areas of highest environmental value. Development within these areas would be restricted to the provision of access, fencing and electrical reticulation. The current identified restricted development areas are indicated in **Figure 4-1** and currently comprises a total of 42.43 hectares within the study area.
Development footprint	The development footprint represents the maximum extent of ground disturbing work associated with construction and operation of the project as indicated in **Figure 4-1**. It includes the study area, minus the restricted development areas. The total development footprint for the project is currently 991.54hectares.

A summary of contextual information is for the study area is provided in **Table 1-1**.

Table 1-1: Study area identification

Item	Details		
Local government area	Mid-Western Regional		
Suburb	Merotherie		
Lot details	Lot 22 DP750761	Lot 33 DP750761	Lot 41 DP750761
	Lot 69 DP750761	Lot 48 DP750761	Lot 53 DP750761
	Lot 26 DP750761	Lot 47 DP750761	Lot 10 DP750761
	Lot 25 DP750761	Lot 55 DP750761	Lot 11 DP750761
	Lot 18 DP750761	Lot 54 DP750761	Lot 52 DP750761
Crown land	There are no identified Crown land parcels within the study area. There are 15 parcels that are subject to reservations and conditions in favour of the Crown. These parcels fall across three private land holdings. There are some Crown roads (refer to discussion in **Section 8.7.2**). Crown roads outside the study area may require upgrade to facilitate the project. These will be identified in the EIS.		

The study area, restricted development areas, and development footprint will continue to be refined during the EIS in response to engineering design refinements, landholder negotiations and outcomes of environmental and social assessments, to minimise potential impacts where possible. This would include consideration of any road upgrades that may be required to facilitate the project.

An approximate 159-hectare portion of land approved under the development consent for the Stubbo Solar and Battery Project will be included within the Narragamba Solar Project (referred to as the 'excess Stubbo land'). Further discussion regarding the approval pathway for the inclusion of this land is described in **Section 4.4.4**. For the purposes of the scoping report, the excess Stubbo land has been included within the study area and development footprint.

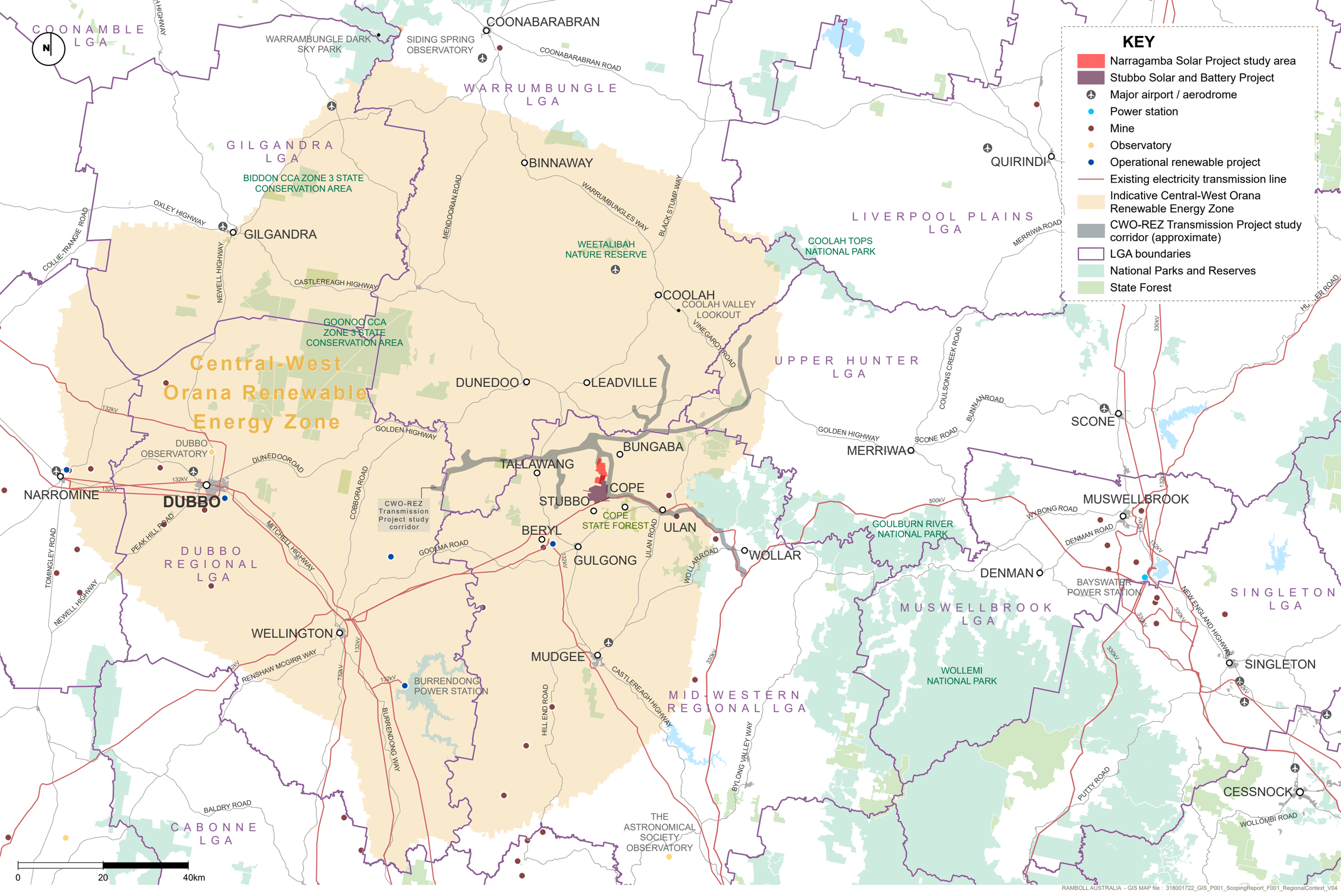

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Figure 1-1 | Regional context

1.1.3 Project objectives

The objectives of the project are to:

- produce electricity from a clean and renewable source and assist in meeting energy demand and improving energy security for NSW
- support Australia's commitments to reduce greenhouse gases and contribute to NSW achieving net-zero emissions by 2050 as set out in the NSW Climate Change Policy Framework, and help deliver on commitments in the Federal Government's Renewable Energy Target (RET) Scheme
- develop an energy generation project which minimises impacts to the environment and local community to the extent possible
- develop a trusted relationship and provide for positive outcomes for the communities affected by the project
- create job opportunities and economic benefits for the region.

1.1.4 Project background and history

ACEN Australia first began investigating the study area for potential renewable development in 2018, prior to the declaration of the CWO-REZ. The study area was initially investigated for solar development as part of the Stubbo Solar and Battery Project (refer to discussion in **Section 1.1.5.1**). It was initially intended that the Stubbo Solar and Battery Project would have a larger capacity and incorporate the study area, however the capacity of the existing 330-kilovolt Transgrid line was limited to 400 megawatts. As such, the study area land was flagged for future development while the Stubbo Solar and Battery Project was developed.

When the NSW Government declared the CWO-REZ in 2020, and then the indicative area for the Merotherie hub in early 2022, it was decided to revive the Narragamba land area. Preliminary assessments such as visual, topography, and land use, had been undertaken to determine the feasibility of a solar project at the study area.

As neighbours of the Stubbo Solar and Battery Project, ACEN Australia has been engaging with the associated residences since early 2022.

1.1.5 Related development

1.1.5.1 Stubbo Solar and Battery Project

The study area is located immediately north of the Stubbo Solar and Battery Project also owned by ACEN Australia (refer to **Figure 1-1**). The Stubbo Solar and Battery Project is a 400-megawatt renewable energy project that was approved by DPE on 29 July 2021 (development consent SSD-10452).

The Stubbo Solar and Battery Project would produce about one million megawatt hours of electricity each year, enough energy to power approximately 185,000 average Australian homes.

Key features of the Stubbo Solar and Battery Project include:

- construction of photovoltaic panels across an approximate 1,250-hectare area of cleared grazing land
- potential for a 200 megawatt-hour BESS
- connection to the existing 330-kilovolt transmission line operated by TransGrid
- other electrical infrastructure including PCUs, onsite substation, and transmission infrastructure
- other permanent infrastructure including:
  - operational and maintenance facility
  - spare parts storage facility

  - SCADA facilities
  - Workshop
  - carparking area
  - security fencing and landscaping
- temporary construction ancillary infrastructure including:
  - construction compounds
  - laydown areas
  - parking areas
  - access tracks
  - associated infrastructure, including gates and fencing
- access road and local road upgrades.

Construction of the Stubbo Solar and Battery Project commenced in November 2022 and is anticipated to be completed by 2025.

As mentioned in **Section 1.1.2**, ACEN intends to include a portion of the land approved under development consent SSD-10452 within the project. Further discussion of this is included in **Section 4.4.4**.

1.1.5.2 ACEN Australia temporary workers accommodation camp

ACEN Australia is currently investigating the potential for a centralised accommodation strategy that would service its renewable projects in the area. Details of this approach are being included in the amendment report for the development application to the Birriwa Solar and Battery Project (development application number SSD-29508870). The construction and operation of this temporary workers accommodation camp would also be included in the Narragamba EIS.

1.1.5.3 EnergyCo Transmission Line

EnergyCo, a NSW Government statutory authority, has been appointed under the *Electricity Infrastructure Investment Act 2020* as the Infrastructure Planner responsible for delivering the CWO-REZ. EnergyCo is responsible for coordinating CWO-REZ transmission, generation, firming and storage projects to deliver efficient, timely and coordinated investment. On 28 April 2023, EnergyCo appointed ACE Energy as the preferred Network Operator for the CWO-REZ.

EnergyCo is seeking approval for the construction and operation of the Central-West Orana Renewable Energy Zone Transmission Project (referred to as the 'CWO-REZ Transmission Project'), which includes new high voltage electricity transmission, energy hubs and switching stations to connect new energy generation and storage projects within the CWO-REZ to the NEM (Energy Corporation of NSW, 2022).

The project includes connection to the proposed Merotherie Hub, located approximately 3.5 kilometres northwest of the study area (refer to **Figure 2-1**). The transmission infrastructure (330 kilovolt single line) to connect the project to the Merotherie Hub would form part of the CWO-REZ Transmission Project.

A scoping report and request for Secretary Environmental Assessment Requirements (SEARs) was submitted to DPE by EnergyCo in September 2022. Based on current public information, it is expected that construction of the CWO-REZ Transmission Project would commence in the second half of 2024 and take approximately three years to complete with initial operations commencing around mid-2027 (Energy Corporation of NSW, 2022).

To support the CWO-REZ Transmission Project and connecting projects, EnergyCo has carried out investigations to understand the scope of road upgrades required to facilitate construction of projects proposed in the CWO-REZ. While EnergyCo is not the proponent for generation projects, they have taken a leading role in coordinating the delivery of required upgrades between the Port of Newcastle and the CWO-REZ. It is expected that local road upgrades specific to individual projects would typically be delivered by each proponent.

1.2 Proponent

The proponent of the project is ACEN Australia Pty Ltd (ACEN Australia). ACEN is the Philippine listed energy platform of the Ayala Corporation. The company has approximately 3,800 megawatts of attributable capacity in the Philippines, Vietnam, Indonesia, India, and Australia. The company's renewable share of capacity is at 87 percent, among the highest in the region. ACEN's aspiration is to be the largest listed renewables platform in Southeast Asia, with a goal of reaching 5,000 megawatts of renewables capacity by 2025.

ACEN has been a partner of UPC Renewables in Australia since 2018. In 2021, ACEN began a transaction to eventually own 100 percent of UPC\AC Renewables by early 2023. With this transaction, the company is now called ACEN Australia.

ACEN Australia has numerous renewable energy assets in Australia under development and construction, including several solar, wind, battery, pumped hydro and energy storage projects across NSW, Tasmania, Victoria and South Australia, including:

- New England Solar in NSW (under construction)
- Stubbo Solar in NSW (under construction)
- Birriwa Solar in NSW
- Valley of the Winds in NSW
- Aquila Wind in NSW
- Phoenix Pumped Hydro in NSW
- Axedale Solar in Victoria
- Robbins Island and Jim's Plain Wind in Tasmania
- North East Wind in Tasmania.

Details of the proponent are provided in **Table 1-2**.

Table 1-2: Details of the proponent

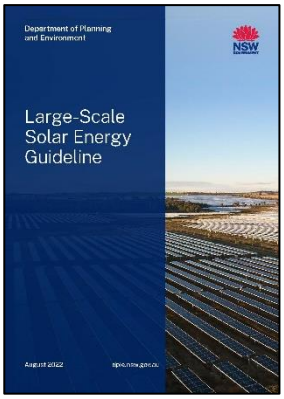
Item	Details
Proponent name	ACEN Australia Pty Ltd (ACEN Australia)
Australian Business Number (ABN)	27 616 856 672
Postal address	Suite 2, Level 2, 15 Castray Esplanade Battery Point, Hobart Tasmania, Australia 7004
Website	https://acenrenewables.com.au/
Project contact	Nicko Keene
Contact details	https://acenrenewables.com.au/contact-us/

1.3 Document purpose

This scoping report has been prepared to support a request for SEARs that would guide preparation of an EIS as part of a development application under Division 4.1 of Part 4 of the EP&A Act.

This report has been prepared in accordance with:

- *Large-Scale Solar Energy Guideline* (Department of Planning, Industry and Environment, 2022b)
- *Large-Scale Solar Energy Guideline Technical Supplement - Landscape and Visual Impact Assessment* (Department of Planning and Environment, 2022c)
- *Preparing a Scoping Report Guidelines for State Significant Projects* (Department of Planning, Industry and Environment, 2021e)
- *Undertaking Engagement Guidelines for State Significant Projects* (Department of Planning, Industry and Environment, 2021f)
- *Social Impact Assessment Guideline for State Significant Projects* (Department of Planning, Industry and Environment, 2021d)
- *Cumulative Impact Assessment Guidelines for State Significant Project* (Department of Planning, Industry and Environment, 2021b).



2. Site and Regional Context

2.1 Regional context

The regional context of the project is shown on **Figure 1-1**. The project is located in the CWO-REZ, an area identified by the NSW Government as a priority area for the delivery of new renewable energy generation and storage, supported by transmission infrastructure, to facilitate the transition from an energy system dominated by large coal-fired generators. The CWO-REZ is approximately 20,000 square kilometres centred by Dubbo and Dunedoo, on the land of the Wiradjuri, Wailwan and Kamilaroi peoples (Australian Energy Market Operator, 2022b).

The project would be in the Central-West region of NSW, which has an estimated population of 212,962 (Australian Bureau of Statistics, 2021h). The region's population is expected to grow to more than 324,943 people by 2041, requiring an additional 21,664 homes (Department of Planning, Industry and Environment, 2021a).

The key economic activities within the Central-West region are agriculture, forestry, and fishing (6,594 business entities recorded in 2020 representing 32 percent of all businesses) (Australian Bureau of Statistics, 2021h). The mining sector is also a key contributor to the economy with gold, silver, and copper deposits, as well as rare earth deposits in Dubbo and Condobolin. Operational coal mines are also located within the Central-West region and contribute to the regional economy more broadly.

Key land uses in the local and broader Central-West region include agriculture (consisting primarily of sheep and cattle grazing and dry land cropping), with areas of mining, viticulture and production forestry located within the broader region (Australian Bureau of Statistics, 2021h). Renewable energy development is a growing land use in the area, with multiple renewable energy projects located in the vicinity and many more proposed due to the declaration of the CWO-REZ (refer to **Section 8.10** for a discussion on cumulative considerations for the project).

The project would be within the Mid-Western Regional LGA. The Mid-Western Regional LGA covers a total area of 8,752 square kilometres and has an estimated population of 25,713 (Australian Bureau of Statistics, 2021i). The social demographic of the Mid-Western Regional LGA can be described as predominantly rural with a mix of urban areas.

The Mid-Western region is home to the Wiradjuri people who are the largest Aboriginal group in central NSW, by area and population. The people of the Wiradjuri country are known as "people of three rivers" being the Macquarie River (Wambool), Lachlan River (Kalari) and the Murrumbidgee River (Murrumbidjeri) which border their lands. Aboriginal people account for approximately 6.8 percent of the Mid-Western Regional LGA (Australian Bureau of Statistics, 2021i).

Major occupations within the broader region include professionals (17 percent), managers (15.1 percent), and technical and trades workers (14.6 percent). Key industries of employment include hospitals (4.1 percent), other social assistance services (3 percent), aged care residential services (2.8 percent), primary education (2.7 percent), and supermarket and grocery stores (2.6 percent) (Australian Bureau of Statistics, 2021h).

Major highways in the region include the Castlereagh Highway (B55) and the Golden Highway (B84). The study area is situated between Merotherie Road (west) and Blue Springs Road (east). The Mid-Western Regional Council considers one of its distinct competitive advantages to be its central location to Sydney and Newcastle, and strong transport links (Mid-Western Regional Council, 2022).

2.2 Local context

The project and surrounds are shown on **Figure 2-1**. The project is in the suburb of Merotherie which has a population of 24 (Australian Bureau of Statistics, 2021g). There are some small localities near the study area including:

- **Bungaba** located approximately four kilometres east of the study area, which has a population of 88 (Australian Bureau of Statistics, 2021d)
- **Cope** located approximately 8.5 kilometres southeast of the study area, which has a population of 113 (Australian Bureau of Statistics, 2021e)
- **Stubbo** located approximately 8 kilometres south of the study area, which has a population of 270 (Australian Bureau of Statistics, 2021k)
- **Tallawang** located approximately 13 kilometres west of the study area, which has a population of 165 (Australian Bureau of Statistics, 2021l)
- **Beryl** located approximately 14 kilometres southwest of the study area, which has a population of 117 (Australian Bureau of Statistics, 2021c).

Larger towns near the study area include Gulgong located approximately 15 kilometres south, and Dunedoo located approximately 25 kilometres northwest. Dubbo is located approximately 90 kilometres west of the study area.

Gulgong is a former gold mining town with a population of 2,680 people (Australian Bureau of Statistics, 2021a). Today Gulgong's primary industry is coal mining, however the area also attracts notable tourist attention due to its rich settler history and reputation as the childhood home of the well-known Australian poet and writer Henry Lawson. The town holds a number of annual historical festivals and celebrations, including the Henry Lawson Heritage Festival in June, the Gulgong Folk festival in December, and the Gulgong Gold and mining Festival in October.

Dunedoo has a population of 1,097 (Australian Bureau of Statistics, 2021f). Primary industries for the town are agriculture, with significant mixed farming and cattle and sheep industries. The township is located at the junction of the Golden and Castlereagh Highways and is often a travel stopover location with a variety of accommodation offerings, local pubs, and the Dunedoo Museum.

There are 67 potential sensitive receivers within five kilometres of the study area. Of these, three are associated with the project (under landholder agreement) and the remaining 64 are currently non-associated. The closest sensitive receivers to the study area are listed in **Table 2-1**. Ground truthing of the identified sensitive receivers has not occurred at this stage and would be confirmed in the EIS.

Table 2-1: Sensitive receiver approximate distance from the study area

Reciever ID	Associated with the project	Approximate distance from the study area (metres)	Receiver ID	Associated with the project	Approximate distance from the study area (metres)
R14	Not associated	160.35	R173	Not associated	3836.19
R13	Not associated	211.63	R32	Not associated	3872.16
R194	Associated	645.70	R453	Not associated	3873.72
R193	Not associated	1019.04	R444	Not associated	3895.15
R38	Not associated	1246.07	R457	Not associated	4001.86
R23	Associated	1324.29	R41	Not associated	4007.73
R191	Not associated	1352.04	R31	Not associated	4040.35
R183	Not associated	1892.25	R36	Not associated	4059.07
R11	Associated	2286.44	R307	Not associated	4171.79
R39	Not associated	2407.63	R463	Not associated	4190.00
R21	Not associated	2527.18	R306	Not associated	4191.27
R9	Not associated	2605.08	R443	Not associated	4225.16
R313	Not associated	2688.81	R43	Not associated	4246.33
R450	Not associated	2695.69	R158	Not associated	4261.63
R458	Not associated	2739.21	R30	Not associated	4282.40
R19	Not associated	2776.77	R18	Not associated	4335.22
R445	Not associated	2822.85	R308	Not associated	4356.71
R449	Not associated	2961.14	R312	Not associated	4521.20
R175	Not associated	2969.65	R464	Not associated	4550.22
R10	Not associated	2982.75	R28	Not associated	4558.74
R439	Not associated	2994.32	R157	Not associated	4571.09
R34	Not associated	3218.14	R438	Not associated	4640.52
R156	Not associated	3249.27	R442	Not associated	4673.58
R459	Not associated	3309.47	R29	Not associated	4705.44
R176	Not associated	3330.59	R35	Not associated	4706.77
R40	Not associated	3418.53	R1	Not associated	4761.34
R87	Not associated	3430.54	R455	Not associated	4849.75
R33	Not associated	3515.49	R472	Not associated	4866.75

Reciever ID	Associated with the project	Approximate distance from the study area (metres)	Receiver ID	Associated with the project	Approximate distance from the study area (metres)
R452	Not associated	3551.40	R441	Not associated	4872.16
R460	Not associated	3593.53	R446	Not associated	4885.77
R88	Not associated	3609.14	R451	Not associated	4890.30
R461	Not associated	3657.60	R470	Not associated	4921.80
R8	Not associated	3678.03	R437	Not associated	4927.60
R462	Not associated	3827.97			

The site is adjacent to Merotherie Road. The main local roads within the locality include Barneys Reef Road, Blue Springs Road, Birkalla Road and Cope Road.

The Cope State Forest is located approximately six kilometres southeast of the study area. There are no National Parks located near the study area with the closest being the Goulburn River National Park located approximately 18 kilometres east of the study area and the Yarrobil National Park located approximately 18 kilometres southwest of the study area.

The project is in the Macquarie-Bogan River catchment. Named creeks surrounding the study area include Cockabutta Creek, Blue Springs Creek, Pine Creek, Merotherie Creek and Stubbo Creek.

Ulan Coal Mine and Moolarben Mine are located approximately 11 kilometres east and 19 kilometres southeast of the study area, respectively (refer to **Figure 1-1**).

2.3 Site context

Details of the lots within the study area are provided in **Section 1.1.2**. The study area covers an area of 1,033.97 hectares comprised of 15 lots, owned by three landholders as shown on **Figure 2-1**.

Properties that would be directly involved with the solar project are privately owned by three landholders. ACEN Australia have entered into land agreements with the associated property owners allowing the option to have rights over the land for the construction, operation and decommissioning of the solar project.

Photos of the study area are included in **Figure 2-2**. The study area is generally characterised as rural and is predominantly utilised for agricultural purposes, mostly cattle and sheep grazing. It is anticipated that landholders would continue to use their remaining properties not involved in the project for agricultural activities during operation of the project, as well as trialling the grazing of sheep within the study area.

The topography of the study area comprises a generally gently undulating area with the elevation generally ranging between approximately 450 metres and 550 metres Australian Height Datum (AHD). The topography is steeper in the south-western portion of the study area, reaching approximately 550 metres AHD, and gradually decreases towards the north towards Narragamba Swamp and the alluvial flats of Cockabutta Creek. The south-eastern boundary of the northern portion of the study area is bounded by a ridgeline with peak elevation of approximately 523 metres AHD. The southern portion of the study area reaches approximately 550 metres AHD, gradually decreasing to the southwestern corner to approximately 500 metres.

The project would be accessed from Merotherie Road via the Golden Highway. Access would likely be from the northwest corner of the study area, however, would be confirmed in the EIS.

Unnamed tributaries occur throughout the study area generally ranging between Strahler Stream order one to three, with one fourth order stream in the northeast corner of the study area. The restricted development areas developed for the project include a 40-metre buffer either side of the Strahler order three and four streams that traverse the study area, which is defined as 'waterfront land'.

RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F002_Locality_V06
Aerial photography from NSW Government Spatial Services

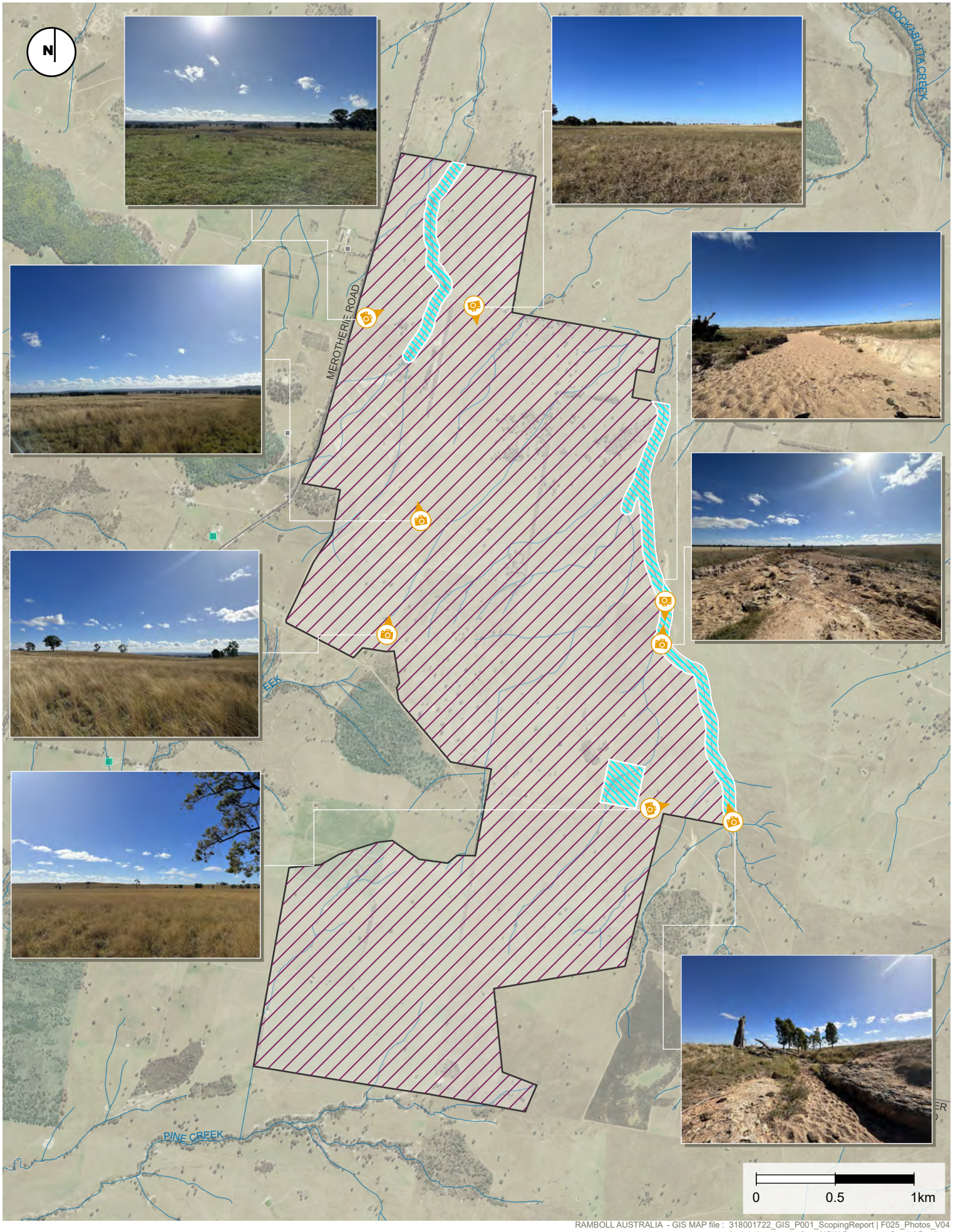
KEY

- Narragamba Solar Project study area
- Existing electricity transmission line
- CWO-REZ Transmission Project study corridor (approximate)

Dwelling status
- Associated
- Not associated

- Road
- Railway
- Waterway
- LGA boundary
- National Parks and Reserves
- State forest

Figure 2-1 | Locality Plan



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F025_Photos_V04
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Dwelling status
  - Associated
  - Not associated
- Photo location and direction
- Road
- Waterway

Figure 2-2 | Photo locations

2.4 Summary of key site features

The key property, community, built and natural features of the study area and broader locality are provided below. Key site features have been presented in **Figure 2-3.**

Property	
Land zoning	Land within and surrounding the study area is zoned as RU1 Primary Production under the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western Regional LEP).
Land ownership	Properties within the study area are privately owned by three landholders. ACEN Australia have entered into land agreements with the associated property owners.
Crown Land	There are no identified Crown land parcels within the study area. There are 15 parcels that are subject to reservations and conditions in favour of the Crown. These parcels fall across three private land holdings. There are some Crown roads (refer to discussion in **Section 8.7.2**). Crown roads outside the study area may require upgrade to facilitate the project. These will be identified in the EIS.
Native title	The study area is subject to a native title claim by the Warrabinga-Wiradjuri #7 (Tribunal No NC2018/002) registered in 2018.
Mining and exploration licences	No mining and exploration licences occur within the study area.

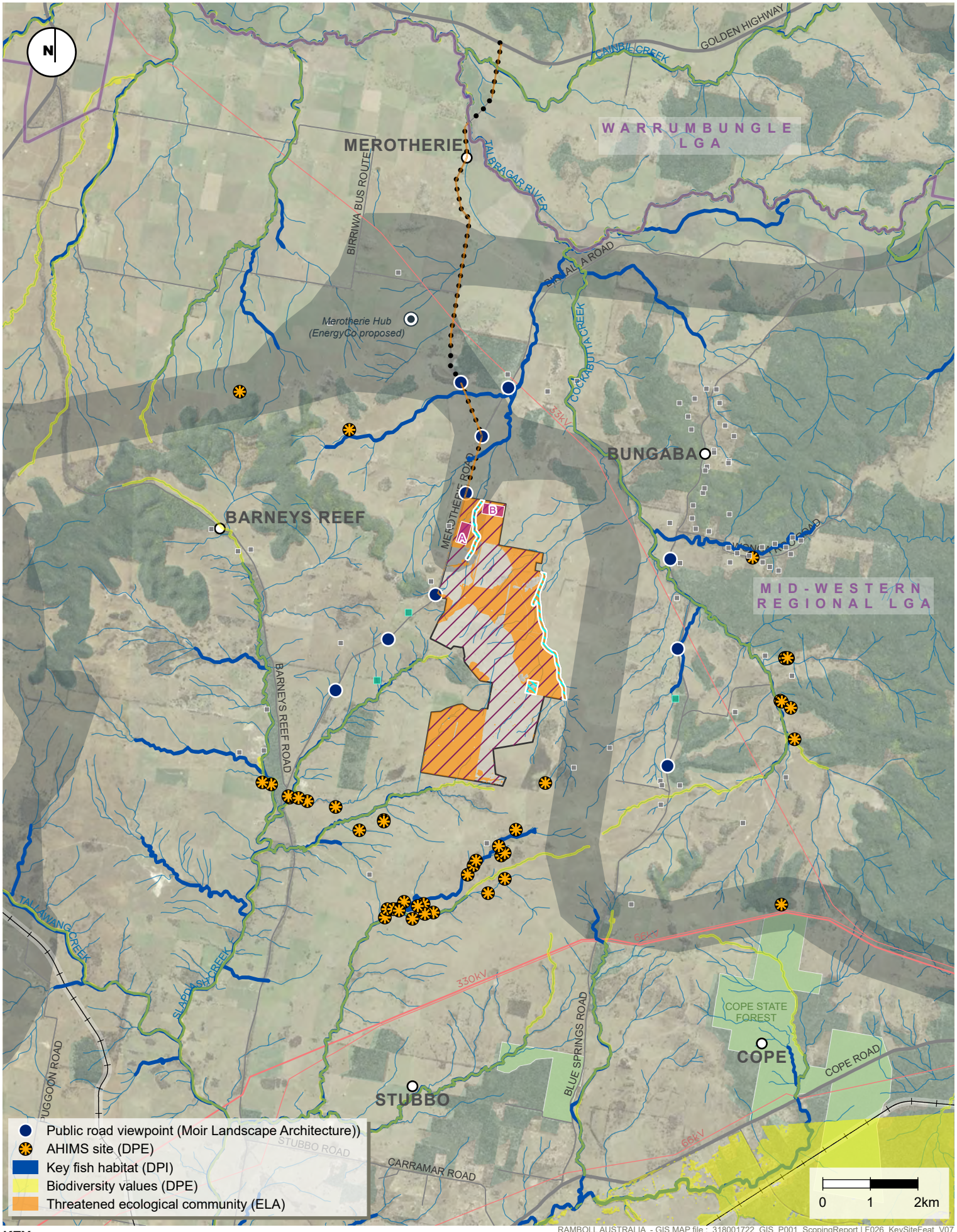
The community	
Population centres	The project is located in the suburb of Merotherie which has a population of 24 (Australian Bureau of Statistics, 2021g). There are some small localities near the study area including Bungaba (east), Cope (southeast), Stubbo (south), Tallawang (west), and Beryl (southwest). Larger towns near the study area include Gulgong located approximately 15 kilometres south, and Dunedoo located approximately 25 kilometres northwest. Dubbo is located 90 kilometres west of the study area.
Sensitive receivers	Potential sensitive receivers within a five-kilometre radius of the study area are shown on **Figure 2-1**. There are 67potential sensitive receivers within five kilometres of the study area. Of these, three are associated with the project (under landholder agreement) and the remaining 64 are currently non-associated.
Land use character and identity	The locality of the project is a rural area characterised by agricultural activities. The study area is generally characterised as rural and is predominantly utilised for agricultural purposes, mostly cattle and sheep grazing.

Aborignal heritage	The Traditional Owners of the study area are the Wiradjuri. The land is managed by the Mudgee Local Aboriginal Land Council (LALC). No Aboriginal places occur near the study area. Preliminary searches have identified no registered Aboriginal sites within the study area.

Built features	
Roads	Major highways in the region include the Castlereagh Highway (B55) and the Golden Highway (B84). The study area is situation between Merotherie Road (west) and Blue Springs Road (east). Other main local roads within the locality include Barneys Reef Road, Birkalla Road and Cope Road.
Transmission lines	The project is situated southeast of the Merotherie Hub proposed by EnergyCo (refer to **Section 1.1.5.3**). The transmission infrastructure (330 kilovolt single line) to connect the project to the Merotherie Hub would form part of the CWO-REZ Transmission Project.
Historic heritage	There are no historic heritage items listed within the study area or immediately adjacent.

Natural features	
Area of biodiversity value	No areas of Outstanding Biodiversity Value are located within the study area.
National parks, nature reserves, state conservation areas and forests	The Cope State Forest is located approximately six kilometres southeast of the study area. There are no National Parks located near the study area.
Rivers and waterways	The project is in the Macquarie-Bogan River catchment. Unnamed tributaries occur throughout the study area ranging between Strahler Stream order one to four.
Topography	The elevation across the study area is between approximately 450 metres and 550 metres AHD.
Vegetation	Vegetation condition within the study area is considered moderate to low, with most of the study area covered by derived native grasslands where the canopy and midstory stratums have been almost entirely removed or very low condition grasslands which demonstrate a long history of cropping. There are some clusters of trees and established wind breaks within the study area.

Natural features	
Habitat	The study area is not mapped on the Important Habitat Map. Habitat features within the study area include vegetation, hollow bearing trees, fallen/standing dead timber, stick nests, semi-permanent/ephemeral wet areas, farm dams, rocks and leaf litter. Koala-habitat trees are present throughout the study area.
Groundwater dependent ecosystems	Groundwater dependent ecosystems (GDE) have not been mapped within the study area. The Groundwater Dependent Ecosystems Atlas identifies that there is low potential for GDEs to occur within and surrounding the majority of the study area, with a portion of land within and adjacent to the southern boundary of the study area having a high and moderate probability of occurring within the riparian corridor of Pine Creek (Bureau of Meteorology, 2023b).



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F026_KeySiteFeat_V07
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Existing electricity transmission line
- CWO-REZ Transmission Project study corridor (approximate)
- Indicative site access
- Development footprint
- Restricted development area
- Potential area of BESS and substation

Dwelling status
- Associated
- Not associated

- Waterway
- Railway
- LGA boundary
- National Parks and Reserves
- State forest

Figure 2-3 | Key site features

3. Strategic Context

3.1 Strategic plans and policies

The project is supported by strategic planning both at the local level and at the State and Federal levels. At a strategic level, the project provides an opportunity to:

- support Australia's commitments to reduce greenhouse gas emissions
- contribute to NSW achieving net-zero emissions by 2050
- deliver on commitments in the Federal Government's RET Scheme
- assist in meeting energy demand and improving energy security and reliability for NSW.

A high-level discussion of the key strategic plans and policies and alignment with the project is provided in **Table 3-1**.

Table 3-1: Project alignment with strategic plans and policies

Strategy, plan, or policy	Description and purpose	Project alignment
National and international context		
The 2015 United Nations Framework Convention on Climate Change (UNFCCC) "Paris Agreement"	The Paris Agreement is a legally binding international treaty to combat climate change. The goal of the agreement is to limit global temperature rise this century to well below two degrees Celsius and to attempt to limit temperature increase to 1.5 degrees Celsius compared to pre-industrial levels (United Nations Framework Convention on Climate Change, 2022). The Australian Government has committed to reduce emissions by 26–28 percent compared to 2005 levels by 2030.	The project will contribute to meeting Australia's commitments through the generation of renewable energy and resultant annual reduction in greenhouse gas emissions.
Large-Scale Renewable Energy Target Scheme	The Large-Scale Renewable Energy Target (LRET) incentivises the development of renewable energy power stations in Australia, through a market involving the creation and sale of certificates known as Large-Scale Generation Certificates (LGCs). The LRET involves the generation of an additional 33,000-gigawatt hours of additional renewable energy annually under the *Renewable Energy (Electricity) Amendment Bill 2015* (Clean Energy Regulator, 2022).	Once operational, the project will generate approximately 908 gigawatt hours of electricity annually contributing to the LRET target.
Integrated System Plan 2022	The Integrated System Plan (ISP) provides an integrated roadmap for the development of the National Electricity Market (NEM) over the next 20 years. The most recent ISP was released on 30 July 2022. The key objective of the ISP 2022 is to support Australia's highly complex and rapid energy transformation towards net zero emissions, enabling low-cost renewable energy and essential transmission to provide consumers with reliable, and secure and affordable power. The ISP 2022 identifies actionable and future projects that can	The project will contribute to addressing the objective of supplying renewable energy to provide consumers with reliable, and secure and affordable power. The project is located in the CWO-REZ, which has been identified in the ISP 2022.

Strategy, plan, or policy	Description and purpose	Project alignment
	achieve Australia's power needs (Australian Energy Market Operator, 2022b). This includes the locations of proposed REZs in Australia that can connect to existing transmission networks.	
2022 Electricity Statement of Opportunities (ESOO)	Each year the Australian Energy Market Operator (AEMO) publishes the ESOO (Australian Energy Market Operator, 2022a) to provide technical and market data that informs opportunities in the national electricity market over a 10-year outlook period. In the short to medium term, without additional investment beyond present commitments, and considering the retirement of the Liddell Power Station (in April 2023) and announced retirements of Eraring Power Station (in August 2025) and Vales Point Power Station (in 2029-30), reliability gaps are forecast in NSW from 2025-26 against the reliability standard. Longer term, indicative reliability gaps are forecast in all NEM mainland regions before 2031-32 against the reliability standard.	The project would contribute to improving reliability of the NSW electricity network by supplying additional electricity to the NEM.
State context		
Net Zero Plan Stage 1: 2020-2030	The Net Zero Plan Stage 1: 2020-2030 is the foundation for NSW's action on climate change and goal to reach net zero emissions by 2050. It outlines the NSW Government's plan to grow the economy, create jobs and reduce emissions over the next decade.	The project will contribute to meeting Australia's commitments through the generation of renewable energy and resultant annual reduction in greenhouse gas emissions.
New South Wales Electricity Strategy 2019	The New South Wales Electricity Strategy (NES) aims to address key challenges in providing "a reliable, affordable and sustainable electricity future that supports a growing economy". The strategy supports approximately $8 billion of private investment in the New South Wales electricity system over a 10-year period, including $5.6 billion in regional New South Wales. The plan also aims to generate 1,200 jobs,	The project is consistent with the NES as it provides renewable energy that, in combination with other renewable projects, is expected to result in lower cost of power in comparison to wholesale prices.

Strategy, plan, or policy	Description and purpose	Project alignment
	predominantly in regional New South Wales (Department of Planning, Industry and Environment, 2019).	
NSW Electricity Infrastructure Roadmap 2020	The Electricity Infrastructure Roadmap is the NSW Government's plan to transform our electricity system into one that is cheap, clean, and reliable. The roadmap emphasises the need for NSW to transition to renewable energy and aims to replace NSW's ageing coal-fired power stations with a coordinated portfolio of energy generation, storage, and network investment. The roadmap is expected to help reduce NSW electricity emissions by 90 million tonnes by 2030 and support NSW to deliver on its net zero by 2050 ambitions (NSW Energy, 2020).	The project will contribute to achieving the vision of the roadmap by producing renewable energy to replace NSW's ageing coal fired power stations and would contribute to annual reductions in greenhouse gas emissions, in combination with other renewable projects.
NSW Transmission Infrastructure Strategy 2018	The NSW Transmission Infrastructure Strategy (Department of Planning and Environment, 2022c) is the NSW Government's plan to boost private sector investment in priority energy infrastructure projects. The strategy forms part of the government's broader plan to make energy more affordable, secure investment in new power stations and network infrastructure and ensure new technologies deliver benefits for consumers. The strategy aims to: • Boost our interconnection with Victoria, South Australia, and Queensland, and unlock more power from the Snowy Hydro Scheme. • Increase NSW's energy capacity by prioritising Energy Zones in the Central-West, South-West, and New England regions of NSW. • Work with other states and regulators to streamline regulation and improve conditions for investment.	The project meets the aim of the strategy by contributing to increased energy capacity in the CWO-REZ.

Strategy, plan, or policy	Description and purpose	Project alignment
Regional context		
Central-West and Orana Regional Plan 2041	The *Central-West and Orana Regional Plan* guides NSW Government's land use planning priorities and decisions for the region through to 2041. The vision or the CWO region to be "*the most diverse regional economy in NSW with a vibrant network of centres leveraging the opportunities of being at the heart of NSW*" (Department of Planning and Environment, 2022a). The plan outlines five parts, each supported by objectives. The five parts are: 1. Region-shaping investment 2. A sustainable and resilient place 3. People, centres, housing and communities 4. Prosperity, productivity and innovation 5. Local government priorities.	The project directly aligns Objective 2 of Part 1: Support the State's transition to Net Zero by 2050 and deliver the CWO-REZ. Other objectives relevant to the project include: • Objective 6: Support connected and healthy communities • Objective 9: Ensure site selection and design embraces and respects the region's landscapes, character and cultural heritage • Objective 10: Protect Australia's first Dark Sky Park • Objective 16: Provide accommodation options for seasonal, temporary and key workers.
Dark Sky Planning Guideline 2016	The *Dark Sky Planning Guideline* is a matter for consideration for all development under the EP&A Act before development consent is granted within the local government areas of Coonamble, Dubbo, Gilgandra and Warrumbungle. It aims to provide guidance and technical information regarding lighting design to preserve the cultural identity of the dark Sky Region (Department of Planning and Environment, 2016).	The project falls within the Dark Sky Region which consists of the land within a 200-kilometre radius of Siding Spring Observatory. Lighting impacts would be considered as part of the EIS.

Strategy, plan, or policy	Description and purpose	Project alignment
Local context		
Mid-Western Regional Development Control Plan 2013	The *Mid-Western Regional Development Control Plan 2013* (Mid-Western Regional DCP) compliments the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western Regional LEP) and provides detailed requirements to guide development in the LGA. Section 6.5 of the Mid-Western Regional DCP relates to solar energy farms. This section outlines the design controls that must be considered for a solar project including project location, land use conflict, hazards and risks, noise impacts, visual impacts (including glint and glare), traffic impacts, biodiversity impacts, heritage impacts, workforce accommodation, and decommissioning and restoration.	The project would have consideration to Section 6.5 of the Mid-Western Regional DCP.
Mid-Western Region Community Plan – Towards 2040	The *Mid-Western Region Community Plan – Towards 2040* (Mid-Western Regional Council) (Mid-Western Regional CP) sets out the community's vision for the future and how to get there. The Mid-Western Regional CP includes four themes, each underpinned by specific goals. These themes are: • Looking after our community • Protecting our natural environment • Building a strong local economy • Connecting our region.	The project is aligned with Goal 1: 'A prosperous and diversified economy' and Goal 2: 'An attractive business and economic environment' under the building a strong local economy theme. The project would also contribute to Goal 3: 'A range of rewarding and fulfilling career opportunities to attract and retain residents' by provided local job opportunities.

3.2 Key risks or hazards

Consideration of key risks or hazardous features that have the potential to affect the study area are outlined below.

Flooding	The study area is not located on flood prone land. Due to the topography and hydrology characteristics, the study area generally has a low flooding risk.
Bushfire	The study area not located within a designated bush fire prone area. Consideration of potential fire risks from the project is included in **Section 8.8**.
Contamination	No known contaminated sites have been identified within the study area (refer to **Section 8.7**).
Climate change	The study area is projected to experience a 0.7°C increase in the daily average temperature in the near future (2020-39) and a 2.1°C increase in the far future (2060-79) (AdaptNSW, 2022). Rainfall is projected to change by +0.4% per year in the near future and by +6.5% per year in the far future (AdaptNSW, 2022). The number of high fire danger days per year is expected to increase by 0.7 days per year in the near future and by two days per year in the far future (AdaptNSW, 2022).

3.3 Cumulative considerations

The solar project would be within the CWO-REZ, which is an area of focus for other existing and proposed large scale renewable energy projects, as well as other developments. When all existing and proposed developments are considered as a whole, it would be expected that the region would be subjected to cumulative effects.

The major operational projects in the region are shown on **Figure 1-1**. Those located within 20 kilometres of the study area include:

- **Ulan Coal Mine** – located approximately 11 kilometres east of the study area
- **Moolarben Coal Mine** – located approximately 17 kilometres southeast of the study area
- **Beryl Solar Project** – located approximately 16 kilometres southwest of the study area.

Additionally, the following other renewable projects are planned to be developed in the future:

- **Stubbo Solar and Battery Project** (approved and under construction) – located immediately south of the study area (refer to **Section 1.1.5.1**)
- **Barneys Reef Wind Project** (under assessment) – located immediately north and west of the study area
- **Birriwa Solar and Battery Project** (under assessment) – located approximately 3.9 kilometres west of the study area
- **Ulan Solar Project** (under assessment) – located approximately 8 kilometres southeast of the study area
- **Tallawang Solar Project** (under assessment) – located approximately 8kilometres southwest of the study area
- **Valley of the Winds Wind Project** (under assessment) – located approximately 12.3 kilometres north of the study area

- **Bellambi Heights Battery Energy Storage System** (under assessment) – located approximately 13 kilometres southwest of the study area
- **Liverpool Range Wind Project** (approved) – located approximately 15 kilometres east of the study area.

Consideration of the cumulative impacts for the project is included in **Section 8.10**.

3.4 Site selection and justification

A summary of the key technical, site and environmental factors considered is presented in **Table 3-2**.

Table 3-2: Key factors consideration in site selection

Factor	Considerations and justification
Technical feasibility	
Quality of solar resource	The yearly solar exposure of the study is approximately 18 megajoules per square metre which is suitable for solar energy generation (Bureau of Meteorology, 2023c)
Land availability	The size of available and suitable land justifies the cost of capital investment for the project at its size
Suitability of land topography	The topography of the site is gently undulating which is suitable for a photovoltaic facility with minimal earthworks
Landholder discussions and property constraints	All infrastructure is proposed to be located on freehold land. Agreements with the host landowners have been made and landowners are willing to be involved with the project
Accessibility	The study area is accessible from the local and regional road network
Availability and capacity of connection to the NEM	The project would connect to the proposed CWO-REZ Transmission Project via the Merotherie Hub
Site and environmental constraints	
Renewable Energy Zones	The project is located within the CWO-REZ and is highly consistent with the NSW Government's plans for development in the wider region
Proximity to regional cities	Larger towns near the study area include Gulgong located approximately 15 kilometres south, and Dunedoo located approximately 25 kilometres northwest. Dubbo is located 90 kilometres west of the study area
Land use	The project is compatible with the existing rural land uses within and surrounding the study area and low density of surrounding dwellings, which minimises the number of dwellings that may be impacted by the project. Additionally the project compliments planned energy infrastructure including the proposed CWO-REZ Transmission Project (refer to discussion in **Section 1.1.5.3**) and Stubbo Solar and Battery Project immediately south of the project (refer to discussion in **Section 4.4.4**)

Factor	Considerations and justification
Visibility	Due to the flat to gently undulating terrain within the study area and its surrounds, the project has the potential to be visible, to varying degrees, in areas surrounding the project. Views towards a larger proportion the project may be available to the immediate north, south, and northeast of the project as well as an area to the immediate west of the project. Siting of project infrastructure would be determined with consideration of visual impacts to sensitive receptors
Biodiversity	The study area primarily consists of cleared agricultural land used for livestock grazing. As a result, the area has limited remnant native vegetation in the form of scattered trees, vegetation along riparian corridors and isolated areas of remnant vegetation. The development footprint has been designed to avoid areas of high condition vegetation where possible
Aboriginal Cultural Heritage	No Aboriginal sites have been identified within the study area based on the preliminary desktop searches. The project would seek to avoid impacts to any sites identified during further detailed assessments to the extent possible
Waterways	The project has sought to avoid key infrastructure within waterways with a Strahler stream order of three or more. These waterways are included within the restricted development areas with a 40-metre buffer applied to each side of the waterway
Cumulative considerations	The project is located nearby to other renewable energy projects and proposed infrastructure associated with the CWO-REZ. The key issues that would be subject to specific cumulative impact assessment relate to visual, traffic, noise, biodiversity, social and land use
Community considerations	
Acceptability of the project	There are a range of views and perception on the CWO-REZ and how surrounding communities would be impacted. Some people are supportive, seeing it as an opportunity to create jobs, attract investment, drive economic growth in the region, and view the shift towards renewable energy as a positive step towards addressing climate change and reducing Australia's dependence on fossil fuels. Others have concerns about the impact of the REZ on the environment, amenity, and the community (refer to discussion in **Section 8.6**)
Employment	The project would provide employment opportunities during construction with up to 400 full time equivalent personnel required during this stage, and during operations with up to 10 full time equivalent personnel required

3.5 Project need

2022 and 2023 has seen electricity prices in NSW and Australia significantly rise. In May 2022, the NSW short-term wholesale price of electricity was reportedly 80 percent higher than in 2021 while National wholesale energy prices had increased 140 percent in 12 months. The Australian Energy Regulator released its draft determination offer of the Default Market Offer for 2023 to 2024 which estimates a 19.5 percent to 23.7 percent cost increase for residential customers depending on their region and whether they have controlled load (Australian Energy Regulator, 2023).

A key driver in State and National electricity prices has been the increasing cost of fossil fuel energy sources. Instability and restriction of global supply chains, exacerbated by conflict in the Ukraine, have led to market prices for fossil fuels to increase notably in Australia. Renewable energy and energy storage have been identified as an appropriate measure to reduce energy prices and reduce State and National vulnerability to global instability (Department of Climate Change, Energy, the Environment and Water, 2023).

In June 2022, the AEMO suspended wholesale spot market trading on the East Coast of Australia to ensure reliable supply. Price caps implemented by AEMO to limit rising electricity costs, resulted in unprofitable conditions for electricity generators. Consequently, electricity generators withdrew from the energy market, reducing supply in a period of notably high demand. This nexus of high demand and high energy production cost has highlighted vulnerabilities within the Australian East Coast energy market (Australian Energy Market Operator, 2022c).

NSW is currently undergoing an energy sector transformation. The NEM (managed by the AEMO) is transitioning from a system dominated by a small number of large coal-fired generators to one of diverse renewable and distributed energy generation and storage. Modelling indicates that 14 gigawatts (60 percent of current coal capacity) may be withdrawn by 2030 and all coal generation could withdraw by 2040 (Australian Energy Market Operator, 2022b).

Three of NSW's large coal-fired power stations are expected to close over the next six years (**Figure 3-1**):

- the remaining units of Liddell Power Station by 2023 (1,680 megawatts)
- Eraring Power Station by 2025 (2,880 megawatts)
- Vales Point Power Station by 2029 (1,320 megawatts).

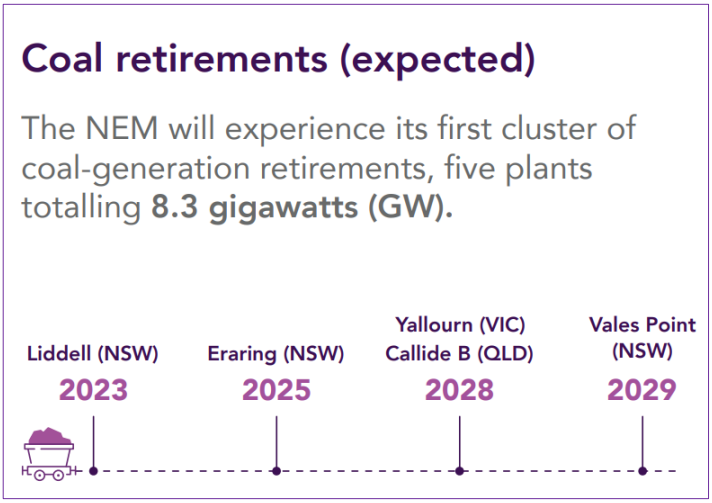


Figure 3-1: Coal retirements (expected) (Australian Energy Market Operator, 2022a)

The closure of large coal-fired power stations has the potential to put pressure on the future supply of energy, particularly when considering that electricity consumption in NSW is forecast to increase in the future (Australian Energy Market Operator, 2022b). This highlights the urgent need to develop and connect new renewable energy to the NEM, noting that more renewables are required to replace conventional generators because of their lower capacity factors due to the intermittency of the electricity that they produce (Australian Energy Council, 2017).

Even with the commissioning of the Tallawarra B Power Station (320 megawatts) in late 2023, the Kurri Kurri Power Station (750 megawatts) in late 2023, and the Snowy 2.0 pumped hydro project (2,000 megawatts) in 2025-26, the assessment completed by AEMO as part of the 2022 ESOO shows these committed developments are not yet sufficient to offset the impact of the expected higher electricity use (Australian Energy Market Operator, 2022a).

Australia's vast natural capital means that it has one of the best solar and wind resources on the planet, setting viable foundations for a strong renewable sector, particularly in rural environments. The construction of solar farms in Australia forms part of the wider transition toward renewable energy and a more sustainable future for the country.

The NSW Government is leading the development of REZs across NSW (refer to **Figure 3-2**). Five REZs have been announced in NSW, of which two have been formally declared. In November 2021, the NSW Government formally declared Australia's first REZ, the CWO-REZ, where the project is located.

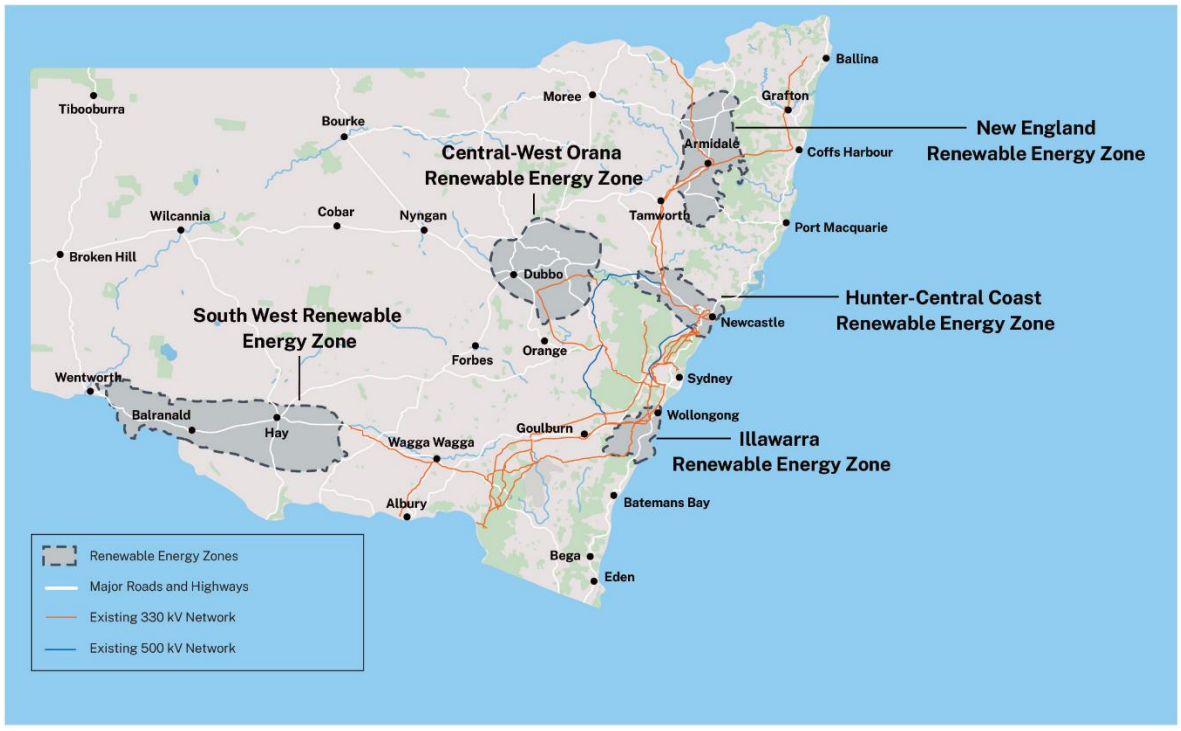


Figure 3-2: NSW Renewable Energy Zones. Source: (Energy Corporation of NSW, 2023b)

The project is justified because:

- it would be located in the CWO-REZ, which has been identified by the NSW Government as a priority area for the delivery of new renewable energy generation and storage, supported by transmission infrastructure
- it is suitably located in a region with ideal climatic and physical conditions for large-scale solar energy generation
- it is close to the proposed CWO-REZ Merotherie Hub providing a connection to dispatch electricity to the NEM
- it would largely affect agricultural land uses that are compatible with large-scale solar energy generation
- it would not result in significant social or economic impacts
- it would create employment opportunities and benefits to the local and regional economy.

The consequences of not proceeding with the project would include:

- loss of opportunity to reduce greenhouse gas emissions and move towards cleaner electricity generation
- loss of a renewable energy supply that would assist in reaching the RET
- loss of additional electricity generation and supply into the NEM
- loss of economic benefits to associated residences including those subject to neighbouring agreements
- loss of social and economic benefits created through the provision of direct and indirect employment opportunities during the construction and operation of the project, as well as flow on social and economic benefits.

4. The Project

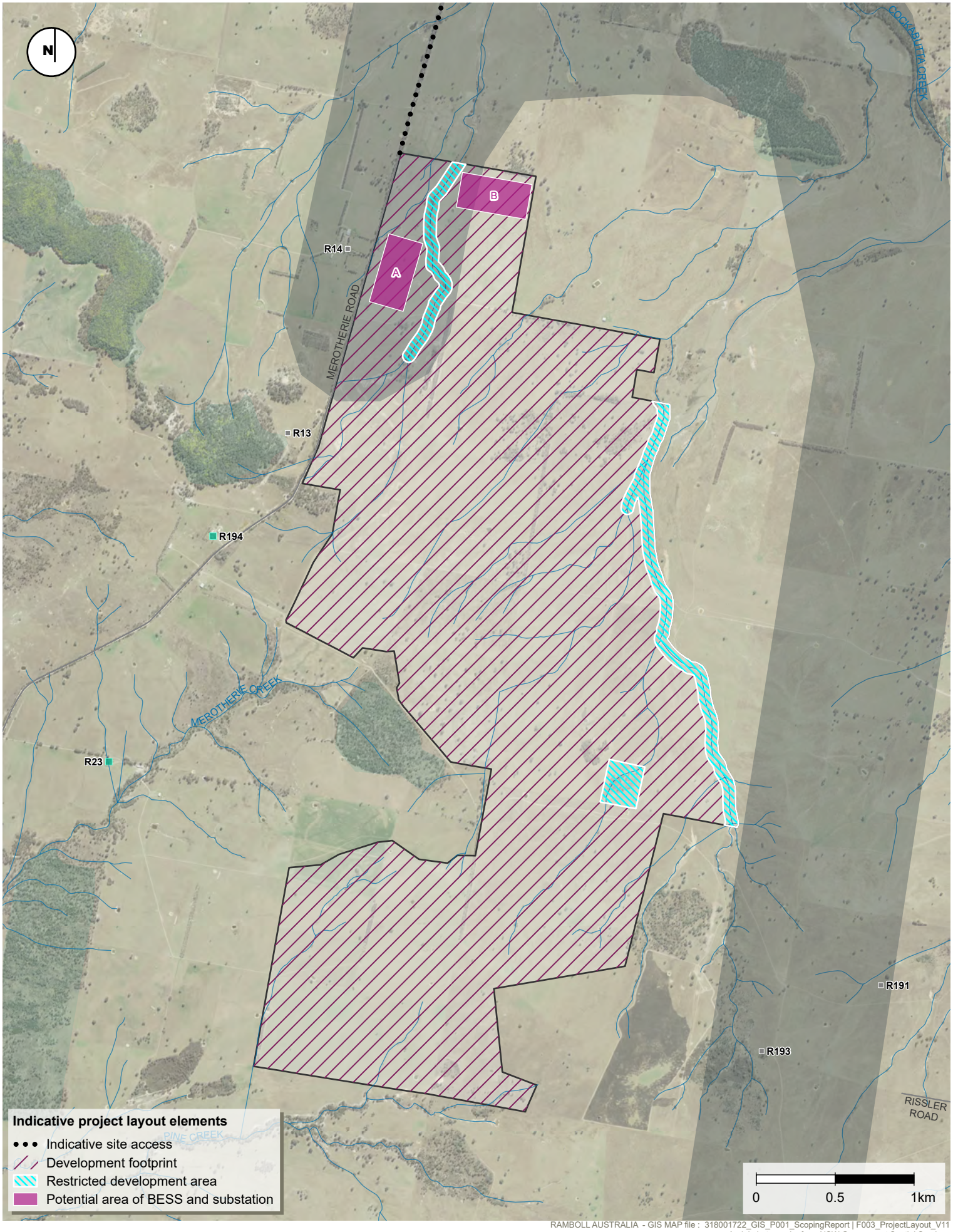
4.1.1 Overview

The 320-megawatt (AC) solar project would include the following key components:

- approximately 832,000 photovoltaic modules (solar panels) using a single axis tracker racking system
- electrical infrastructure including:
  - approximately 55 PCUs which include inverters for converting DC power to AC
  - onsite substation containing main transformers and associated switchgear
  - overhead and underground electrical reticulation connecting the project elements
  - connection from the onsite substation to the Merotherie Hub proposed by EnergyCo. The transmission infrastructure (330 kilovolt line) to connect the project to the Merotherie Hub would form part of the CWO-REZ Transmission Project (refer to discussion in **Section 1.1.5.3)**
  - potential BESS, which may be distributed amongst the solar array area (if DC coupled) or co-located in an area near the substation (if AC coupled). This would be confirmed in the EIS
- other permanent onsite ancillary infrastructure including:
  - operational and maintenance facility
  - a temperature-controlled spare parts storage facility
  - SCADA facilities for remote monitoring of the project
  - a workshop and associated infrastructure
  - access roads, both to the project and internal access roads
  - carparking area
  - security fencing and landscaping
- temporary construction ancillary infrastructure including:
  - construction compounds
  - laydown areas
  - parking areas
  - access tracks and associated infrastructure, including gates and fencing
  - concrete batching plant
  - potential temporary workers accommodation camp (refer to discussion in **Section 1.1.5.2**).

Indicative locations of infrastructure are presented in **Figure 4-1**. Ongoing refinement of the proposed layout and technology would continue throughout the EIS process in response to engineering design refinements, landholder negotiations and outcomes of environmental and social assessments, to minimise potential impacts where possible.

Development that is required for the project and is subject to separate assessment (refer to discussion in **Section 1.1.5**) includes the EnergyCo Transmission Line.



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F003_ProjectLayout_V11
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- CWO-REZ Transmission Project study corridor (approximate)

Dwelling status
- Associated
- Not associated

- Road
- Waterway

Figure 4-1 | Indicative project layout

4.1.2 Photovoltaic modules

The project would include arrays of photovoltaic modules (solar panels). Based on the current layout and study area, the project would include up to approximately 832,000 photovoltaic modules using a single axis tracker racking system. The size and number of photovoltaic modules and inverters required to reach the proposed capacity is subject to detailed design and further refinement during the detailed design and EIS process.

The modules would be mounted on single-axis tracking mounting structures, which allow the modules to track the sun throughout the day. Compared to fixed-tilt mounting systems, single-axis tracking mounting structures capture more of the sun's energy and therefore generate more power.

The module configuration would be determined during detailed design and would depend on market availability. The modules would generally be installed in rows spaced typically between five and twelve metres apart. The rows of photovoltaic modules would be aligned in a north-south direction, allowing the panels to rotate from east to west during the day, tracking the sun's movement.

Depending on the final technology selected, the height of the bottom of the solar modules would typically range from 0.3 to 1.5 metres above ground level. The maximum height of modules is anticipated to be up to a maximum of 2.5 metres above ground level in a 1P configuration (vertical one panel configuration) (refer to **Photo 4-1** as an example) or up to five metres above ground level in a 2P configuration (vertical two panel configuration) (refer to **Photo 4-2** as an example).

The footings that would be used for the mounting structures would comprise either screw piles, driven piles (with or without pre-drilling), concrete footings, or a combination, such as driven piles with concrete filling. The final footing selection would be subject to geotechnical investigations and determined through development of the detailed design for the project.

DC cables would be strung underneath the panels, housed in cable trays, or be passed through the tracker tubes before being connected to the PCUs.

Source: Nextracker

Photo 4-1: Example of a photovoltaic module (1P Configuration)

Source: Nextracker

Photo 4-2: Example of a photovoltaic module (2P Configuration)

4.1.3 Power conversion units

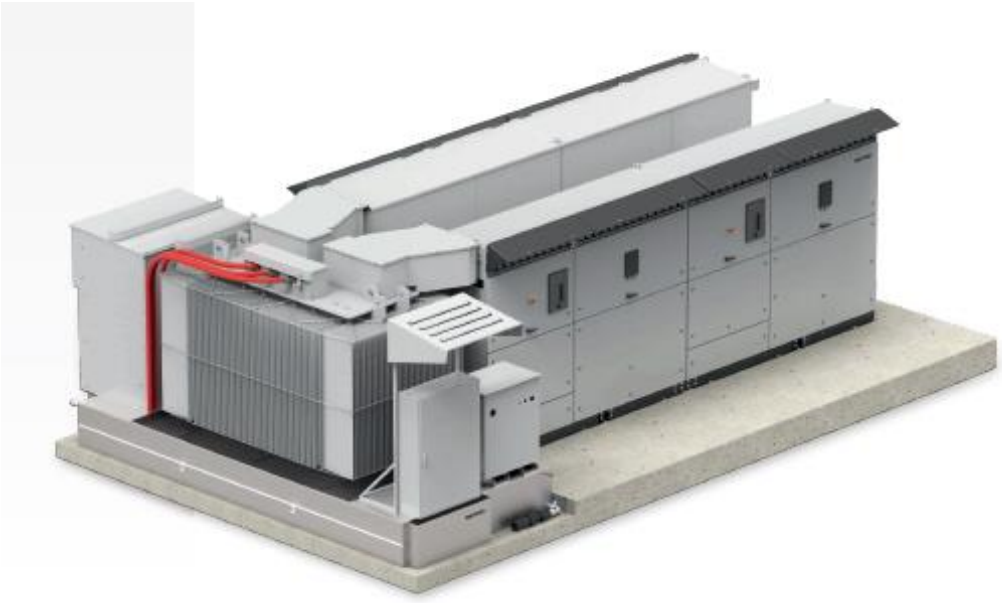
The photovoltaic modules would be connected to PCUs, which would be situated throughout the study area. The PCUs convert the DC electricity generated by the photovoltaic modules into AC and step up the voltage to reduce losses. An example of the type of PCU that may be used (outdoor design) is provided in **Photo 4-1**.

The PCUs typically comprise three main components:

- **inverters** – to convert the DC electricity into AC to allow the solar generated energy to be fed into the electricity grid. The final selection of inverters would be undertaken during detailed design and would consider factors such as minimising maintenance, maximising reliability and the optimal amount of redundancy
- **transformers** – skid-mounted transformers would be installed to step up the voltage to the internal reticulation voltage across the project. One or more main transformers would also be installed in the project substation to step up the internal reticulation voltage to the connection point voltage
- **ring main unit** – enclosed set of switchgear at the load connection points.

The PCUs are typically either containerised (within shipping containers) or a skid-mounted or "outdoor" design, which is with the cabinets and transformers mounted on either a steel platform or a thin concrete pad. A typical PCU using the outdoor design could be expected to be approximately eight metres in length by 2.6 meters wide by 2.7 meters high.

The quantity and exact dimensions of the PCUs will be determined during detailed design, however, based on a 320-megawatt (AC) facility it is anticipated that approximately 55 PCUs would be required, depending on the final design and procurement decisions made at the time of construction commencing.



Source: Ingeteam

Photo 4-1: Example of a power conversion unit

4.1.4 Electrical reticulation

Medium voltage (33 kilovolt) underground or aboveground cables would be installed to connect each PCU to the project substation. Underground cabling would be installed with the relevant Australian Standards (*AS/NZS 3000:2018, Electrical installations)* and would be at a depth of at least 600 millimetres below ground.

As part of the medium voltage cable reticulation network development, waterway crossings will be required. All waterway crossings will comply with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI, 2003) and *Guidelines for Watercourse Crossings on Waterfront Land* (DPI, 2012).

4.1.5 Substation and grid connection

Electricity from the medium voltage (33 kilovolt) electrical reticulation cable network would be increased to high voltage electricity at the substation, to match the voltage of the network at the connection point (330 kilovolt). An indicative location for the substation is shown on **Figure 4-1**.

The substation would consist of an indoor switch room to house the medium voltage switchboard and circuit breakers, and an outdoor switch yard to house the transformer(s), gantries and associated infrastructure. A security fence would be installed around the substation to maintain site security and public safety.

From the substation, electricity generated by the project would be injected into the NEM via the Merotherie Hub proposed by EnergyCo as part of the CWO-REZ Transmission Project (refer to discussion in **Section 1.1.5.3**). The transmission infrastructure (330 kilovolt single line) to connect the project to the Merotherie Hub would form part of the CWO-REZ Transmission Project.

4.1.6 Battery energy storage system (potential)

A BESS may be included in the project subject to further investigations. If included in the project, the BESS would allow for the storage and export of renewable energy within the network so that it can be used during times of peak demand (energy arbitrage). It would also provide various Market Ancillary Services to the NEM, assisting in network stabilisation and facilitating higher volumes of renewable energy generation. The BESS would provide a total capacity of approximately 200 megawatts and two hours of storage.

The BESS will be either a centralised 'AC Coupled' or a decentralised 'DC Coupled' BESS with small BESS units connected to some or all of the PCUs distributed throughout the site. If an AC Coupled solution is selected as the preferred option, the centralised BESS would be housed in a secure compound (such as a modified shipping container, prefabricated switch room structures or smaller outdoor-rated cabinets) adjacent to the electrical substation. An indicative location for the centralised BESS is shown on **Figure 4-1**. This infrastructure component would likely be in the order of 3.5 metres high. The decentralised system would involve small enclosures/cabinets similar in size to the inverter cabinets.

The major components of the BESS would comprise:

- **Batteries** – most likely a lithium-ion technology type
- **Inverters** – convert the DC electricity generated by the photovoltaic modules into AC. The decentralised DC Coupled arrangement will utilise battery DC to DC converters connected to the solar inverters rather than additional battery inverters. DC to DC converters are a simplified version of an inverter missing components such as the AC to DC transformation equipment

- **Transformers** – there would be two types of transformers within the centralised AC Coupled BESS if this option is chosen: a low-voltage to medium-voltage transformer and a medium-voltage to high-voltage transformer if a separate grid connection for the BESS is required. The decentralised BESS option does not require any additional transformers
- **Heating ventilation air conditioning** (HVAC) – the HVAC would maintain the batteries at a temperature to optimise their lifetime and performance. This would include small package units and large chillers or a liquid cooling system
- **Fire protection** - active gas-based fire protection systems would be installed within the BESS enclosure. Thermal sensors and smoke/gas detectors would be installed and connected to a fire control panel.

Advances in battery storage technology have been continuous and rapid. Commercial scale battery storage is a relatively new technology that is rapidly evolving and decreasing in cost. Due to this rapidly evolving technology, the final technology choice and battery storage capacity for the project is subject to final selection and detailed design.

4.1.7 Permanent on-site ancillary infrastructure

In addition to the infrastructure described above, the project will also require:

- staff office, operations and control room, meeting facilities, amenities, and carparking
- a temperature-controlled spare parts storage facility
- SCADA facilities
- a workshop and associated infrastructure
- permanent lighting and CCTV, security fencing and vegetation screen, and lightning protection.

The specific locations for the permanent onsite ancillary infrastructure would be confirmed during detailed design of the project and would be located within the development footprint. Structures would be set back from the road frontages and sited near the primary site access point to allow for ease of access for the workforce.

4.1.8 Access track network

The project would require an access track network to enable both access to the site from the surrounding road network and access between infrastructure within the site. The internal access track network would comprise internal tracks of approximately four metres wide between the solar arrays and PCUs to allow for sufficient vehicle manoeuvring, including large vehicle deliveries. Gates would be installed where the access tracks meet the perimeter road to restrict access.

The study area would be accessed from Merotherie Road via the Golden Highway. Access would likely be from the northwest corner of the study area, however, would be confirmed in the EIS.

The access track network would be appropriately designed, constructed, and maintained to allow for necessary access to solar and electrical infrastructure for all stages of the project. The design of the access network, including access points from the public road network, is subject to detailed design. The design would seek to avoid areas of high environmental impact where possible such as avoiding roadside native vegetation.

4.2 Project staging, timing and sequencing

4.2.1 Project stages

The project includes the following key stages:

- construction
- operation
- decommissioning.

4.2.2 Construction

4.2.2.1 Construction phases

Construction of the project would be undertaken in the following phases:

- **Phase 1. Detailed design and site investigations**: Detailed design, including the design of electrical reticulation, geotechnical design, and other project elements
- **Phase 2. Site preparation**: Pre-construction activities such as site preparation and vegetation clearing, installation of environmental management measures (such as erosion and sediment controls) and protection mechanisms for watercourses and exclusion zones, utility adjustments, erection of site and workers compounds; and upgrades to public roads if required
- **Phase 3. Main construction works**: Onsite civil works including access tracks and permanent drainage works, solar arrays, BESS and electrical infrastructure construction, installation of electrical reticulation and ancillary infrastructure
- **Phase 4. Commissioning**: Activities to be undertaken prior to operation such as testing of modules and tracks and energising substations.

4.2.2.2 Temporary construction ancillary facilities

Several temporary construction ancillary facilities would be required during construction. These would typically include:

- construction compounds – inclusive of site offices, car parking, and amenities
- laydown areas – suitable for plant and equipment
- construction access tracks and associated infrastructure such as gates and fencing
- concrete batching plant.

The locations of all temporary infrastructure would be determined following detailed site investigations during preparation of the EIS and would be located within the development footprint. Where possible, areas that are to be disturbed through the temporary construction activities would be repurposed for operational uses to prevent further land disturbance.

4.2.2.3 Haulage routes and traffic movements

Investigations into the suitable access route for construction would be undertaken in consultation with Mid-Western Regional Council, Warrumbungle Shire Council, Transport for NSW and EnergyCo. Other councils will be consulted as appropriate.

It is anticipated that construction materials and infrastructure would be largely transported to the study area via road from the Port of Newcastle or from Sydney. Assuming the origin is Newcastle, trucks would use the following route: Bourke Street → Hannel Street → Industrial Drive → Maitland Road → New England Highway → John Renshaw Drive → Hunter Expressway → New England Highway → Golden Highway → Merotherie Road.

Deliveries may also come from Sydney or the North Coast (subject to resource supplier selection and port capabilities and fees etc). Deliveries coming from Sydney are expected to use the M1

Motorway to the Hunter Expressway and then use the same route as deliveries coming from Newcastle. Deliveries from the North Coast would use the Pacific Highway to Maitland Road then use the same route as deliveries coming from Newcastle.

It is anticipated that materials would primarily arrive via the most effective route and be transported to site by heavy vehicles up to B-double in size, however some oversize overmass vehicles may also be required.

It is estimated that the project would require around 250 light vehicles and 100 heavy vehicles per day during peak construction. Oversize overmass vehicles would also be required for deliveries of transformers and other major equipment. These numbers would be further investigated and refined in the EIS.

Some public road upgrades would likely be required to facilitate construction traffic. These would be confirmed during the EIS, following the detailed traffic and transport assessment, but it is expected that these would include upgrades of Merotherie Road from its intersection with the Golden highway to the project site access. Some road upgrades in the REZ are to be delivered by EnergyCo as part of the CWO-REZ Transmission Project (refer to discussion in **Section 1.1.5.3**). ACEN will continue to consult with EnergyCo, and the EIS will clearly define the extent of road upgrades to be delivered by EnergyCo, and those to be delivered as part of the project. Any road upgrades required as part of the project would be included in the development footprint and assessed in the specialist studies for the EIS including biodiversity, heritage, and construction noise. It is expected the EIS for Narragamba Solar Project would refer to the port to REZ transport assessment undertaken by EnergyCo for the haulage route between Newcastle and the intersection with Merotherie Road.

4.2.2.4 Construction program, hours and workforce

Construction of the project is anticipated to commence in Quarter 4 of 2025, subject to timing of the approvals process and detailed design, in alignment with the CWO-REZ Transmission Project schedule. The construction phase is expected to be undertaken over approximately 20 to 24 months from the commencement of site establishment works.

Construction would likely be undertaken during standard daytime construction hours consistent with the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009) (ICNG) with the addition of work on Saturday afternoons from 1pm to 6pm, as follows:

- 7am to 6pm Monday to Friday
- 8am to 6pm on Saturdays
- no works on Sunday or public holidays.

ACEN Australia proposes exceptions to these hours without additional approval of the Secretary under the following circumstances:

- activities that are inaudible at non-associated residences
- the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons
- emergency work to avoid the loss of life, property and/or material harm to the environment.

The project would likely require approximately 400 construction workers during peak periods, which are expected to be during Phase 3 of the project when the main construction works would be undertaken. ACEN will work with local communities and Mid-Western Regional Council to investigate opportunities to maximise the local workforce.

The construction program, hours and workforce are subject to detailed design, construction methodology and scheduling. Further details would be included in the EIS, including a consideration of the potential cumulative impacts associated with accommodation, infrastructure, and services as part of the social impact assessment.

4.2.2.5 Temporary construction workforce accommodation

ACEN Australia is currently investigating the potential for a centralised accommodation strategy that would service its renewable projects in the area. Details of this approach are being included in the amendment report for the development application to the Birriwa Solar and Battery Project (development application number SSD-29508870). The construction and operation of this temporary workers accommodation camp would also be included in the Narragamaba EIS (refer to discussion in **Section 1.1.5.2**).

4.2.3 Operation

The project would likely operate 24 hours per day, seven days per week with the operations and maintenance team attending site during standard working hours unless responding to an alarm, fault, or major maintenance works. Up to 10 full time equivalent employees would be required to operate and maintain the project.

Ongoing monitoring and maintenance would include maintenance of the solar panels, associated infrastructure, vegetation, and internal access tracks. Regular light vehicle access will be required throughout operations. Heavy vehicles would be required occasionally for replacing larger components of project infrastructure including inverters, transformers or components of the BESS.

The operational lifespan of the project is indicatively 25 years, with potential for upgrades, including repowering. At the end of its operational life, the project would be decommissioned and land that is impacted by the project would be appropriately rehabilitated in consultation with the affected landholders.

4.2.4 Decommissioning

Should it be determined that the project would be decommissioned, associated infrastructure would be decommissioned and removed for sale, recycling or disposal, unless agreed with the host landholder (e.g. cabling at a certain depth may remain to mitigate impact on soil). Access tracks and hardstand areas would be remediated to prepare a suitable soil profile for subsequent sowing with an appropriate ground cover mix. Land impacted by the project would be appropriately rehabilitated in consultation with the affected landholders.

4.3 Service and utility supplies

4.3.1 Water supply

Water would primarily be used for dust suppression during construction and decommissioning activities. During operations, non-potable water would be required for ongoing maintenance activities such as cleaning the photovoltaic modules (indicatively once a year) and vegetation management and for amenities, and potable purposes by operational staff.

Water required for construction would be preferentially sourced from:

- commercial suppliers of treated wastewater in the nearby region
- opportunistically sourced from farm dams located within the study area
- sourced from town water.

Water sources would be determined in consultation with suppliers and landholders and be subject to availability. Further details on quantities and sources would be included in the EIS.

4.3.2 Electricity

Access to electricity during construction activities would be via the local distribution network where available and via diesel generation where access to the grid is unavailable.

Electricity requirements during operation would include lighting, staff computers, domestic appliances and onsite security systems during operations. Electricity generated by the project would be used for most activities during operations, except for maintaining the inverters during the night which will involve a small amount of auxiliary load being supplied from the grid.

4.3.3 Telecommunications

Telecommunication utilities are not available within the study area. As such, the cellular network would be used during construction. During operations connection to telecommunications would be via optical fibre with cellular backup.

4.3.4 Sewer

There is no sewer access at the site. Therefore, amenity facilities would be pumped out via tanker and delivered to a sewage treatment facility as agreed with Mid-Western Regional Council or other councils in the region.

It is likely that a septic system would be installed for the operational amenities. This would be constructed and managed in accordance with the relevant Mid-Western Regional Council requirements.

4.3.5 Waste management

It is understood that Mid-Western Regional Council would not have the landfill capacity to accept waste from the project. The EIS would provide detail on the expected quantity and proposed destination for waste associated with construction and operation of the project. The strategy for waste management would be developed in consultation with local councils.

4.4 Alternatives considered

4.4.1 Do nothing

The 'do nothing' option represents the option of not developing a solar project, and not investing in other renewable projects. This option would avoid all the impacts of the project, however, would also not deliver the potential benefits of the project (refer to **Section 3.5**).

4.4.2 Alternate renewable energy projects

Consideration was given to the type of development that would best suit the environmental conditions, whilst having regard to the local community and other environmental constraints. The local topography lends itself to solar energy due to the gently undulating landform.

4.4.3 Alternate layouts

Refinements to the project layout were made during the scoping phase which involved the inclusion of the restricted development areas around environmentally sensitive areas (refer to discussion in **Section 1.1.2**). This informed the selection of the potential BESS and substation locations within the study area (refer to **Figure 4-1**).

Further refinements to the project layout will be made during preparation of the EIS in response to the findings of detailed assessments and feedback from engagement with the view to avoid or minimise environmental and social impacts.

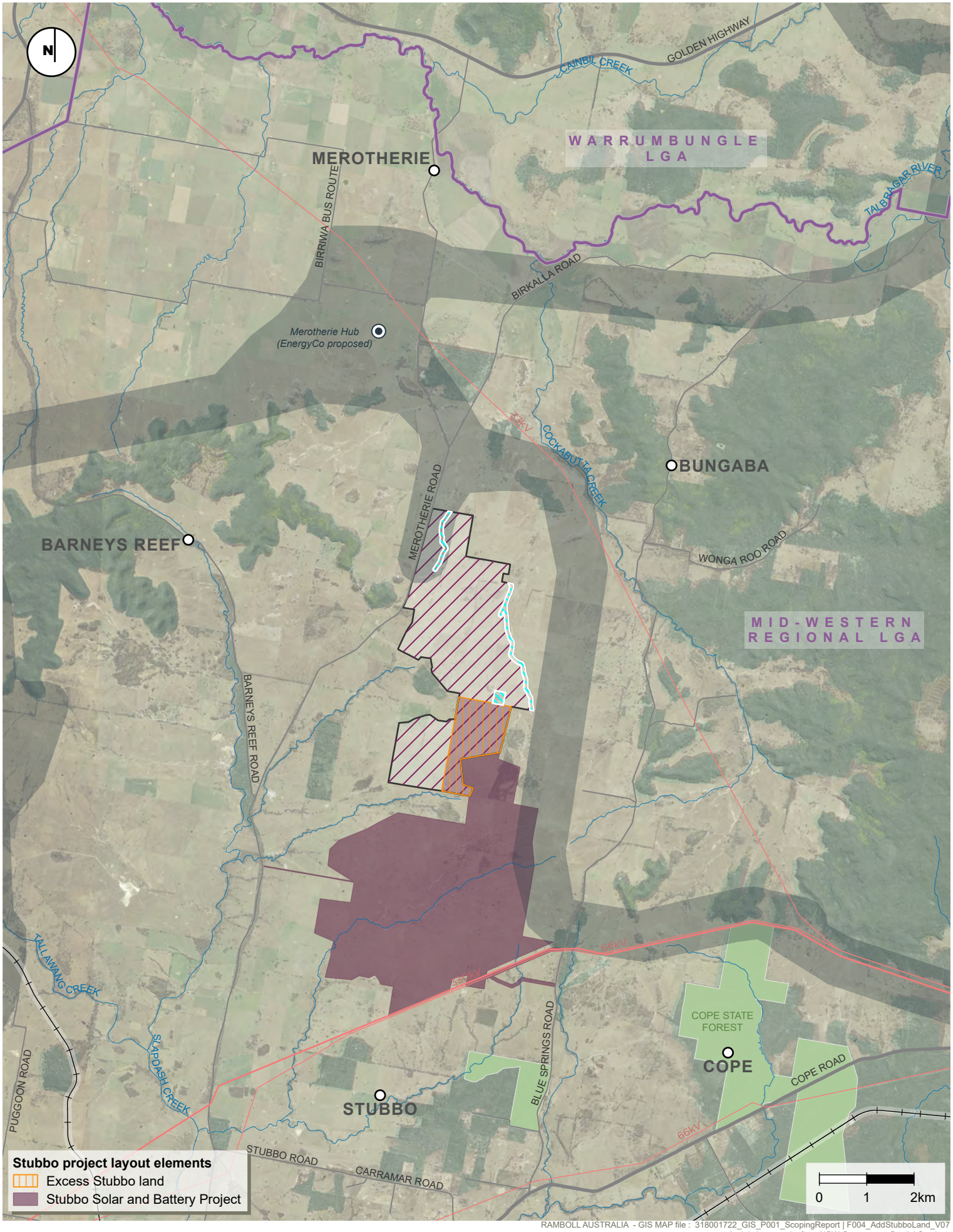
4.4.4 Excess Stubbo Land

A 159-hectare portion of land referred to as 'excess Stubbo land' (refer to **Figure 4-2**), will be included as part of the Narragamba Solar Project. This area is approved for development with solar arrays under the development consent for the Stubbo Solar and Battery Project, and is not expected to be part of the final design for the Stubbo Solar Project.

The proposed 400-megawatt capacity for Stubbo Solar and Battery Project (connecting to 330 kW transmission line #79) can be generated using less than the 1,250 hectares approved for the development under SSD-10452. Inclusion of the excess Stubbo land into the Narragamba Solar Project will provide additional opportunity for project refinement to minimise environmental and social impacts. Power generation associated with the development of this land as a part of the project would form part of the Narragamba project and its generation through the CWO REZ. Additionally, construction on the excess Stubbo land would be undertaken at the same time as the Narragamba Solar Project, would be managed by the Narragamba Solar Project's construction contractor and would provide benefit from a coordinated management approach.

The land use would remain consistent with the Stubbo Solar and Battery Project approval, however access to the excess Stubbo land would change from Blue Springs Road to Merotherie Road and the grid connection would be via the CWO-REZ Transmission Line and the Merotherie Hub. There would be a fence between the project and the Stubbo Solar and Battery Project to prevent interruption to farming activities and to provide access to paddocks in the area. This excess Stubbo land would form a part of the Narragamba solar study area.

The EIS will consider any potential impacts associated with development of this land as a part of the project such as traffic, visual, biodiversity, land, and social. Cumulative impacts will consider both projects as well as other projects being developed in the area.



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F004_AddStubboLand_V07
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Existing electricity transmission line
- CWO-REZ Transmission Project study corridor (approximate)
- Development footprint
- Restricted development area
- Road
- Railway
- Waterway
- LGA boundary
- State forest

Figure 4-2 | Excess Stubbo land

5. Statutory Context

The key statutory considerations for the project under the EP&A Act and other relevant NSW and Commonwealth legislation are outlined in **Table 5-1**. The relevant statutory requirements for the project will be outlined in further detail within the EIS.

Table 5-1: Statutory requirements for the project

Matter	Requirements for the project
Power to grant consent	The project meets the threshold for SSD and is subject to assessment under Part 4 of the EP&A Act. Approval for the project will be sought under Part 4, Division 4.7 of the EP&A Act. Under Section 4.36(2) of the EP&A Act, a State Environmental Planning Policy (SEPP) may declare any development, or any class or description of development, to be SSD. Under the provisions of Clause 2.6(1) of *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP), a development is classified as SSD 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 or 2.* Schedule 1, Clause 20 of the Planning Systems SEPP determines 'electricity generating works' to be SSD if it meets the following criteria: *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:* *(a) has a capital investment value of more than $30 million.* The project is a development for the purpose of electricity generation and exceeds the threshold for SSD with a capital investment value of more than $30 million. Under Division 4.2, Section 4.5 of the EP&A Act the consent authority for SSD is the Independent Planning Commission (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister (if the development is not of that kind).
Permissibility	The permissibility of solar farm developments in NSW is determined by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP). Clause 2.36(1) of the Transport and Infrastructure SEPP provides that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone (including RU1 Primary Production zone). The study area is on land zoned as RU1 Primary Production under Mid-Western Regional LEP and is permitted with consent. Under Clause 2.7(1) of the Transport and Infrastructure SEPP, the provisions of the SEPP prevail where there are inconsistencies with other environmental planning instruments, including local environmental plans.

Matter	Requirements for the project
Other approvals	**Approvals not required for SSD** Clause 4.41 of the EP&A Act clarifies that development consent for SSD includes authorisations under the following statutory provisions, meaning that separate planning approval processes do not apply for: • a permit under section 201, 205 or 219 of the *Fisheries Management Act 1994* (FM Act) • an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977* • an Aboriginal Heritage Impact Permit (AHIP) under section 90 of the *National Parks and Wildlife Act 1974* • a bushfire safety authority under section 100B of the *Rural Fires Act 1997* • a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000* (WM Act).
	EPBC Act Approval Any action which could have a significant impact on a MNES must be referred to the Minister for the Environment and Energy. The nine MNES protected under the EPBC Act are: • World heritage properties • National heritage places • wetlands of international importance (listed under the Ramsar Convention) • listed threatened species and ecological communities • migratory species protected under international agreements • Commonwealth marine areas • The Great Barrier Reef Marine Park • nuclear actions (including uranium mines) • a water resource, in relation to coal seam gas development and large coal mining development. A referral to DCCEEW for potential impacts to MNES would be required for potential impacts to CEECs (Box Gum Woodland) and EECs (Grey Box Woodland) (refer to **Section 8.1**). Should a referral be required and DCCEEW determine that the project is a controlled action under Section 75 of the EPBC Act, the project would require assessment and approval under the EPBC Act.
	Environmental protection licence Under Section 48 of the *Protection of Environment Operations Act 1997* (POEO Act), an Environment Protection Licence (EPL) from the NSW Environmental Protection Authority (EPA) is required for scheduled activities listed in Schedule 1. Although "electricity generation" is listed under Schedule 1, Clause 17 of the POEO, generation by solar power is not included in this definition. The project is therefore not a scheduled activity and is unlikely to require an EPL.

Matter	Requirements for the project
	Road approvals An approval is required under Section 138 of the *Roads Act 1993* to permit the erection of a structure or carry out a work in, on or over a public road. These would be obtained prior to the commencement of relevant works. Any road upgrades required for the project and impact assessment of the upgrades will be assessed and identified in the EIS.
	Biodiversity Offsets Scheme Entry into the Biodiversity Offset Scheme (BOS) is automatically triggered for SSD projects. The biodiversity assessment which will be prepared to accompany the EIS will provide a discussion of the management and protection of listed threatened species of native flora and fauna and threatened ecological communities (TECs) and assess biodiversity offsets consistent with the BOS.
	Water access licences Water access licenses may be required for the project. Water sources for construction and operations will be identified and quantified within the EIS. Detailed investigations will be carried out as part of the EIS to determine whether proposed earthworks would impact on aquifers or groundwater. Relevant license and approvals would be obtained prior to the commencement of construction.
	Native title Under the *Native Title Act 1993* (Native Title Act), native title claimants can make an application to the Federal Court to have their native title recognised by Australian law. Preliminary investigations indicate the study area is subject to a native title claim by the Warrabinga-Wiradjuri #7 (Tribunal No NC2018/002). Native Title is expected to have been extinguished on all freehold parcels and road reserves within study area.
	Crown land Under the *Crown Land Management Act 2016*, consent from the Land Division, Department of Primary Industries (DPI) is required for works over Crown Land. There are no crown land parcels within the study area, however there are some crown roads.
	Lease of premises and subdivision ACEN Australia has entered in to access licence agreements with owners of the affected land. Lease of a solar farm site is treated as a lease of premises, regardless of whether the lease will be for more or less than 25 years. The land on which the onsite substation is constructed may require subdivision (refer to discussion in **Section 8.7.2**). Section 23G of the *Conveyancing Act 1919* will likely apply to the subdivision of the land required for the onsite substation. Once the final location of the onsite substation is determined, the proposed subdivision will be the subject of ongoing discussion with Mid-Western Regional Council, DPE and the project landholders.

Matter	Requirements for the project
	Dangerous Goods Dangerous goods transportation licences will be required under the *Dangerous Goods (Road and Rail Transport Act) 2008* for vehicles and drivers if more than 500 litres or 500 kilograms of dangerous goods are required to be delivered to the site. Dangerous goods required to be transported during construction and operations would be identified and quantified within the EIS and all required licences and approvals obtained prior to the commencement of relevant construction activities.
	Heavy Vehicle National Law Approvals would be required should the project require the transport of any infrastructure by over size and over mass vehicles. This will be confirmed in the EIS.
Pre-conditions to exercising the power to grant consent	No pre-conditions to exercising the power to grant approval have been identified for the project. An EIS will be prepared in accordance with relevant legislative requirements and guidelines.
Mandatory matters for consideration	**Environmental Planning and Assessment Act 1979** The project is consistent with the Section 1.3 objectives of the EP&A Act, which 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 promote the delivery and maintenance of affordable housing,* *e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,* *f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),* *g) to promote good design and amenity of the built environment,* *h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,* *i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,* *j) to provide increased opportunity for community participation in environmental planning and assessment.* Section 4.15 of the EP&A Act describes the matters for consideration in assessing SSD, which includes the provisions of relevant environmental planning instruments, proposed instruments that have been the subject of public consultation, development control plans, planning agreements and statutory regulations. The assessment of SSD must also consider the likely impacts of the development, suitability of the site, any submissions received and the public interest. These will be considered in the EIS.

Matter	Requirements for the project
	Biodiversity Conservation Act 2016 The Minister for Planning and Homes is required to take into account the impact of the development on biodiversity values as assessed in the Biodiversity Development Assessment Report (BDAR). The Minister may (but is not required to) further consider under the Act the likely impact of the proposed development on biodiversity values.
	National Parks and Wildlife Act 1974 Governance, care, control and management of national parks, nature reserves, Aboriginal areas and historic sites are detailed under the *National Parks and Wildlife Act 1974* (NPW Act). The objectives of the NPW Act include the conservation of nature, objects, places or features such as habitats, biological diversity, landforms and places of Aboriginal, social or historical value. These objectives are achieved by applying principles of ecologically sustainable development. Impacts to biodiversity and heritage values will be assessed in more detail as part of the EIS.
	Heritage Act 1977 The *Heritage Act 1977* (Heritage Act) provides for the conservation of environmental heritage items in NSW. It is used to regulate the impacts of development on the State's European and Aboriginal heritage assets. Administered by the NSW Heritage Office, the Heritage Act details the statutory requirements for protecting historic buildings and places and includes any place, building, work, relic, movable object or precinct, which may be of historic, scientific, cultural, social, archaeological, natural or aesthetic value. A heritage impact assessment will be included in the EIS consistent with the requirements of the Heritage Act.
	Fisheries Management Act 1994 The FM Act is in place to conserve fish stocks, habitats and threatened species, populations and communities, to preserve fishery resources for future generations. The FM Act requires consideration of proposed construction and operation of the project which may affect fish passage or cause adverse impact to threatened fish species. Mapped key fish habitat does not occur within the study area, however, occurs within creeks surrounding the study area. Potential for direct impacts to aquatic habitats would be primarily associated with access track crossings of waterways and would be assessed within the EIS.
	Rural Fires Act 1997 The *Rural Fires Act 1997* aims to prevent, mitigate and supress bush and other fires whilst protecting people, property and infrastructure from damage and having regard to the principles of ecological sustainable development. Consultation is required to be undertaken with the Rural Fire Service (RFS) and local Fire Brigades to determine the features required to minimise the threat of fire both to and from the project. The project land is not identified as bushfire prone land. However, bushfire protection zones around critical infrastructure would be required to be established as part of the project. Bushfire risk will be considered in the context of the *Rural Fires Act 1997* at all levels of the development process, from project design through to decommissioning and will be assessed in more detail as part of the EIS.

Matter	Requirements for the project
	Contaminated Land Management Act 1997 The *Contaminated Land Management Act 1997* establishes a process for investigating and where appropriate, remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3. Under Section 60, a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify the EPA when they become aware of the contamination. The project does not contain land listed on the Contaminated Lands Register.
	Soil Conservation Act 1938 The *Soil Conservation Act 1938* allows for conservation of soil resources and erosion management. Notices can be issued under Section 15A to control erosion or degradation. The construction of the project would follow best practice methods and a management plan will be prepared to guide soil management during construction to minimise sedimentation of downstream waterways. This would be documented further in the EIS.
	State Environmental Planning Policy (Resilience and Hazards) 2021 Part 3 of Chapter 3, 'Hazardous and Offensive Development', applies to any development which falls under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. As the project may include a BESS with a maximum capacity of approximately 200 megawatts, the EIS will include a preliminary hazard analysis (PHA) will be prepared in accordance with the *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP), *Multi-Level Risk Assessment* and *Applying SEPP 33*. The EIS will include an assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, flooding, human health (electromagnetic fields), and the proposed grid connection infrastructure and the proposed internal solar arrays and central substations against relevant guidelines. These potential hazards are discussed in **Section 8.8**.
	Mid-Western Regional Local Environmental Plan 2012 The relevant provisions of the Mid-Western Regional LEP for consideration include: • Clause 2.3 – Zone objectives and land use table • Clause 4.1 – Minimum subdivision lot size • Clause 5.10 – Heritage conservation • Clause 6.4 – Groundwater vulnerability • Clause 6.5 – Terrestrial biodiversity • Clause 6.11 – Temporary workers' accommodation. The requirements outlined in the above clauses would be considered in the EIS as they relate to the project.

6. Engagement

6.1 Consultation objectives

The objectives of stakeholder and community engagement are to:

- identify and engage with the local community and key stakeholders
- build a foundation of strong relationships and community support
- ensure stakeholders are informed, consulted, and involved
- wherever possible, activities would continue to be conducted with emphasis on stakeholder collaboration and empowerment
- uphold the four principles set by the Clean Energy Council (accepted rules of conduct) of community engagement which include openness, inclusiveness, responsiveness, and accountability
- provide an accessible complaints management process as a mechanism for feedback to ACEN Australia.

6.2 Stakeholder and community engagement strategy

The stakeholder and community engagement strategy are guided by the requirements of relevant policies and guidelines including:

- *Undertaking Engagement Guidelines for State Significant Projects* (Department of Planning, Industry and Environment, 2021f)
- *Social Impact Assessment Guideline for State Significant Projects* (Department of Planning, Industry and Environment, 2021d)
- *Large-Scale Solar Energy Guideline* (Department of Planning, Industry and Environment, 2022b)
- *Clean Energy Council's Community Engagement Guidelines for Building Powerlines for Renewable Energy Development* (Clean Energy Council, 2018b).

6.3 Engagement approach

The approach to engagement utilises the five-point framework developed by the International Association for Public Participation (IAP2) shown in **Figure 6-1**, where 'inform' is the lowest level of engagement, and 'empower' is the highest. The proposed levels of engagement for this project are inform, consult and involve.

- **Inform** - to provide the public with balanced and objective information to assist them in understanding the problem, alternatives, benefits and/or solutions
- **Consult** - to obtain public feedback on the project and/or alternatives
- **Involve** - to work directly with the public throughout the decision-making process to ensure that community concerns and aspirations are consistently understood and considered.

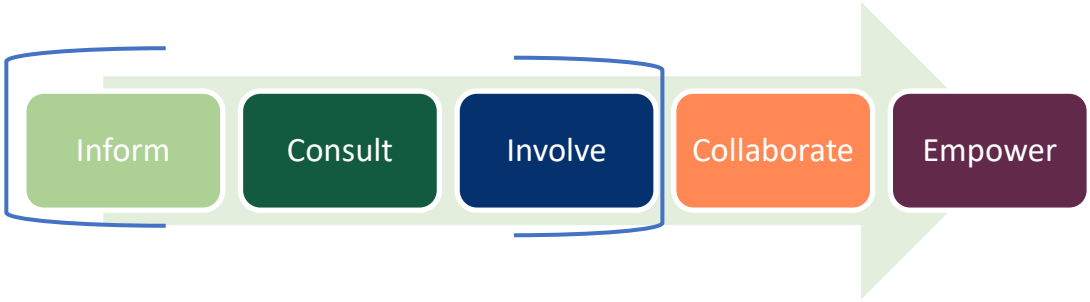


Figure 6-1: The IAP2 Public Participation Spectrum

6.4 Stakeholders

Stakeholders may be affected groups or individuals that:

- live, work, or recreate near the project
- have an interest in the proposed action or change
- use or value a resource associated with the project
- are affected by the project.

A stakeholder identification process was undertaken during the scoping phase for the project to support the planning and delivery of community and stakeholder consultation to inform the broader EIS, including the social impact assessment (refer to **Section 8.6**). Key stakeholder groups identified during the scoping phase are outlined in **Figure 6-2**.

Figure 6-2: Identified project stakeholders

6.5 Engagement carried out

6.5.1 Scoping phase consultation activities

Details of consultation undertaken with the community during the scoping phase is outlined in **Table 6-1**.

Table 6-1: Summary of scoping phase consultation activities undertaken

Stakeholder	Date	Method	Engagement activities
Associated residences	November 2021-ongoing	Phone / email / letters / face to face	Discussions on the project, updates, land agreements and potential impacts
Neighbours	January 2023 - ongoing	Phone / email / face to face	Discussions on the project with neighbours located within three kilometres of the study area
	31/03/23	Letterbox drop	Letters and Factsheet distributed to residents within five kilometres from the study area to introduce the project and advise of the community information session
General community	April 2023	Newspaper article	Information on the project and invitation to the community information session (refer to **Figure 6-3**)
	20/04/23	Community information session	Community information session held at Gulgong Memorial Hall (refer to **Section 6.5.2** for further details)
	April 2023 - ongoing	Website	Updates via the project webpage: https://acenrenewables.com.au/projects/narragamba-solar/
DPE	13/04/23	Online	Introductory meeting to the project
Mid-Western Regional Council	19/04/23	Face to face	Introductory meeting to the project (refer to **Section 6.5.3** for further details)
EnergyCo	May 2022 on-going	Online / face to face	Regular project discussions as part of Candidate Foundation Generator process (refer to **Section 6.5.4** for further details)

Narragamba Solar

Renewable Energy from ACEN

The Narragamba Solar project is a proposed 320-megawatt renewable energy project located 20 kilometres north of the historic mining town of Gulgong, in the Mid-Western Regional Council Local Government Area.

Narragamba Solar will help Australia transition to net zero carbon emissions, delivering low-cost renewable energy and jobs for the Central-West Orana region of New South Wales.

The project will be connecting to new transmission infrastructure developed by the Energy Corporation of NSW (EnergyCo) as part of the Central-West Orana Renewable Energy Zone.

The project will generate enough renewable energy to power 160,000 average Australian homes per year and contribute to Australia's domestic and international commitments of renewable energy development, including NSW's target of 50% renewable energy by 2030.

Narragamba Solar will be developed across an approximately 600 hectare site of cleared grazing land and will include rows of solar panels, electrical infrastructure such as inverters, a substation, cables and the battery system, access roads and other associated infrastructure such as storage and maintenance facilities

Find out more information on the project and meet the team

Community information session

Thursday 20 April 2023

8:00am-6:00pm

Drop in any time

Gulgong Memorial Hall

112 Herbert Street, Gulgong

8 | Apri; 2023 • Gulgong Gossip

Figure 6-3: Project advertisement in the Gulgong Gossip – April 2023

6.5.2 Community views

Consultation undertaken during the scoping phase has provided valuable early input into the understanding of stakeholder needs and potential issues. Consultation activities undertaken included a mixture of face-to-face consultation, phone calls, letter box drops, emails and advertisements. Additionally, a community information session was held at Gulgong Memorial Hall on 20 April 2023 to provide the community with an opportunity to provide feedback on the project.

A summary of the outcomes of consultation undertaken to date is provided in **Table 6-2**.

Table 6-2: Summary of community feedback

Aspect	Feedback	Where addressed in this report
Visual	• near neighbours wish to see tree screening along Merotherie Road to reduce visual impacts	**Section 8.2**
Consultation	• near neighbours wish to be engaged in ongoing consultation with ACEN throughout the process	**Section 6.6**
Social and economic	• employment opportunities • business opportunities • opportunities for provision of services • accommodation facility offerings • additional pressure on existing health care	**Section 8.6** and **Section 8.9.3**
Land value	• depreciation of land values / inequitable distribution between neighbours subject to neighbouring landholder agreements and those who are not eligible	**Section 8.6** and **Section 8.9.3**

Plate 6-1: Narragamba and Stubbo Solar and Battery Projects community session (April 2023)

6.5.3 Consultation with Mid-Western Regional Council

A meeting with Mid-Western Regional Council was held on 13 March 2023, with a follow up meeting on 19 April 2023 to introduce the project. Topics discussed included:

- overall project schedule in line with the CWO REZ Transmission Project
- accommodation strategy (refer to discussion in **Section 1.1.5.2**)
- Social Investment Programme (SIP) and community contributions, potentially in the form of a Voluntary Planning Agreement (VPA) as formally requested by Mid-Western Regional Council (refer to discussion in **Section 6.7**)
- community consultation, including with near neighbours
- traffic and access along Merotherie Road (refer to **Section 4.2.2.3**)
- relationship and relative location to the Stubbo Solar and Battery Project.

6.5.4 Consultation with EnergyCo

ACEN Australia is part of the Candidate Foundation Generator process, which has been established to manage the interface and cumulative impacts of the major renewable energy generators and the proposed CWO-REZ Transmission Project. As part of this process, ACEN Australia has regular meetings with EnergyCo to discuss CWO-REZ matters.

ACEN Australia is working with EnergyCo to facilitate a coordinated approach to address various issues more broadly in the CWO-REZ, along with other major generators. Specific matters relating to the project that have been discussed include:

- connection to the Merotherie Hub via a dedicated 330 kilovolt transmission line from the hub to the project's 'gates'. This is part of the CWO REZ Transmission Project and will be assessed in the EIS currently being prepared by EnergyCo on behalf on the Network Operator
- upgrade of Merotherie Road and its intersection with the Golden Highway (refer to discussion in **Section 4.2.2.3**)
- accommodation strategy (refer to discussion in **Section 1.1.5.2**)
- coordination of some aspects related to community consultation
- contributions to the local communities
- training and skills development
- waste management
- other matters as required.

On 28 April 2023, EnergyCo appointed ACE Energy as the preferred Network Operator for the CWO REZ. The Candidate Foundation Generator process will now include the Network Operator as part of a tripartite process involving EnergyCo, the Network Operator and ACEN Australia.

6.6 Engagement to be carried out

Details of stakeholder consultation that will be undertaken during the preparation of the EIS is outlined in **Table 6-3**.

Table 6-3: Proposed environmental impact statement phase consultation

Engagement activity	Stakeholders	Consultation level
Social impact assessment engagement activities	• General community • Local residents • Key stakeholders	Involve
Community information sessions	• General community • Local residents • Key stakeholders • EnergyCo and Network Operator	Consult
Newsletters	• All neighbours within an approximate five kilometres of the study area • General community • Interested business owners	Inform
Community surveys	• All stakeholders	Consult
Project-specific website and on-line Community Hub, email address, and free call 1800 community hotline	• All stakeholders	Inform
Information Hub at Gulgong	• All stakeholders	Consult
Personal visits	• Host landowners	Collaborate
Personal visits and letters	• Neighbours	Collaborate
Project briefings and presentations	• Councillors and staff – Mid Western Regional Council and Warrumbungle Shire Council in relation to upgrades of Merotherie Road if required • DPE • NSW Biodiversity and Conservation Division • Transport for NSW • Gulgong Chamber of Commerce	Consult
	• Members of Parliament – Dugald Saunders (MP – Dubbo), Roy Butler (MP – Barwon)	Inform Consult
	• NSW Rural Fire Service	Collaborate
	• Local media – radio, newspaper, television	Inform
Cumulative impacts consultation	• Other developers or contractors undertaking construction in the area	Consult Collaborate

Engagement activity	Stakeholders	Consultation level
Management of cultural heritage	• Registered Aboriginal Parties (RAPs)	Collaborate
Pre-vocational training, traineeships and apprenticeships	• Local employment and training providers	Collaborate

6.7 Community benefit sharing

ACEN Australia's current contribution to the community involves the following programs:

- Stubbo Solar and Battery Project SIP, that aims to eventually transition into a community benefit sharing program
- Stubbo Solar VPA with Mid-Western Regional Council, with initial contributions commencing in May-June 2023
- Central West Orana solar projects community benefit sharing program, currently in discussion with the Mid-Western Regional Council and Warrumbungle Shire Council
- Neighbour Benefit Sharing Program for Stubbo Solar and Battery Project and Birriwa Solar and Battery project.

Within the region, ACEN Australia currently has two projects in the approvals phase (Birriwa Solar and Battery Project and the Valley of the Winds project) and one approved project that is under construction (Stubbo Solar and Battery Project). ACEN Australia is seeking to develop a community benefit sharing program with the local residents and the broader community proximate to these projects aimed at building and supporting local projects and initiatives.

ACEN Australia is also currently working on a Neighbour Benefit Sharing Program framework for the Narragamba Solar Project.

A VPA would be prepared with Mid-Western Regional Council as part of the Narragamba Solar Project.

7. Proposed Assessment of Impacts

7.1 Scoping methodology

In accordance with the Scoping Report Guideline, the following factors were considered to identify matters requiring further assessment in the EIS:

- the scale and nature of the likely impacts of the project and the sensitivity of the receiving environment (refer to **Figure 7-1**)
- whether the project is likely to generate cumulative impacts with other relevant projects in the area
- the ability to avoid, minimise and/or offset the impacts of the project, to the extent known at the scoping stage. This includes consideration of factors that could be incorporated into the detailed design and potential for mitigation measures and landholder agreements to address residual impacts
- the complexity of the technical assessment including data and investigations required, methods and any uncertainties.

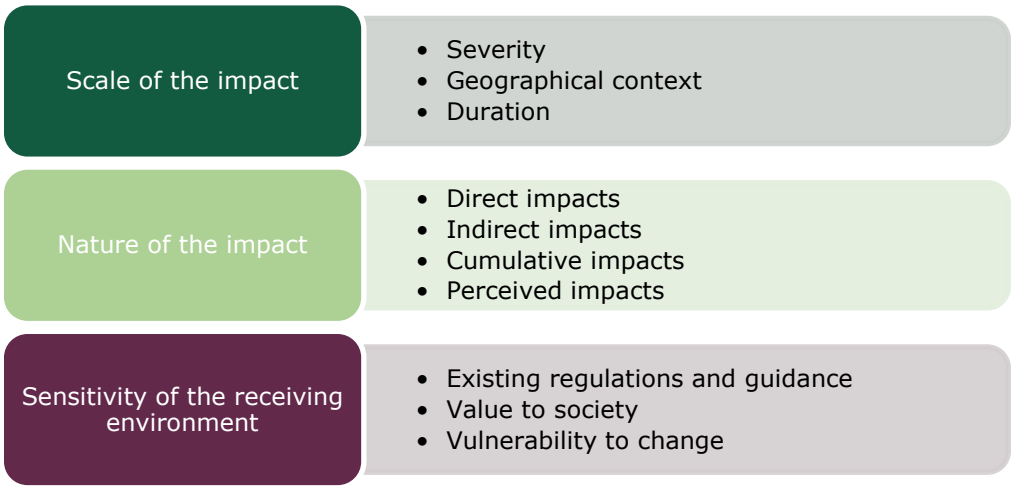


Figure 7-1: Key factors to consider during scoping – Appendix C of the Scoping Report Guideline

A scoping summary table for the project is provided in **Appendix 1**. The scoping summary table provides an overview of expected issues and, the proposed assessment approach for the issues requiring further assessment in the EIS and lists the relevant legislation, plans, policies, or guidelines that would be relevant to the proposed assessment. This table also highlights whether any specific community engagement would be undertaken and if a cumulative impact is anticipated.

Matters that have been identified as requiring further assessment for the EIS have been separated into 'key issues' and 'other issues'. These are presented in **Section 8** and **Section 8.9** respectively.

Key issues are those that may generate some material impact based on the information that is currently available. Other issues are those that have been determined as unlikely to have a material impact based on existing available information. However, this may change through the preparation of more detailed assessments as part of the EIS, and as community and stakeholder engagement progresses.

This chapter also outlines those matters that have been identified to require no further assessment in the EIS. These are presented in **Section 8.11**.

7.2 Categorisation of assessment matters

Each matter and its proposed level of assessment (detailed or standard) is identified in **Table 7-1**. The matters considered in the assessment are consistent with those listed in Appendix B of the Scoping Report Guideline. Specific matters have been grouped or separated where relevant.

Table 7-1: Categorisation of assessment matters summary

Level of assessment	Assessment matter
Detailed (key issues)	• Amenity – noise and vibration, visual • Access – traffic and parking, access to property (traffic and access) • Biodiversity – conservation areas, terrestrial flora and fauna, aquatic flora and fauna • Heritage – Aboriginal • Social – way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods • Land – land capability • Hazard and risks – bushfire, dangerous goods, hazardous and offensive development, battery storage, electromagnetic fields
Standard (other issues)	• Air – atmospheric emissions, gases, particulate matter • Built environment – private property, public land (both included in land chapter) • Economic – natural resource use, livelihood • Heritage – historic • Land – stability, topography • Water – hydrology, water quality, water availability • Hazard and risks – biosecurity, flooding, land contamination (included in land chapter), waste (included in waste and resources chapter)
Matters requiring no further assessment	• Access – port and airport facilities, road and rail facilities • Amenity – odour • Built environment – public infrastructure, design quality • Economic – opportunity cost • Hazards and risks – coastal hazards, dams safety, groundwater land movement, environmental hazards • Land – soil chemistry • Heritage – natural • Social – decision-making systems

8. Key issues

8.1 Biodiversity

8.1.1 Preliminary investigations

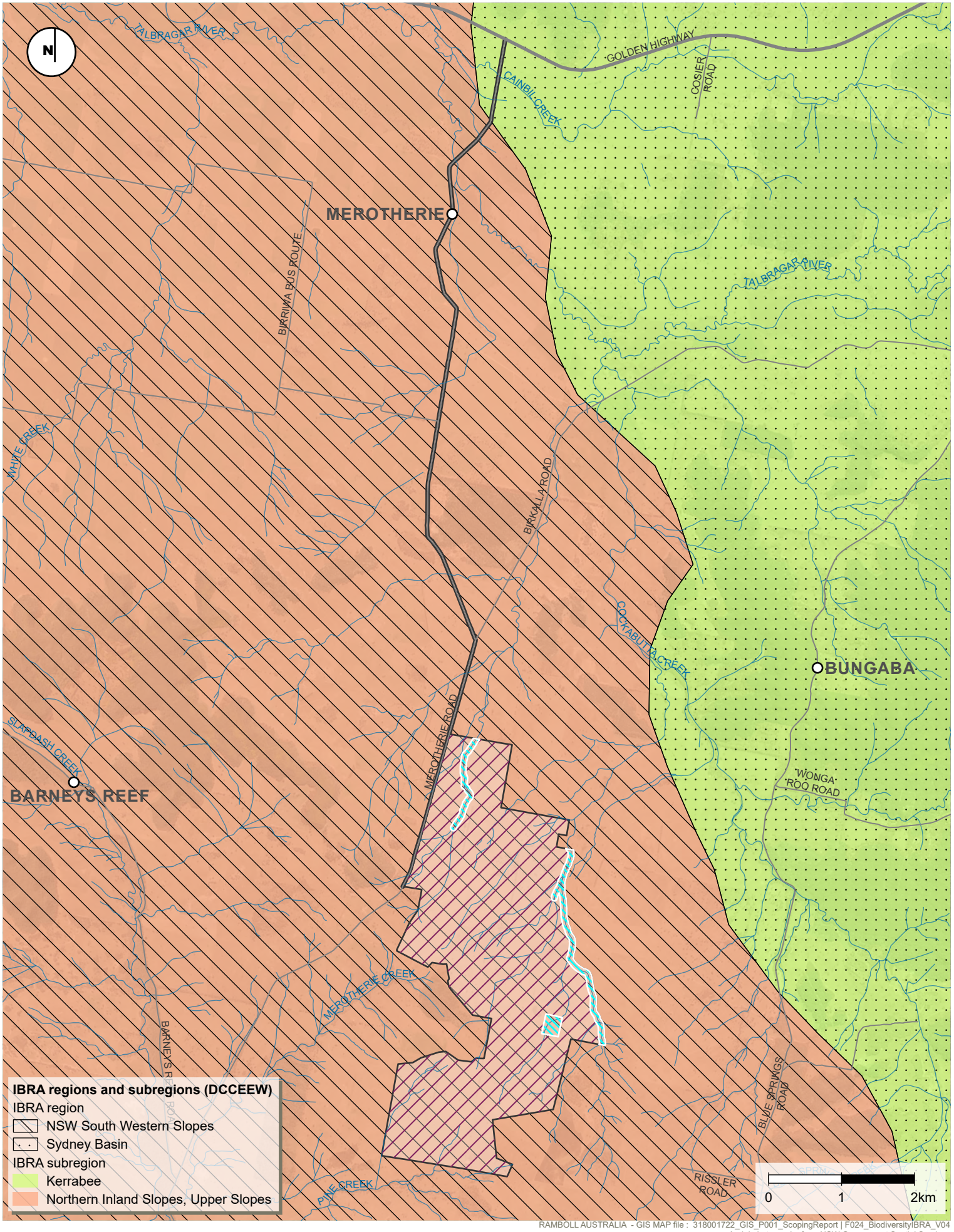
Preliminary biodiversity surveys have been undertaken within the study area for the solar project (referred to in this section as the Narragamba Solar Project study area) and along the likely access route of Merotherie Road (referred to as the Merotherie Road study area). Collectively, the Narragamba Solar Project study area and the Merotherie Road study area are referred to as the biodiversity study area. The biodiversity study area is shown in **Figure 8-1** with a summary of the preliminary biodiversity surveys undertaken to date provided in **Table 8-1**.

The biodiversity study area includes a section of the approved Stubbo Solar Farm (SSD 10452), which was assessed under a BDAR (as amended) in 2021. For the purpose of this scoping report, this section has been included as assessed for SSD 10452; however, further assessment will be undertaken in this area consistent with the methods proposed for the rest of the study areas, particularly vegetation mapping and assessment of Category 1 land.

Table 8-1: Preliminary biodiversity surveys undertaken to date

Survey	Description	Staff	Date
Vegetation mapping	Mapping of vegetation to Plant Community Type (PCT) and categorisation of vegetation zones (VZs) delineated on vegetation condition	ELA Senior Ecologist Dr Cheryl O'Dwyer ELA Senior Ecologist Rebecca Croake (BAAS 21008) ELA Ecologist Lachlan Metzler	15-21 December 2022
Vegetation mapping (Stubbo Solar Farm)	Mapping of vegetation to Plant Community Type (PCT) and categorisation of vegetation zones (VZs) delineated on vegetation condition. Assessment of Category 1 land.	Accredited Assessor Tom Schmidt (BAAS19034)	2020 - 2021
Threatened flora surveys	Threatened flora surveys for the following species were undertaken in accordance with DPIE *Surveying threatened plants and their habitats. NSW survey guide for the Biodiversity Assessment Method* (2020): • *Dichanthium setosum* (Bluegrass) • *Euphrasia arguta* • *Pomaderris queenslandica* (Scant Pomaderris) • *Tylophora linearis* • *Eucalyptus cannonii* (Capertee Stringybark)	ELA Senior Ecologist Dr Cheryl O'Dwyer ELA Principal Ecologist Daniel McDonald ELA Senior Ecologist Rebecca Croake (BAAS 21008) ELA Ecologist Kate Taylor ELA Ecologist Lachlan Metzler	20-31 March 2023
Vegetation Integrity (VI) assessment	A total of 25 VI plots have been completed throughout the biodiversity study area	ELA Senior Ecologist Rebecca Croake (BAAS 21008) ELA Ecologist Lachlan Metzler	March and June 2023
Arboreal mammal surveys	Surveys have commenced for Brush-tailed Phascogale (*Phascogale tapoatafa*), Squirrel Glider (*Petaurus norfolcensis*) and	ELA Senior Ecologist Rebecca Croake (BAAS 21008)	March – April 2023

Survey	Description	Staff	Date
	Eastern Pygmy Possum (*Cercartetus nanus*)	ELA Ecologist Tim Finter ELA Graduate Ecologist Jack O'Sullivan	
Microbat surveys	Deployment and retrieval of microbat recording devices targeting cliffline and Southern Myotis (*Myotis macropus*)	ELA Senior Ecologist Rebecca Croake (BAAS 21008) ELA Ecologist Lachlan Metzler	December 2022, March 2023
Owl surveys	Call playback and spotlighting targeting threatened owls	ELA Senior Ecologist Dan McKenzie, Graduate Ecologists Jack O'Sullivan and Greg Natesan	July 2023
Koala surveys	Spot assessment technique (SAT) surveys targeting Koala	ELA Senior Ecologist Dan McKenzie and Graduate Ecologist Jack O'Sullivan	July 2023



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F024_BiodiversityIBRA_V04
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Merotherie Road study area
- Development footprint
- Restricted development area
- Road
- Waterway

Figure 8-1 | Biodiversity - IBRA regions

8.1.2 Existing environment

Bioregions

The Narragamba Solar Project study area is located in the NSW South Western Slopes bioregion, within the Inland Slopes sub-bioregion as per the Interim Biogeographic Regionalisation of Australia (IBRA) (refer to **Figure 8-1**). Approximately one kilometre of the Merotherie Road study area is located within the Sydney Basin IBRA Region, and Kerrabee IBRA Subregion.

Vegetation

Vegetation within the study area has been altered significantly by historical agricultural land-use, including cropping and livestock grazing. Review of historical aerial imagery indicates that woody vegetation (canopy and midstorey stratums) was largely cleared within the biodiversity study area prior to 1963, which is the earliest available aerial imagery (NSW Spatial Services, 2023).

A review of the Central Tablelands State Vegetation Type Map (SVTM) (Department of Planning, Industry and Environment, 2022a) was undertaken to inform the field survey. The PCTs mapped on the SVTM include:

- **PCT 0**: Not classified (exotic)
- **PCT 277**: Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- **PCT 358**: Mugga Ironbark - Red Box - White Box - Black Cypress Pine tall woodland on rises and hills in the northern NSW South Western Slopes Bioregion
- **PCT 478**: Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion.

The vegetation mapping was validated in the field through a detailed field survey undertaken in accordance with the Biodiversity Assessment Method (BAM) throughout all areas except the southern portion of the study area, and the area previously assessed under the Stubbo Solar Farm. These areas were subject to a detailed desktop assessment including a review of the NSW SVTM (DPE 2022) and the Biodiversity Development Assessment Report (BDAR) for the Stubbo Solar Farm (ELA, 2020).

It is noted that the assessment for the Stubbo Solar Farm (ELA 2020) included an assessment of 'Category 1 – exempt land' under the NSW *Local Land Services Act 2013*. This area will be subject to field surveys to review the vegetation mapping and align it with the mapping in the remainder of the study area. It is likely that areas previously mapped as Category 1 will be mapped to PCT, albeit with a low condition score.

A total of 1068.76 hectares of native vegetation was mapped to 12 PCTs within the biodiversity study area, comprising two vegetation classes (the vegetation classes being consistent with the SVTM mapping):

- Western Slopes Grassy Woodlands
- Western Slopes Dry Sclerophyll Forests.

PCTs within the biodiversity study area was stratified into 20 vegetation zones (VZ) based on broad condition state. Vegetation mapping, including Threatened Ecological Communities (TECs) mapping, is provided in **Figure 8-2** to **Figure 8-4**. Two additional rows detail mapping from the Stubbo Solar Farm – it is likely that these will be added into one of the existing VZs as noted, following field surveys in that area.

The study area contains a mosaic of planted and remnant vegetation. Per the BAM Appendix D: Streamlined assessment module – Planted native vegetation decision making key, 'planted native vegetation' is present within the biodiversity study area (VZ18; *Eucalyptus dawsonii* plantings). A PCT (PCT 1177) can be applied to this VZ, due to the presence of characteristic canopy species (*Eucalyptus dawsonii*) and ground species which is consistent with PCT 1177. Therefore, the BAM Streamlined assessment module – Planted native vegetation cannot be used to assess this VZ and the BAM is applied.

Several VZs meet the listing criteria and / or condition thresholds for the following TECs listed under the BC Act and the EPBC Act due to the presence of key species. TECs are summarised in **Table 8-2** and further detail provided in **Table 8-4**.

Table 8-2: Threatened Ecological Communities summary

TEC	SAII^	Listing status	VZs	Condition	Solar Farm area (ha)	Merotherie Rd area (ha)	Total area (ha)
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	No	BC Act EEC	-	Woodland	-	-	-
			PCT 76 DNG (VZ1)	DNG	29.70	-	29.70
				Total			**29.70**
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	No	EPBC Act EEC	PCT 267 Woodland (VZ6)	Woodland	6.42	5.24	11.66
			PCT 267 DNG (VZ5), PCT 76 DNG (VZ1)	DNG	456.49	7.5	463.99
			Category 1 exempt land from Stubbo Solar Farm – likely to form part of VZ 5 PCT 276 Moderate condition DNG	DNG	152.34	-	152.34
				Total			**627.99**
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions / White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	BC Act CEEC / EPBC Act CEEC	PCT 281 Remnant moderation condition woodland (VZ9), PCT 281 Remnant low condition woodland (VZ10)	Woodland	24.15	11.04	35.19
			PCT 281 Moderate DNG (VZ7)	DNG	43.36	4.14	47.50
				Total			**82.69**

^ SAII – Entity at risk of Serious and Irreversible Impacts

Table 8-3: PCTs and VZs present within the biodiversity study area

PCT	Formation and Class (Keith 2006)	Condition	VZ ID	Area (ha) Solar Project	Area (ha) Merotherie Road	Area (ha) total
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	KF_CH3 Grassy Woodlands Floodplain Transition Woodlands	Derived Native Grassland (DNG)	1	29.70	-	29.70
PCT 78: River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	KF_CH9 Forested Wetlands Inland Riverine Forests	Woodland	2	-	0.26	0.26
		DNG	3	-	2.17	2.17
PCT 267: White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion	KF_CH3 Grassy Woodlands Western Slopes Grassy Woodlands	Cropped December 2022	4	99.98	-	99.98
		Moderate DNG	5	456.49	7.50	463.99
		Woodland	6	6.42	5.24	11.66
PCT 281: Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	KF_CH3 Grassy Woodlands Western Slopes Grassy Woodlands	Moderate DNG	7	43.36	4.14	47.50
		Regenerating shrubland	8	5.25	-	5.25
		Remnant moderate condition woodland	9	15.32	11.04	26.36
		Remnant low condition woodland	10	8.83	-	8.83
PCT 461: Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	KF_CH3 Grassy Woodlands Western Slopes Grassy Woodlands	DNG	11	168.43	0.18	168.61
		Woodland	12	17.26	0.20	17.46

PCT	Formation and Class (Keith 2006)	Condition	VZ ID	Area (ha) Solar Project	Area (ha) Merotherie Road	Area (ha) total
PCT 472: Thyme Honey-myrtle – red gum – Mugga Ironbark shrubland / woodland in impeded drainage flats or depressions in the southern Brigalow Belt South Bioregion	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation) Western Slopes Dry Sclerophyll Forests	Woodland	13	12.87	-	12.87
PCT 478: Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong - Mendooran region, southern Brigalow Belt South Bioregion	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation) Western Slopes Dry Sclerophyll Forests	Regenerating	14	0.57	-	0.57
		Forest	15	-	1.92	1.92
PCT 479: Narrow-leaved Ironbark-Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation) Western Slopes Dry Sclerophyll Forests	Forest	16	-	3.17	3.17
PCT 1177: Slaty Gum woodland of the slopes of the southern Brigalow Belt South Bioregion	KF_CH5B Dry Sclerophyll Forests (Shrubby sub-formation) Southern Tableland Dry Sclerophyll Forests	Woodland	17	0.89	-	0.89
		Eucalyptus dawsonii (Slatey Gum) plantings	18	7.12	-	7.12
PCT 1767: Rough-barked Apple grassy tall woodlands of the Brigalow Belt South	KF_CH3 Grassy Woodlands	Woodland	19	3.53	-	3.53

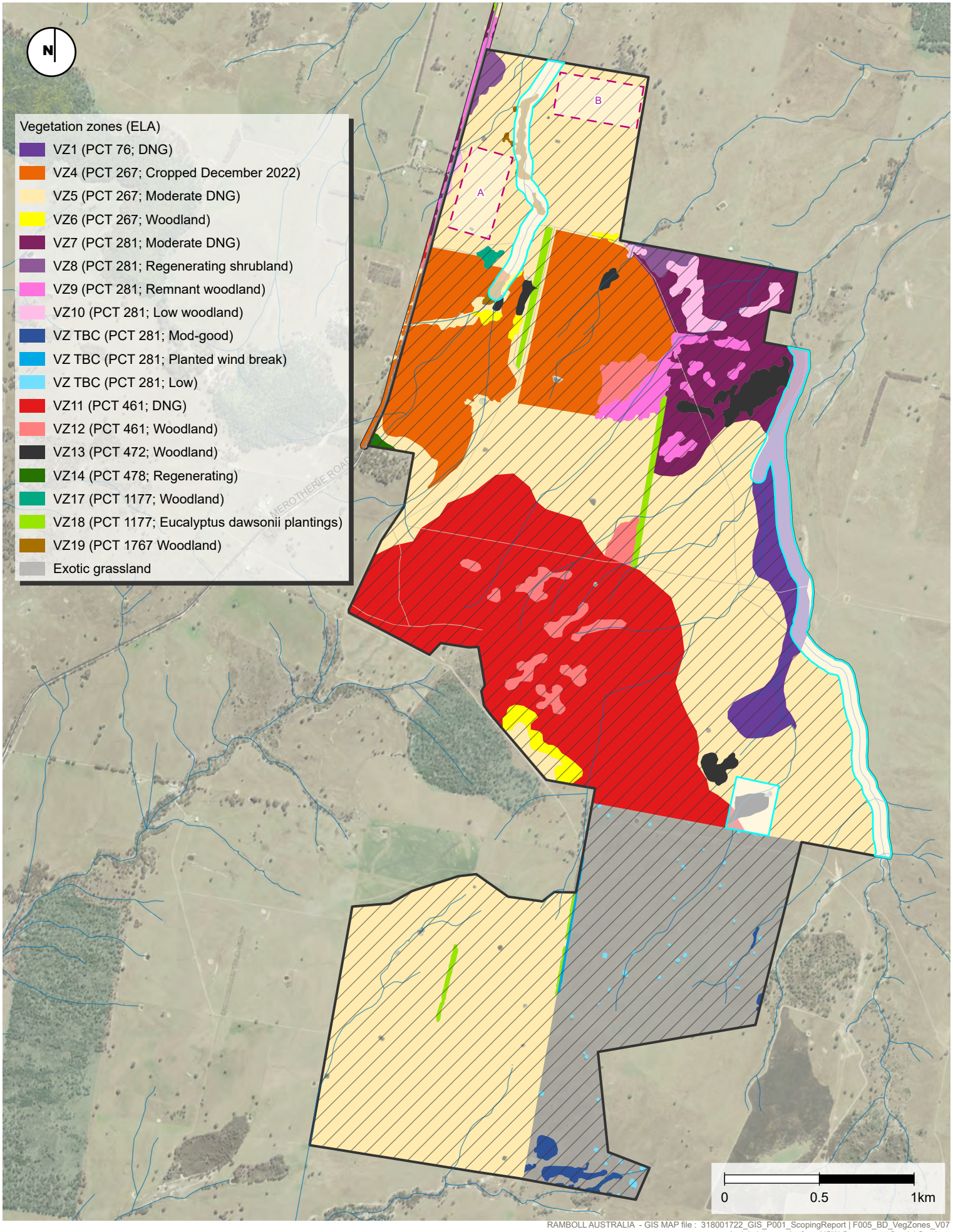
PCT	Formation and Class (Keith 2006)	Condition	VZ ID	Area (ha) Solar Project	Area (ha) Merotherie Road	Area (ha) total
	Western Slopes Grassy Woodlands					
PCT 3396: Northwest Flats Box-Blakely's Red Gum Forest	KF_CH3 Grassy Woodlands Western Slopes Grassy Woodlands	DNG	20	-	3.64	3.64
Category 1 exempt land from Stubbo Solar Farm – likely to form part of VZ 5 PCT 276 Moderate condition DNG				152.34		152.34
PCT 281: Planted wind break from Stubbo Solar Farm – likely to form part of VZ 8				0.94		0.94
Total native vegetation				**1029.53**	**39.46**	**1068.76**
Waterbodies (farm dams)				1.64	0.02	1.66
Existing roads and access tracks				3.04	7.29	10.33

Note: Minor descrepencies in totals may occur due to rounding

Table 8-4: TEC assessment

TEC	Description summary	Justification
BC Act Inland Grey Box Woodland	Occurs on relatively fertile soils of the western slopes and plains of NSW in which *Eucalyptus microcarpa* is the most characteristic species. Eucalyptus microcarpa is often found in association with *Eucalyptus populneus, Callitris glaucophylla, Brachychiton populneus, Allocasuarina luehmannii* or *Eucalyptus melliodora.* Shrubs are typically sparse or absent, although may be locally common. The ground layer is also variable. Some remnants of the community survive with trees partly or wholly removed. Disturbed remnants are considered to form part of the community including remnants where the understorey, overstorey or both would under appropriate management, respond to assisted natural regeneration from the soil seed bank (Threatened Species Scientific Community, 2011).	Only PCT 76 is associated with this TEC (PCT 76 DNG VZ1). *Eucalyptus microcarpa* is the dominant canopy species throughout VZ1. This VZ shows signs of disturbance including historical land clearing and livestock grazing. The shrub layer is absent.
BC Act Box Gum Woodland	The BC Act listed Box Gum Woodland is characterised by the presence or prior occurrence of *Eucalyptus blakelvi* (Blackely's Red Gum) and / or *Eucalyptusmelliodora* (Yellow Box). The understorey in intact sites is characterised by native grasses and a high diversity of herbs. Shrubs are generally sparse or absent but may be locally common.	PCT 281 and PCT 267 are associated with this TEC, in the NSW BioNet Vegetation Classification. These PCTs are present in the following conditions within the biodiversity study area: • PCT 267 Cropped December 2022 (VZ4) • PCT 267 Moderate DNG (VZ5) • PCT 267 Woodland (VZ6) • PCT 281 DNG (VZ7) • PCT 281 Regenerating shrubland (VZ8) • PCT 281 Remnant woodland (VZ9) • PCT 281 Low condition woodland (VZ10) • PCT 3396 Woodland (VZ20). The canopy of PCT 281 VZs contain *Eucalyptus blakelyi* and / or *Eucalyptus melliodora* , with a native grassy understorey. The canopy of PCT 267 VZs do not contain *Eucalyptus albens*, *Eucalytpus melliodora* or *Eucalyptus blakelyi*. *Eucalyptus microcarpa* which is the

TEC	Description summary	Justification
		dominant canopy species (where canopy is present), is not characteristic of Box Gum Woodland per Part 4.4 of the Final Determination. Therefore, PCT 267 VZs are not BC Act Box Gum Woodland.
EPBC Act Box Gum Woodland	The EPBC Act Box Gum Woodland has a ground layer of native tussock grasses and herbs, and a sparse, scattered shrub layer. Eucalyptus albens, Eucalyptus melliodora and / or Eucalyptus blakelyi dominate the ecological community where a tree layer still occurs. Minimum condition thresholds are provided in the EPBC Act Policy Statement (Commonwealth of Australia, 2006). A 'patch' is defined as a continuous area containing the ecological community. The patch is the larger of an area that contains five or more trees in which no tree is greater than 75 metres from another tree, or the area over which the understorey is predominately native (Commonwealth of Australia, 2012).	PCT 281 is associated with this TEC, which is present in the following conditions within the biodiversity study area: • PCT 281 DNG (VZ7) • PCT 281 Regenerating shrubland (VZ8) • PCT 281 Remnant woodland (VZ9) • PCT 281 Low condition woodland (VZ10) • PCT 3396 Woodland (VZ20). The canopy of these VZs contain *Eucalyptus blakelyi* and / or *Eucalyptus melliodora*, with a predominately native perennial grass understorey and rich herb diversity.
EPBC Act Grey Box Woodland	The EPBC Act Grey Box Woodland occurs in two forms. The most common form is as grassy woodland comprising a tree layer and an understorey that must have native grasses but with a varying proportion of shrubs and herbs. The derived native grassland form can occur in patches where the tree canopy and mid layer have been almost entirely removed but the native ground layer remains largely intact with high flora diversity. Condition thresholds were established when the ecological community was listed to determine which patches of woodland and derived native grassland should receive full protection as a matter of national environmental significance under the EPBC Act (Commonwealth of Australia, 2012).	The EPBC Act Grey Box Woodland is present throughout PCT 267 woodland as the most common tree species is *Eucalyptus microcarpa*, the patch is at least 0.5 hectares in size and non-grass weeds make up more than 30 percent of the plant cover in the ground layer. The EPBC Act Grey Box Woodland is also present throughout PCT 267 DNG (VZ5) and PCT 76 DNG (VZ1) as there is evidence that *Eucalyptus microcarpa* trees were once common in the patch, there are at least 12 perennial native species in the mid and ground layers and at least 50 percent of the plant cover in the ground layer is made up of perennial native species. PCT 267 was cropped in December 2022 and does not conform to the EPBC Act Grey Box Woodland. Whilst there is evidence of *Eucalyptus microcarpa* trees being common in this patch prior to clearing, the plant cover in the ground layer is not made up of at least 50 percent native perennial species.



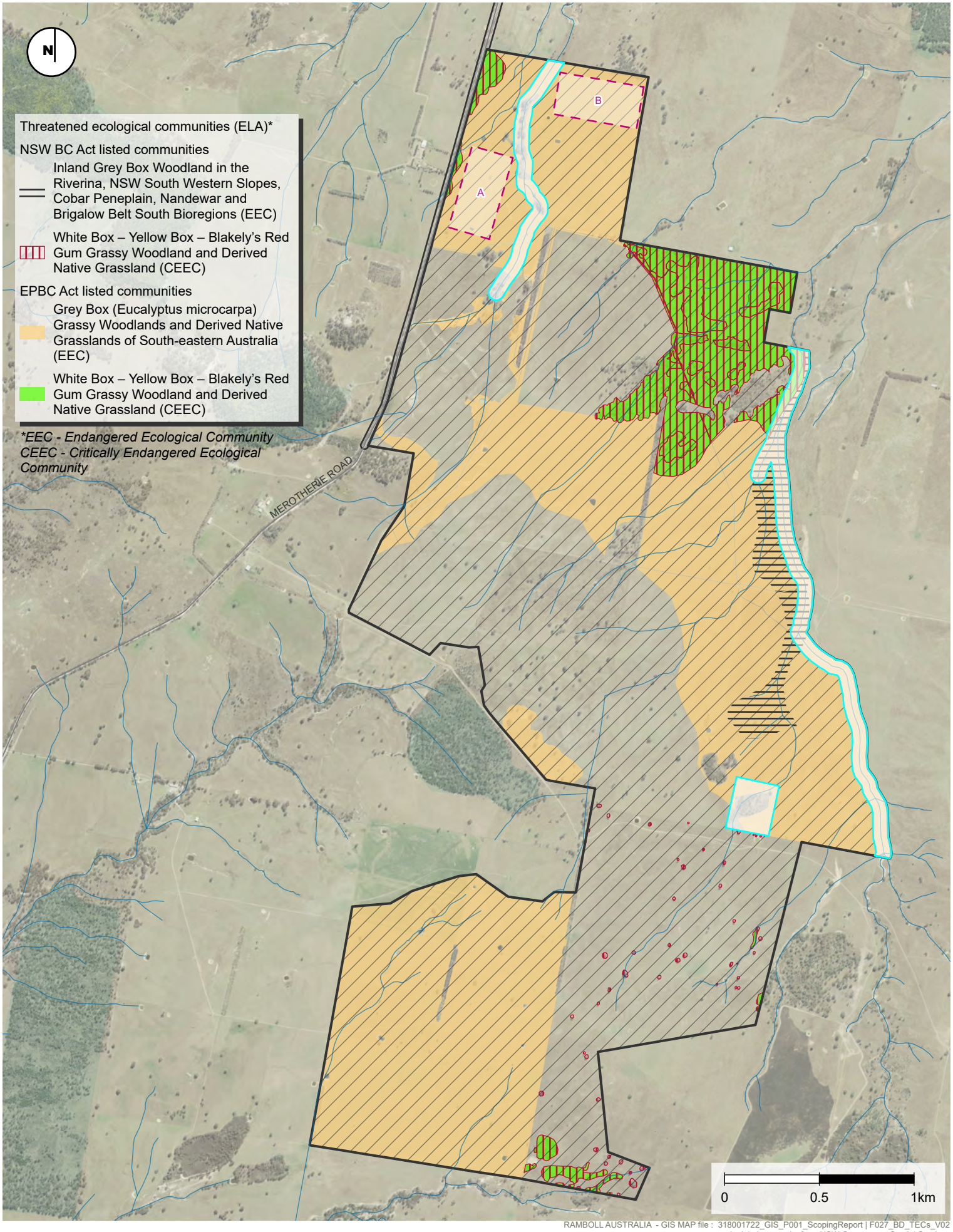
RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F005_BD_VegZones_V07
Aerial photography from NSW Government Spatial Services

KEY

Narragamba Solar Project study area
Development footprint
Restricted development area
Potential area of BESS and substation
Road
Waterway

Figure 8-2 | Biodiversity - Preliminary vegetation mapping - Narragamba Solar Project study area

Figure 8-3 | Biodiversity - Preliminary vegetation mapping - Merotherie Road study area



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F027_BD_TECs_V02
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Potential area of BESS and substation
- Road
- Waterway

Figure 8-4 | Biodiversity - Preliminary threatened ecological communities

A subset of VI plots were undertaken in March and June 2023 to determine indicative VI scores, as provided in **Table 8-5**. In accordance with the BAM Section 9.2 (Department of Planning, Industry and Environment, 2020a), VZs require offsetting where the VI is:

- ≥15, where the PCT is representative of an EEC or CEEC
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a Vulnerable Ecological Community
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

The subset of VI plots indicates that all VZs will likely attain VI scores ≥15, where the PCT is representative of an EEC or CEEC (VZs 1, 4, 5, 6, 7, 8, 9, 10 and 20) and VI scores ≥20 where the PCT does not represent a TEC (all remaining VZs). The preliminary assessment indicates that offsets may be required for all VZs (refer to **Table 8-5**). VI plots have not yet been undertaken within PCT 76 DNG (VZ1) and PCT 78 DNG (VZ3) however, condition in these areas is consistent with other DNG areas within the study areas and therefore VZ1 and VZ3 will also likely require offsetting.

The VI plot data from the Stubbo Solar Farm assessment will be reviewed to determine if additional plots are required in that area.

Table 8-5: Indicative VI scores

PCT	Condition	VZ ID	VI Plots completed	Composition	Structure	Function	VI score	Offsetting required
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils	DNG	1	0/1	-	-	-	-	TBC
PCT 78: River Red Gum riparian tall woodland / open forest wetland	Woodland	2	1/1	72.6	40.2	38.0	48.0	Yes
	DNG	3	0/1	-	-	-	-	TBC
PCT 267: White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland	Cropped December 2022	4	5/5	63.4	60.5	9.3	32.9	Yes
	Moderate DNG	5	6/7	44.5	56	10.8	30.0	Yes
	Woodland	6	1/3	97.5	91.4	82.4	90.2	Yes
PCT 281: Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats	Moderate DNG	7	3/4	59.3	66	6.7	29.7	Yes
	Regenerating shrubland	8	2/3	72.7	45.5	12.7	34.8	Yes
	Remnant moderate condition woodland	9	4/4	80.6	90.1	88.1	86.2	Yes
	Remnant low condition woodland	10	1/3	66.3	47.4	39.5	49.9	Yes
PCT 461: Tumbledown Gum woodland on hills	DNG	11	4/6	59.2	55.3	3.5	22.6	Yes
	Woodland	12	5/5	91.8	82.8	39.2	66.8	Yes
PCT 472: Thyme Honey-myrtle – red gum – Mugga Ironbark shrubland / woodland in impeded drainage flats or depressions	Woodland	13	1/3	51.4	41.3	72.2	53.5	Yes

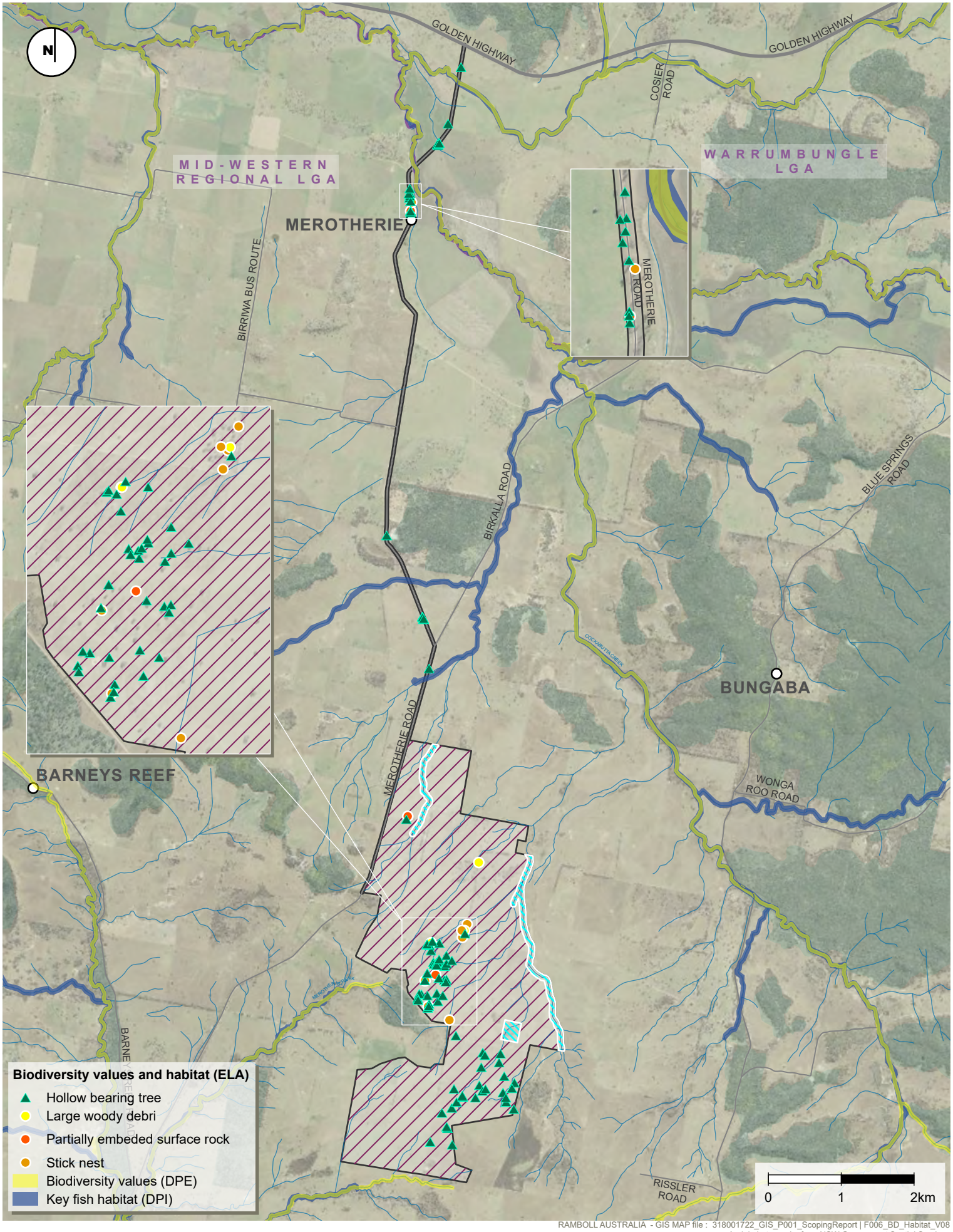
PCT	Condition	VZ ID	VI Plots completed	Composition	Structure	Function	VI score	Offsetting required
PCT 478: Red Ironbark - Black Cypress Pine - stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone	Regenerating	14	1/1	80.1	32.6	19.5	37.1	Yes
	Forest	15	1/1	95.8	57.9	88	78.8	Yes
PCT 479: Narrow-leaved Ironbark-Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills	Forest	16	1/2	96	66.5	84.2	81.3	Yes
PCT 1177: Slaty Gum woodland of the slopes	Woodland	17	1/1	49.6	32.2	65	47.0	Yes
	Eucalyptus dawsonii (Slatey Gum) plantings	18	1/3	55.6	22.7	61.4	42.7	Yes
PCT 1767: Rough-barked Apple grassy tall woodlands	Woodland	19	2/2	90.3	99.1	71	86.0	Yes
PCT 3396: Northwest Flats Box-Blakely's Red Gum Forest	DNG	20	1/1	31.2	55.1	6	21.8	Yes
Total			43/57					

Habitat assessment

A range of habitat features for threatened species have been recorded within the biodiversity study area, listed in **Table 8-6**. Locations of key habitat features are provided in **Figure 8-5**. Habitat assessments and suitability for threatened species is provided in **Table 8-7** and **Table 8-8**.

Table 8-6: Threatened fauna species habitat present within biodiversity study area

Habitat type	Threatened fauna species usage group
Hollow-bearing trees (HBTs)	Breeding and refuge for arboreal mammals, parrots, and owls
Stick nests	Nesting habitat for raptors/birds of prey
Partially embedded surface rock	Reptiles (Pink-tailed Legless-Lizard (*Aprasia parapulchella*))
Remnant woodland	Foraging, refuge and breeding habitat for Koala (*Phascolarctos cinereus*) and woodland birds
Proximity to clifflines	Cliffline dependent fauna (microbats and Brush-tailed Rock Wallaby (*Petrogale penicillata*))
Proximity to main water courses (Talbragar River)	Southern Myotis (*Myotis macropus*)
Key fish habitat (Department of Planning and Environment, 2023d)	Mapped key fish habitat does not occur within the biodiversity study area, however, occurs within creeks surrounding the biodiversity study area including Cockabutta Creek, Blue Springs Creek, Pine Creek, Merotherie Creek and Stubbo Creek (refer to **Figure 8-5**)



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F006_BD_Habitat_V08
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Merotherie Road study area
- Development footprint
- Restricted development area
- Road
- Waterway
- LGA boundary

Figure 8-5 | Biodiversity - Habitat features

Biodiversity values

Small areas within the biodiversity study area are mapped as high biodiversity under the *Mid-Western Regional LEP*. Clause 6.5(3) of the Mid-Western Regional LEP states that before determining a development application the consent authority must consider:

a) *whether the development is likely to have—*
   i. *any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and*
   ii. *any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and*
   iii. *any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and*
   iv. *any adverse impact on the habitat elements providing connectivity on the land, and*
b) *any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.*

The above matters will be considered in the EIS.

The Biodiversity Values (BV) Map identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing. The map forms part of the Biodiversity Offsets Scheme (BOS) threshold, which is one of the factors for determining whether the BOS applies to a clearing or development proposal, under Part 7 of the BC Act. There is no land mapped on the BV Map within the Narragamba Solar Project study area, however, small sections of the Merotherie Road study area are included within the BV Map (refer to **Figure 8-5**) (Department of Planning and Environment, 2023b).

Threatened flora

The PCTs mapped within the study areas were entered into the BAM Calculator (BAM-C), which identified 13 candidate flora species associated with the PCTs occurring within the biodiversity study area. Of these, 12 require further assessment due to the presence of habitat and / or geographic constraints within the biodiversity study area. One species, *Austrostipa wakoolica* does not require further assessment due to lack of geographical constraints within the biodiversity study area (refer to **Table 8-7**).

Threatened flora surveys commenced during March 2023 in accordance with the methodology outlined in DPE's *Surveying threatened plants and their habitats- NSW survey guide for the Biodiversity Assessment Method* (Department of Planning, Industry and Environment, 2020a) for the following species:

- *Dichanthium setosum* (Bluegrass)
- *Euphrasia arguta*
- *Pomaderris queenslandica* (Scant Pomaderris)
- *Tylophora linearis*
- *Eucalyptus cannonii* (Capertee Stringybark).

Surveys undertaken to date have not identified any threatened flora species within the biodiversity study area. Surveys will be undertaken in accordance with the above guideline for the remaining species during spring 2023.

Table 8-7: Candidate flora species and habitat assessment

Species	Common Name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey completed?
Austrostipa wakoolica	A spear-grass	No	E	E	PCT 76	Alluvial plains and pans (Department of Planning and Environment, 2023d). The geographical constraint for this species is 'West of Cowra' and 'South of Narranderra' (Office of Environment and Heritage, 2023).	The Narragamba Solar Project study area does not meet the geographical constraint for this species ('West of Cowra' and 'South of Narrandera'); and therefore surveys are not required.	NA – survey not required
Dichanthium setosum	Bluegrass	No	V	V	PCT 76, PCT, PCT 461	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species grows on heavy basaltic black soils and red-brown loams with clay subsoil (Department of Planning and Environment, 2023b). Red-brown loams with clay subsoil are present within valleys and drainage lines within the associated PCTs within the biodiversity study area.	Survey commenced March 2023, to be completed Spring 2023
Euphrasia arguta	-	No	CE	CE	PCT 267 and PCT 281	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers' (Department of Planning and Environment, 2023b). Potential habitat for this species exists within PCT 281 and PCT 267; however, VZ4 (PCT 267 cropped December 2022) is	Survey commenced March 2023, to be completed Spring 2023

Species	Common Name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey completed?
							considered too disturbed to provide habitat for this species.	
Pomaderris queenslandica	Scant Pomaderris	No	E	-	PCT 78, PCT 472	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks. PCT 472 remnant woodland and regenerating contains potential habitat for this species as it has a shrubby understorey.	Survey commenced March 2023, to be completed Spring 2023
Tylophora linearis	-	No	V	E	PCT 461, PCT 479	No habitat constraints (DPE 2023b) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii* (Department of Planning and Environment, 2023b). This vegetation associated is present within PCT 479 within the biodiversity study area.	Survey commenced March 2023, to be completed Spring 2023
Indigofera efoliata	Leafless Indigo	No	E	E	PCT 76, PCT 267	No habitat constraints (DPE 2023b) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species has been recorded growing in Eucalyptus crebra and Callitris glaucophylla dry sclerophyll forest, and in Eucalyptus microcarpa and Callitris glaucophylla tall woodland (Department of Planning and Environment, 2023b). These vegetation associations are present	Surveys to be completed Spring 2023

Species	Common Name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey completed?
							throughout PCT 76 and PCT 267 within the biodiversity study area. VZ5 (PCT 267 cropped December 2022) is considered too disturbed to provide habitat for this species. DNG forms of the associated PCTs are not considered potential habitat as the shrub stratum is not present.	
Diuris tricolor	Pine Donkey Orchid	No	V	-	PCT 76, PCT 267 and PCT 461	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species is usually recorded from disturbed habitats (Department of Planning and Environment, 2023b) and has been recorded in grassy woodland on granite derived soils with a long history of livestock grazing recently by ELA approximately 10 kilometres east of the study area. Potential habitat exists within the biodiversity study area. VZ5 (PCT 267 cropped December 2022) is considered too disturbed to provide habitat for this species.	Surveys to be completed Spring 2023
Caladenia arenaria	Sand-hill Spider Orchid	Yes	E	E	PCT 76	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Occurs in woodland with sandy soil, especially that dominated by Callitris glaucophylla (Department of Planning and Environment, 2023b). Habitat requirements for this species are not met within the biodiversity study area as soil present within PCT 76 (VZ1) is not sandy.	Surveys to be completed Spring 2023

Species	Common Name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey completed?
Acacia ausfeldii	Ausfeld's Wattle	No	V	-	PCT 267, PCT 281, PCT 461	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	ELA has recorded this species outside of the habitat constraints listed in the Threatened Biodiversity Data Collection, including on soils derived from granite and metasedimentary rocks. Within the biodiversity study area, PCT 461 is located on a low sandstone rise; however, based on ELA's experience suitable habitat for this species also exists on granite and metasediments throughout remnant woodland forms of the associated PCTs within the biodiversity study area. DNG forms of the associated PCTs are not considered potential habitat as the shrub stratum is not present.	Surveys to be completed Spring 2023
Swainsona sericea	Silky Swainson-pea	No	V	-	PCT 76, PCT 267, PCT 281, PCT 461, PCT 472	Footslopes and low rises on sandstone (DPE 2023b).	This species is found in Box Gum Woodland in the Southern Tablelands and South West Slopes (Department of Planning and Environment, 2023b). ELA has recently recorded this species growing in PCT 266 with a long history of livestock grazing. Potential habitat for this species is present throughout the associated PCTs within the biodiversity study area. VZ5 (PCT 267 cropped December 2022) is considered too disturbed to provide habitat for this species.	Surveys to be completed Spring 2023

Species	Common Name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey completed?
Swainsona recta	Small Purple-pea	No	E	E	PCT 76, PCT 267	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by *Eucalyptus blakelyi, E. melliodora, E. rubida* and *E. goniocalyx* (DPE 2023). This species grows in association with understorey dominants that include *Themeda triandra, Poa* spp. and *Austrostipa* spp (DPE 2023). The above species assemblage, and therefore potential habitat, is present throughout PCT 76 and PCT 267 within the biodiversity study area. VZ5 (PCT 267 cropped December 2022) is considered too disturbed to provide habitat for this species.	Surveys to be completed Spring 2023
Prasophyllum sp. Wybong^	-	Yes	-	CE	PCT 281	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	ELA has recently recorded this species in DNG on granite derived soils approximately 10 kilometres east of the study area at a site with moderate levels of disturbance (historical livestock grazing). Potential habitat is present throughout PCT 281 within the biodiversity study area.	Surveys to be completed Spring 2023
Prasophyllum petilum^	Tarengo Leek Orchid	No	E	E	PCT 267, PCT 281, PCT 461	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical	ELA has recently recorded this species in DNG on granite derived soils approximately 10 kilometres east of the biodiversity study area at a site with	Surveys to be

Species	Common Name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey completed?
						constraints for this species (Office of Environment and Heritage, 2023).	moderate levels of disturbance (historical livestock grazing). Potential habitat is present throughout the associated PCTs within the biodiversity study area. VZ5 (PCT 267 cropped December 2022) is considered too disturbed to provide habitat for this species.	completed Spring 2023

V= Vulnerable, E=Endangered, CE=Critically Endangered.

^ The NSW Herbarium considers *Prasophyllum petilum* and *Prasophyllum sp*. Wybong (C. Phelps ORG5269) to be synonyms (i.e. the same species). This taxonomic recognition will be released in the next Orchidaceae taxonomic update via the Australian Plant Census, which provides a list of currently accepted names. As it stands, the two species are treated as one for NSW regulatory purposes, with the distinction maintained under Commonwealth legislation.

Threatened fauna

The BAM-C identified 26 candidate fauna species associated with the PCTs occurring within the study area. Of these, 20 require further assessment due to the presence of habitat and / or geographic constraints within the biodiversity study area. Six species do not require further assessment due to lack of suitable habitat, habitat or geographical constraints within the biodiversity study area (refer to **Table 8-8**).

Threatened freshwater fish species occur within the Talbragar River (being Southern Purple Spotted Gudgeon and Eel Tailed Catfish) (Department of Primary Industries, 2023).

Targeted threatened flora surveys commenced in March 2023 and will be continued as required throughout 2023. Surveys undertaken to date have not identified any threatened fauna species within the biodiversity study area. Surveys will be undertaken in accordance with the above guideline for the remaining species during 2023.

The restricted development areas would be refined with consideration of the biodiversity impacts as the project is further refined in EIS stage.

Table 8-8: Candidate fauna species and habitat assessment

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Booroolong Frog	*Litoria booroolongensis*	No	E	E	PCT 281, PCT 461, PCT 472, PCT 3369	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species requires permanent, or near permanent river environment with rocky structures (bedrock or cobble) (Department of Planning, Industry and Environment, 2020a). There are no rivers or creeks present within the biodiversity study area. An unnamed tributary of Cockabutta Creek exists in the south eastern section of the Narragamba Solar Project study area; however, does not contain the required bedrock or cobble features.	Survey not required – habitat constraint not met
Sloane's Froglet	*Crinia sloanei*	No	V	E	PCT 76	Semi-permanent/ephemeral wet areas, Swamps, Waterbodies. Within 500 metres of swamps. Within 500 metres of waterbodies (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Breeding habitat consists of still or very slow sections of permanent and temporary streams as well as pools (e.g. farm dams) with vegetation located on the subject land. Non-breeding habitat includes waterbodies and areas of native and non-native vegetation (including areas of cleared rural grazing land). Sloane's froglet is also known to move between breeding and non-breeding waterbodies; connectivity between these habitats is important to maintain population processes.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Regent Honeyeater	*Anthochaera phrygia*	Yes	CE	CE	PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 479	As per Important Habitat Map (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	The biodiversity study area is not mapped on the Important Habitat Map (Department of Planning and Environment, 2023b).	Survey not required – habitat constraint not met
Bush Stone-curlew	*Burhinus grallarius*	No	E	-	PCT, 76, PCT 78, PCT 267, PCT 281, PCT 461, PCT 472	Fallen/standing dead timber including logs. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Fallen/standing dead timber including logs are present throughout remnant woodland patches within the study area.	Survey required
Gang-gang Cockatoo	*Callocephalon fimbriatum*	No	V	E	PCT 267, PCT 281, PCT 3396	Eucalypt tree species with hollows at least three metres above the ground and with hollow diameter of seven centimetres or larger. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	No	V	V	PCT 76, PCY 78, PCT 461, PCT 472, PCT 3369	Living or dead tree with hollows greater than 15 centimetres diameter and greater than eight metres above ground (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	Survey required
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	No	V	-	PCT 76, PCT 78, PCT 267, PCT 281, PCT 3396	Living or dead mature trees within suitable vegetation within one kilometre of a rivers, lakes, large dams or creeks, wetlands and coastlines (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several stick nests were recorded throughout the biodiversity study area. Further survey is required to determine if White-bellied Sea-Eagle are utilising these nests.	Survey required
Little Eagle	*Hieraaetus morphnoides*	No	V	-	PCT 76, PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 1177, PCT 3396	Nest trees – live (occasionally dead) large old trees within vegetation (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several stick nests were recorded throughout the biodiversity study area. Further survey is required to determine if Little Eagle are utilising these nests.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Swift Parrot	*Lathamus discolor*	Yes	E	CE	PCY 76, PCT 78, PCT 267, PCT 281, PCT 472, PCT 461, PCT 479, PCT 478, PCT 1177, PCT 1767, PCT 3396	As per Important Habitat Map. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	The biodiversity study area is not mapped on the Important Habitat Map (Department of Planning and Environment, 2023b).	Survey not required – habitat constraint not met
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	No	V	-	PCT 76, PCT 78, PCT 461, PCT 472	Living or dead tree with hollows greater than 10 centimetres diameter (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	Survey required
Square-tailed Kite	*Lophoictinia isura*	No	V	-	PCT 76, PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 3396	Nest trees (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several stick nests were recorded throughout the biodiversity study area. Further survey is required to determine if Square-tailed Kites are utilising these nests.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Barking Owl	*Ninox connivens*	No	V	-	PCT 76, PCT 78, PCT 267, PCT 281, PCT 472, PCT 461, PCT 479, PCT 478, PCT 1177, PCT 1767, PCT 3396	Living or dead trees with hollows greater than 20 centimetre diameter and greater than four metres above the ground (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements. . This species was recorded south of the Stubbo Solar Farm (ELA 2020) and offsets have been calculated for SSD 10452. A review will be undertaken to determine if additional offsets will be required.	Survey required
Powerful Owl	*Ninox strenua*	No	V	-	PCT 78, PCT 281, PCT 1177, PCT 3396	Living or dead trees with hollow greater than 20 centimetre diameter (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Superb Parrot	*Polytelis swainsonii*	No	V	V	PCT 76, PCT 78, PCY 267, PCT 281, PCT 461, PCT 572, PCT 1177, PCT 3396	Living or dead E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta with hollows greater than five centimetre diameter; greater than four metres above ground or trees with a diamteres at breast height (DBH) of greater than 30 centimetre (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	Survey required
Masked Owl	*Tyto novaehollandiae*	No	V	-	PCT 76, PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 117, PCT 3396	Living or dead trees with hollows greater than 20 centimetre diameter. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Eastern Pygmy-possum	*Cercartetus nanus*	No	V	-	PCT 78, PCT 461, PCT 472, PCT 3369	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities (Department of Planning and Environment, 2023d).	Survey required – arboreal cameras deployed in March / April 2023
Greater Glider	*Petauroides volans*	No	E	E	PCT 1177, PCT 3369	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This is a hollow dependent species that utilises large trees with hollows within its home range (Department of Planning and Environment, 2023d).	Survey required – arboreal cameras deployed in March / April 2023
Squirrel Glider	*Petaurus norfolcensis*	No	V	-	PCT 76, PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 1177, PCT 3396	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species inhabits mature or old growth Box, Box Ironbark and River Red Gum forest west of the Great Dividing Range (Department of Planning and Environment, 2023d).	Survey required – arboreal cameras deployed in March / April 2023

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Brush-tailed Rock-wallaby	*Petrogale penicillata*	Yes	E	V	PCT 78, PCT 267, PCT 281, PCT 461, PCT 3396	Land within one kilometre of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	The biodiversity study area contains areas within one kilometre of clifflines and rocky areas. This species browse on vegetation in and adjacent to rocky areas (Department of Planning and Environment, 2023d).	Survey required
Brush-tailed Phascogale	*Phascogale tapoatafa*	No	V	-	PCT 76, PCT 267, PCT 281, PCT 461, PCT 3396	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	The species is associated with a wide range of PCTs across NSW and may occur in habitat without any hollow-bearing trees. Hollow bearing trees are not a habitat constraint for this species. This species prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter (Department of Planning and Environment, 2023d).	Survey required – arboreal cameras deployed in March / April 2023, to be continued throughout 2023

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Koala	*Phascolarctos cinereus*	No	E	E	PCT 76, PCT 78, PCT 267, PCT 281, PCT 472, PCT 461, PCT 479, PCT 478, PCT 1177, PCT 1767, PCT 3396	Presence of koala use trees (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Koala use trees, as per Schedule 3 of the *State Environment Planning Policy (Biodiversity and Conservation) 2021* are present throughout the biodiversity study area.	Survey required – arboreal cameras deployed in March / April 2023, to be continued throughout 2023
Pink-tailed Legless Lizard	*Aprasia parapulchella*	No	V	V	PCT 267, PCT 281, PCT 461, PCT 472, PCT 478	Rocky areas, or within 50 metres of rocky areas (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	Suitably sized rocks for this species are approximately: 300 millimetres wide and 50 millimetres deep (Wong et al. 2011). 100–150 millimetres wide, 120–220 millimetres long, 50–150 millimetres deep (Jones 1999). Rocks of this approximate size were recorded within the southern section of the Narragamba Solar Project study area.	Survey required

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Pale-headed Snake	*Hoplocephalus bitorquatus*	No	V	-	PCT 78, PCT 472	No habitat constraints (Department of Planning and Environment, 2023d) and no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species is cryptic but is typically found in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, like that present within the study area, this species favours habitats close to riparian areas (Department of Planning and Environment, 2023d). Whilst there are minor drainage lines present within the Narragamba Solar Project study area, these areas would only flow with significant rainfall and do not constitute riparian habitat. Therefore, there is no habitat present for this species within the biodiversity study area.	Survey not required – no suitable habitat present

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Grey-headed Flying-fox	*Pteropus poliocephalus*	No	V	V	PCT 76, PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 1177, PCT 3396	Breeding camps. Camps are generally located within 20 kilometres of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Potential breeding habitat is PCTs associated with the species within 100 metres of rocky areas, caves, overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	An assessment of habitat confirmed that no breeding camps are present within the biodiversity study area.	Survey not required – no breeding camps identified

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Large-eared Pied Bat	*Chalinolobus dwyeri*	Yes	V	V	PCT 78, PCT 267, PCT 281, PCT 461, PCT 472, PCT 3396	Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. Potential breeding habitat is PCTs associated with the species within 100 metres of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings (Department of Planning and Environment, 2023d). There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species is a species credit species for breeding and foraging habitat (Department of Planning and Environment, 2018). Any impact to breeding habitat is a Serious and Irreversible Impact (SAII). There is no breeding habitat present within the biodiversity study area; however, foraging habitat is present. Targeted survey is required as sections of the study area are within two kilometres of rocky areas containing caves, overhands, escarpments, outcrops or crevices (i.e clifflines.	Survey required – ultrasonic recording devices deployed in January 2023

Species	Common name	SAII	BC Act	EPBC Act	Associated PCTs	Habitat / geographical constraints	Habitat presence	Survey required?
Eastern Bent-wing Bat	*Miniopterus schreibersii* subsp. *Oceanensis*	No	V	-	PCT 78, PCT 281, PCT 461, PCT 472, PCT 3396	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding. Potential breeding habitat is caves, tunnels, mines or other structures known or suspected to be used by *M. schreibersii oceanensis* including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature. There are no listed geographical constraints for this species (Office of Environment and Heritage, 2023).	This species is a species credit species for breeding habitat only (Department of Planning, Industry and Environment, 2018). This is no breeding habitat for this species present within the biodiversity study area.	Survey not required – breeding habitat not present within or near biodiversity study area

*Serious and Irreversible Impact

V= Vulnerable, E=Endangered, CE=Critically Endangered.

8.1.3 Potential impacts

A summary of the potential biodiversity impacts from the project is provided in **Table 8-9**.

Table 8-9: Potential impacts – Biodiversity

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Removal of terrestrial vegetation	High / Long term	Direct	Sensitive (environmental value)	Y	• Avoid – design the project to avoid high value vegetation • Avoid – impacts to SAII's and CEEC's would be avoided and minimised where feasibly possible as per the BAM (Department of Planning, Industry and Environment, 2020b) • Minimise – minimise clearing of vegetation where possible • Offset – native vegetation that cannot be avoided in clearing works would be offset through the BOS as required
Construction	Disturbance / loss of habitat	High / Long term	Direct	Sensitive (environmental value)	Y	• Avoid – design the project to avoid high value habitat • Minimise – minimise removal of habitat where possible • Offset – habitat that cannot be avoided in clearing works would be offset through the BOS as required
Construction	Indirect impacts to fauna (light, noise, vibration)	Moderate / Short term	Indirect	Sensitive (environmental value)	Y	• Avoid – undertake pre-clearing surveys to identify and relocate fauna prior to commencing works if required • Minimise – minimise noise and vibration emissions where practical through the implementation of best practice management

8.1.4 Avoidance and minimisation of impacts to biodiversity

As discussed in **Section 8.1.2**, the study area contains limited remnant vegetation. The study area has been selected based on the large proportion of relatively low condition grassland vegetation. Large areas have been subject to agricultural disturbances as recently as December 2022. The study area contains approximately 46 ha of remnant vegetation (woodland or forest; VZ6, VZ9, VZ10, VZ12, VZ17 and VZ19), which is approximately 4% of the total study area.

Development in two main drainage lines within the study area and one patch of woodland in the southern edge of the study area will be avoided (refer to **Figure 4-1**).

Whilst several areas of high biodiversity value have been identified within the study areas, these are generally in low condition, with signs of agricultural land use present throughout (e.g. livestock grazing, small scale logging/ firewood collection).

Areas of highest biodiversity value identified within the study areas to date include:

- Box Gum Woodland (DNG and Woodland condition states, approximately 82 ha) which is listed as an entity at risk of Serious and Irreversible Impacts.
- remnant woodland patches containing HBTs, particularly VZ12 (PCT 461 Woodland).

On-going surveys will see the completion of candidate flora and fauna surveys, VI assessment and refinement of TEC, PCT and habitat mapping. The findings of the surveys will be considered in further iterations of the Project design, with avoidance of impacts to biodiversity values to be undertaken where possible. A full appreciation of biodiversity values within the study areas, which will be available once surveys are completed, will be utilised to develop a strategy to minimise and / or avoid impacts to biodiversity, which will be discussed in the BDAR.

PCT mapping used in this report is preliminary only. Where data is lacking due to incomplete field surveys, a precautionary approach has been applied, particularly to the extent and condition of TECs within the study areas. The maximum area of TECs has been mapped. The extent and condition of TECs may be less than that displayed in this report; however, this will be determined following completion of further field surveys.

8.1.5 Assessment level and approach

The assessment will be completed in accordance with the requirements outlined in the NSW BAM (Department of Planning, Industry and Environment, 2020b). The assessment will include:

- further refinement of PCT and VZ mapping with focus on accurately delineating TECs and area of threatened species habitat
- completion of targeted surveys for candidate flora and fauna species as listed in **Table 8-7** and **Table 8-8**
- completion of the appropriate number of VI plots as required in accordance with Table 3 of the BAM (Department of Planning, Industry and Environment, 2020a)
- consideration of any impacts to key fish habitat and threatened aquatic species
- a referral to the Commonwealth considering impacts to any MNES is being prepared for the Project. To date, the following MNES have been recorded within the biodiversity study area:
  - EPBC Act listed Box Gum Woodland
  - EPBC Act listed Grey Box Woodland
- assessments of impacts to any entities at risk of SAII, including the BC Act listed Box Gum Woodland and any other SAII listed species or entities which may be recorded during further surveys, will be undertaken following completion of field surveys. DPE will be consulted to ensure any unavoidable impacts to entities at risk of SAII will not be serious and irreversible

Each of the above points will be addressed and justified in the BDAR, which will be prepared to meet the requirements of the BAM established under Section 6.7 of the BC Act

8.2 Amenity – visual

8.2.1 Preliminary investigations

A preliminary visual impact assessment was completed by Moir Landscape Architecture (Moir LA, 2023) and is included in **Appendix 2**.

8.2.2 Existing environment

Sensitive receivers

Sensitive receivers located within five kilometres of the study area are shown in **Figure 2-1** and are listed in **Table 2-1**. The preliminary visual impact assessment is required to identify public and private viewpoints within four kilometres of the proposed development in accordance with the *Large-Scale Solar Energy Guideline Technical Supplement - Landscape and Visual Impact Assessment* (Department of Planning and Environment, 2022c). There are 38 residences located within four kilometres of the project. Of these, three are associated with the project and the remaining 35 are non-associated (refer to **Figure 8-6**).

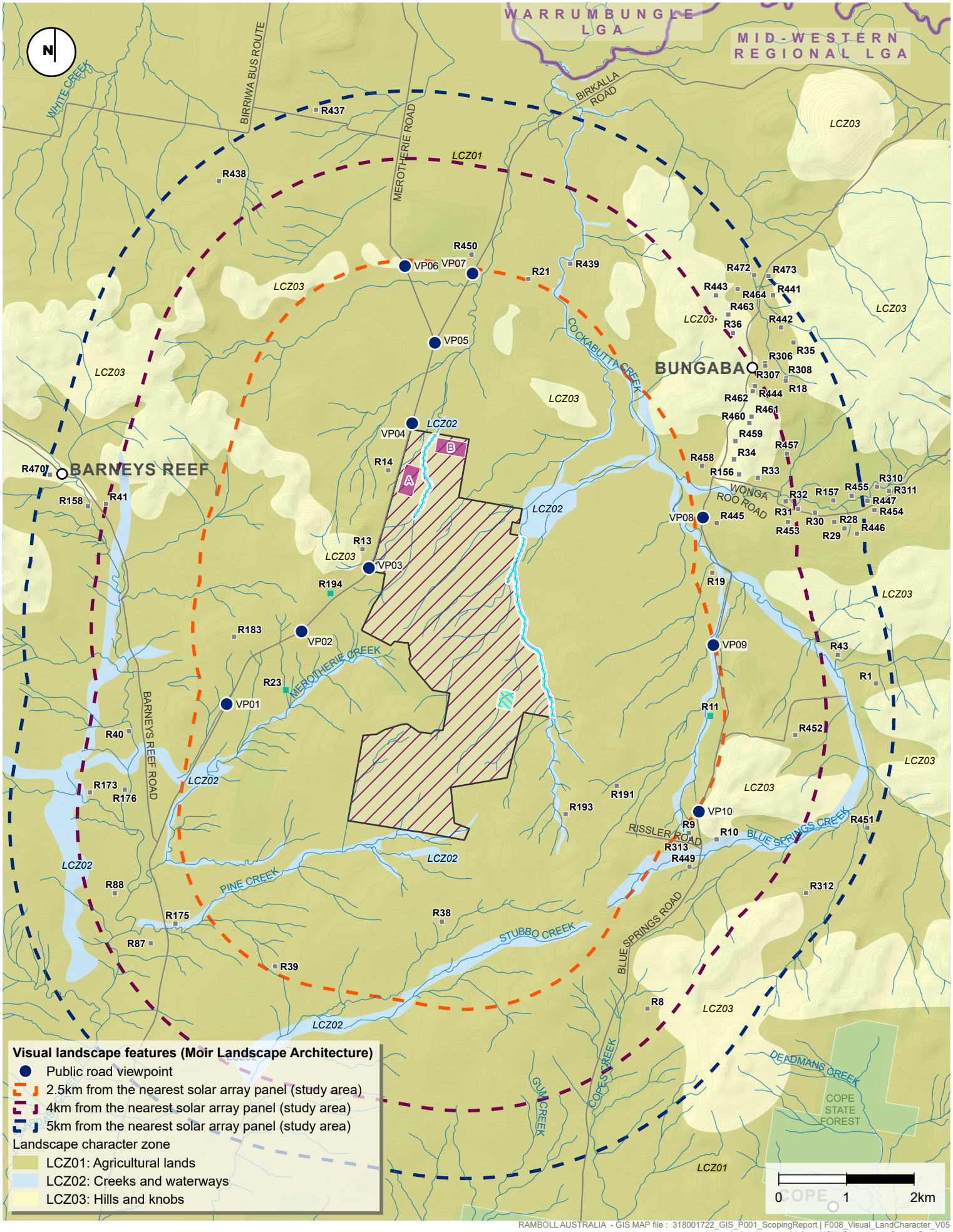
Viewpoints

The preliminary visual assessment considered representative viewpoints from public roads and rail lines within 2.5 kilometres of the project. A total of 11 public viewpoints were selected to represent roads within 2.5 kilometres of the study area (refer to **Figure 8-6**).

Landscape character zones

Preliminary landscape character zones (LCZs) have been developed for the project to divide the landscape based on common distinguishing visual characteristics. The LCZs developed for the project are shown on **Figure 8-6** and include:

- LCZ01 – Agricultural pastures
- LCZ02 – Creeks and waterways
- LCZ03 – Hills and knobs.



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F008_Visual_LandCharacter_V05
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Potential area of BESS and substation
- Dwelling status
  - Associated
  - Not associated
- Road
- Waterway
- LGA boundary
- State forest

Figure 8-6 | Visual - Preliminary landscape character zones

8.2.3 Potential impacts

Viewshed mapping

The viewshed map identifies all areas from which the project may be viewed (refer to **Figure 8-7**). The viewshed is based on a maximum panel height of five metres which represents a worst-case scenario (refer to description of photovoltaic modules in **Section 4.1.3**).

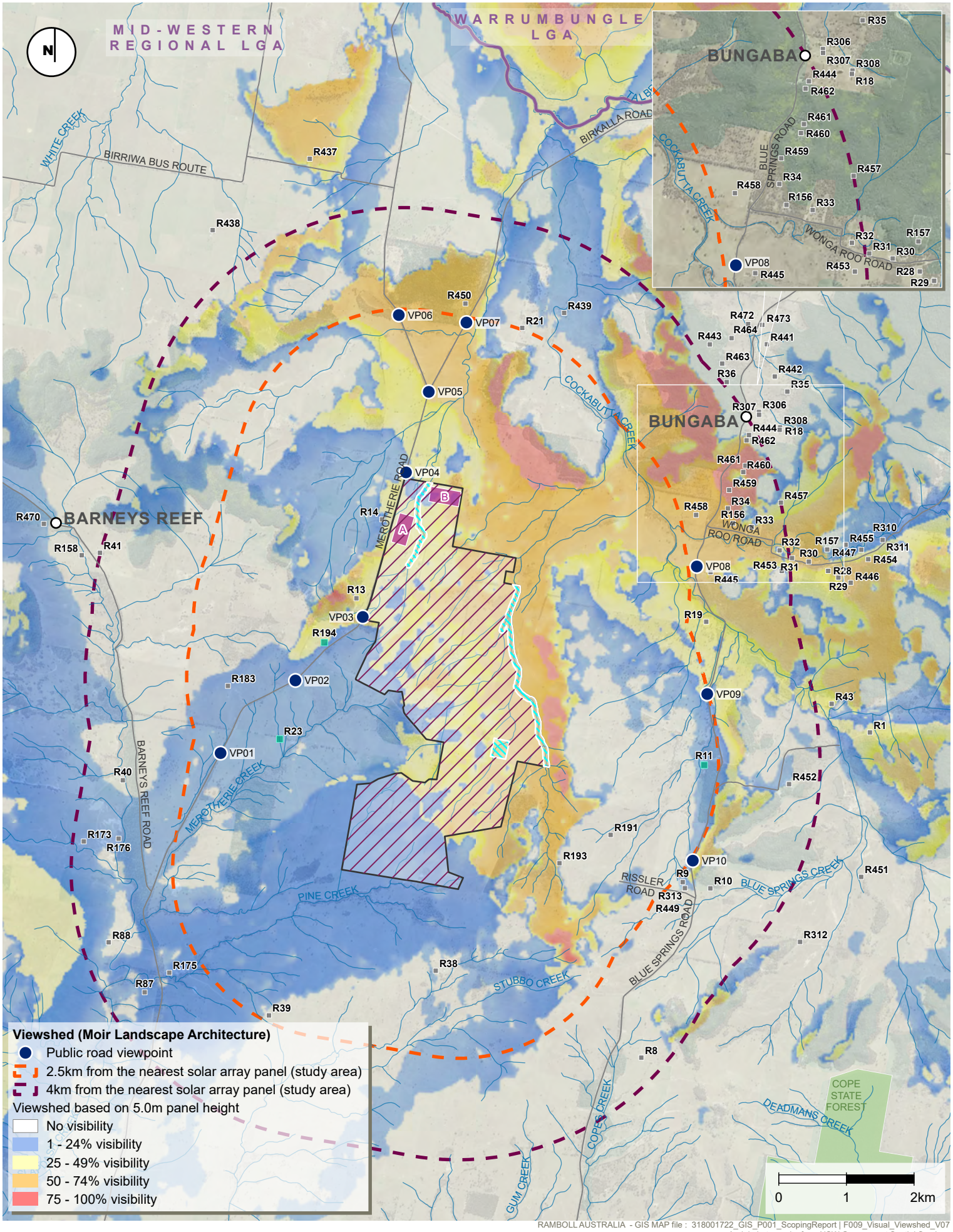
The viewshed map provides an assessment based on topography alone and does not consider intervening elements such as vegetation and structures. The viewshed map, therefore, represents a theoretical worst-case scenario.

Due to the flat to gently undulating terrain within the study area and its surrounds, the viewshed map indicates that the project may be visible, theoretically to varying degrees, in areas surrounding the project. Views towards a larger proportion of the project may theoretically be available to the immediate north, south, and northeast of the project as well as an area to the immediate west of the project. Due to the densely vegetated areas it is likely that views to the project from residences located in the northeast would be limited (refer to **Figure 8-7**). Areas to the east, northwest and southwest may have potential to experience views of the project. This would be further investigated in the EIS.

Approximately 28 non-associated residences located within four kilometres of the study area were identified as having the potential to view the project (refer to **Figure 8-7**). The remaining seven non-associated residences would not be able to view the project.

The northern stretch of Merotherie Road, where it intersects with Birkalla Road, and the central section of Merotherie Road that runs adjacent to the study area, may have the potential to view the majority of the project (refer to **Figure 8-7**). Locations along the northern section of Blue Springs Road may also view most of the project. Areas further to the west (near Barneys Reef Road and the southern sections of Blue Springs Road) are not likely to have any views of the project due intervening topography.

The reverse viewshed mapping shows the areas of highest visibility within the study area (refer to **Figure 8-8**). The reverse viewshed map shows that theoretically, most of the study area may potentially be visible, with the highest visibility may be towards the central area of the study area. Approximately eight residences may theoretically view the southern/south eastern areas of the project due to existing topographical conditions.



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F009_Visual_Viewshed_V07
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Potential area of BESS and substation
- Dwelling status
  - Associated
  - Not associated
- Road
- Waterway
- LGA boundary
- State forest

Figure 8-7 | Visual - Viewshed map

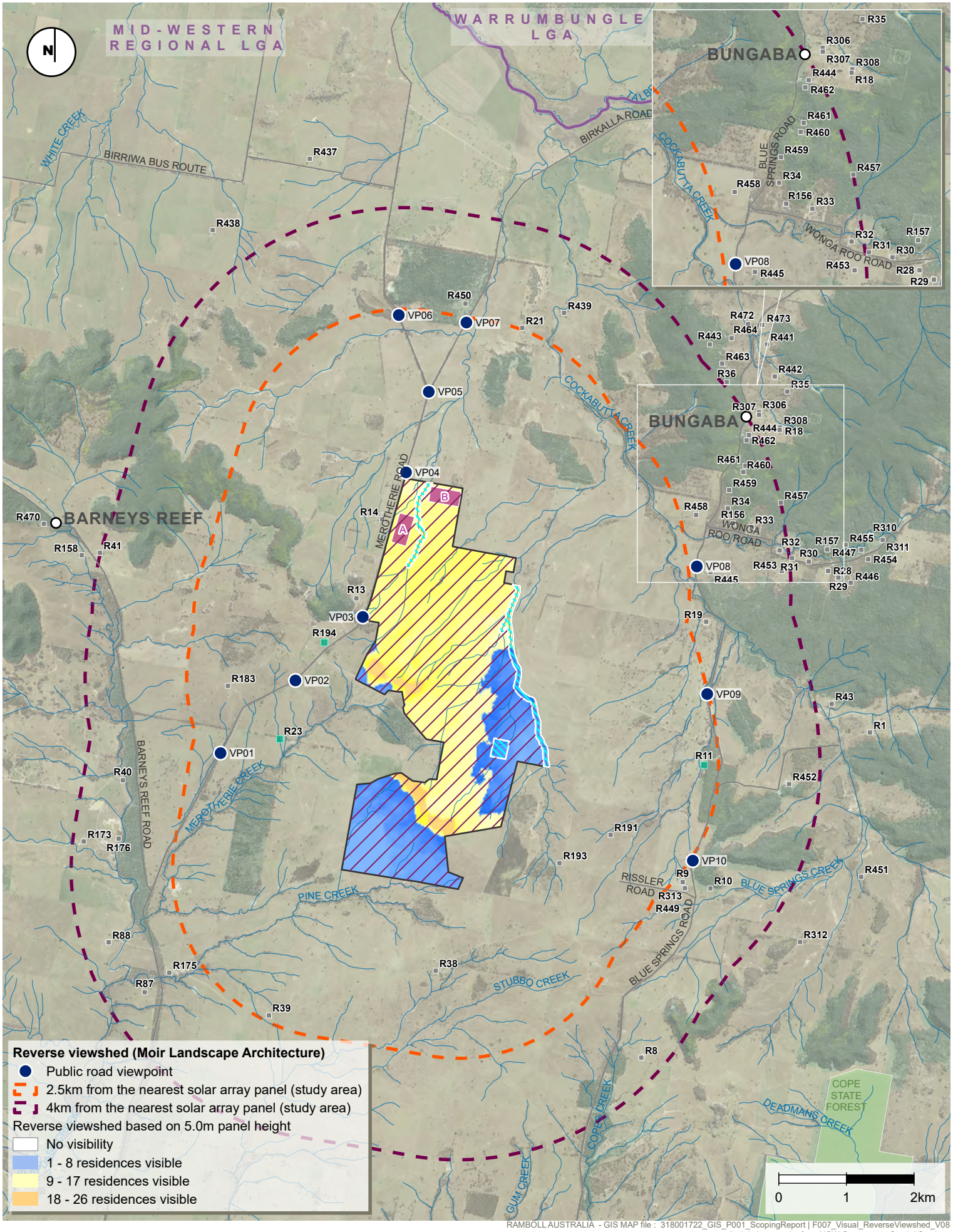


Figure 8-8 | Visual - Reverse viewshed map

Vertical and horizontal field of view

The field of view represents the total observable area that can see in a vertical (**Figure 8-9**) or horizontal plane (**Figure 8-10**).

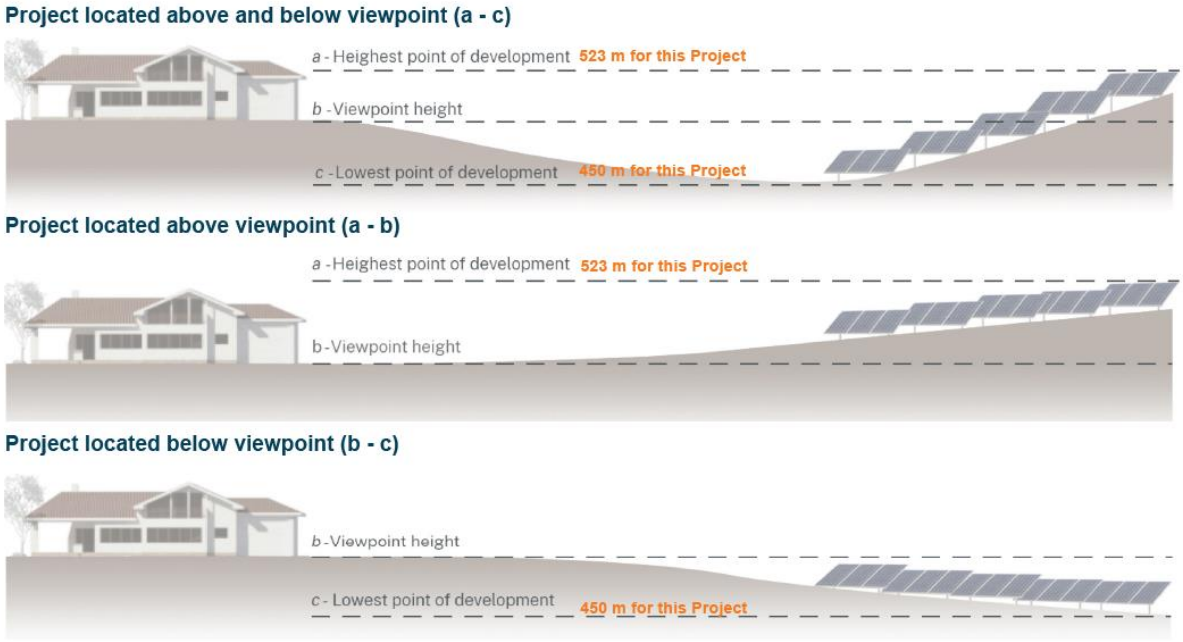


Figure 8-9: Visual – Vertical field of view

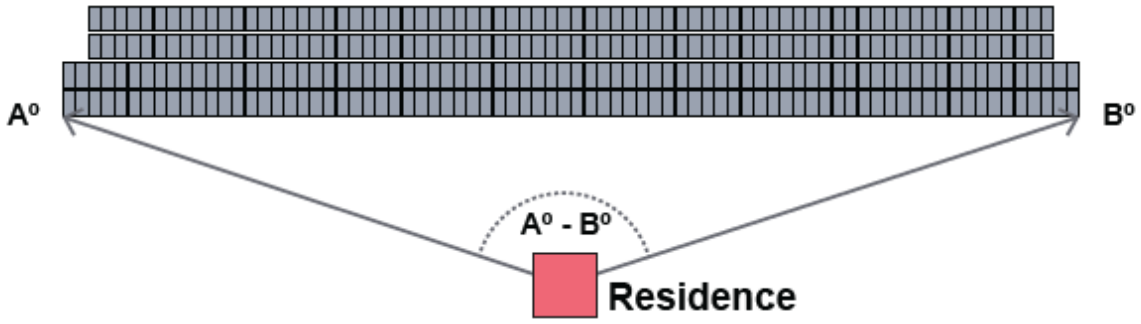


Figure 8-10: Visual – Horizontal field of view (Source: Moira LA (2023)

The field of view calculation considers both private and public viewpoints (refer to **Figure 8-6**). The preliminary assessment identified five non-associated residences (R13, R14, R19, , R191, and R193) and one associated residence (R194) that will require further detailed assessment. Additionally, four public viewpoints (VP02, VP03, VP04, and VP05)) would require further detailed assessment.

Cumulative visual impacts

Five renewable energy projects are currently proposed, operating or under construction within the immediate region surrounding the project. These are listed in **Table 8-10** along with the potential cumulative visual impacts.

Table 8-10: Nearby large-scale renewable energy projects and potential visual impacts

Project	Status	Location	Potential visual impacts
Stubbo Solar and Battery Project	Approved and under construction	immediately south of the study area	There may be opportunities to view the Stubbo Solar and Battery Project and the project simultaneously from areas to the west and east of the project. Cumulative impacts will be assessed in detail during the EIS
Barneys Reef Wind Project	Under assessment	immediately north and west of the study area	There are likely to be opportunities to view Barneys Reef Wind Project and the project simultaneously. Cumulative impacts will be assessed in detail during the EIS
Birriwa Solar and Battery Project	Under assessment	approximately 3.9 kilometres west of the study area	There is likely to be limited opportunity to view the Birriwa Solar and Battery Project and the project simultaneously due to the distance and scale of the projects
Tallawang Solar Project	Under assessment	located approximately 8 kilometres southwest of the study area	There is likely to be limited opportunity to view the Tallawang Solar Project and the project simultaneously due to the distance and scale of the projects

A summary of the potential visual impacts from the project is provided in **Table 8-11**.

Table 8-11: Potential impacts – visual

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Temporary reduction in visual amenity from construction infrastructure	Moderate / Short term	Direct	Sensitive (social value)	Y	• Minimise – locate temporary construction infrastructure away from sensitive receptors where possible
Operation	Reduction in visual amenity from project infrastructure	High / Long term	Direct	Sensitive (social value)	Y	• Avoid – avoid placing large infrastructure in locations where high visual impacts would be perceived • Minimise – establish vegetation planting to provide visual screening
Operation	Changes to the landscape character from agricultural to electrical infrastructure	High / Long term	Direct	Sensitive (social value)	Y	• Minimise – locate photovoltaic modules in less publicly visible areas

8.2.4 Assessment level and approach

A landscape and visual impact assessment would be prepared for the project in accordance with the *Large-Scale Solar Energy Guideline* (Department of Planning, Industry and Environment, 2022b) and the *Large-Scale Solar Energy Guideline Technical Supplement - Landscape and Visual Impact Assessment* (Department of Planning and Environment, 2022c). A glint and glare assessment would also be prepared in accordance with Appendix C of the *Large-Scale Solar Energy Guideline* (Department of Planning, Industry and Environment, 2022b).

The landscape and visual impact assessment would include the following methodology:

- desktop assessment and application of preliminary assessment tools to identify public and private viewpoints
- preparation of zone of influence diagrams based on the maximum panel height of the photovoltaic modules
- photographic analysis from private viewpoints within four kilometres of the study area
- a detailed receptor assessment including preparation of panoramic photomontages and determination of visual impact ratings
- recommendations for visual mitigation measures for dwellings identified with moderate or high visual impact ratings.

The glint and glare assessment would be prepared as a standalone report. The assessment will represent a 'worst case' scenario that assumes no cloud cover throughout the year.

8.3 Heritage – Aboriginal

8.3.1 Preliminary investigations

A preliminary Aboriginal heritage assessment was completed by OzArk Environment and Heritage (OzArk) and is included in **Appendix 3**.

8.3.2 Existing environment

Known sites

A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 17 April 2023 (refer to **Figure 8-11**) for an area of approximately six kilometres by six kilometres around the study area. The search returned a result of 43 sites, with no registered sites being contained within the study area.

The closest registered site to the study area is located approximately 850 metres to the east, being an isolated stone artefact (Rosevale IF-01 (36-3-3691)) that was recorded when conducting investigations as part of the Stubbo Solar and Battery Project.

The most frequently recorded of the registered sites (33 percent) in proximity to the study area have been identified as isolated finds. Other site types identified include isolated find with potential archaeological deposit (PAD) (19 percent), artefact scatter (16 percent), artefact site (16 percent), artefact scatter with PAD (14 percent) and culturally modified trees (two percent). Most sites are located along the drainage lines of Stubbo Creek, Slapdash Creek and Pine Creek to the south of the study area, and in association with Cockabutta Creek to the east of the study area.

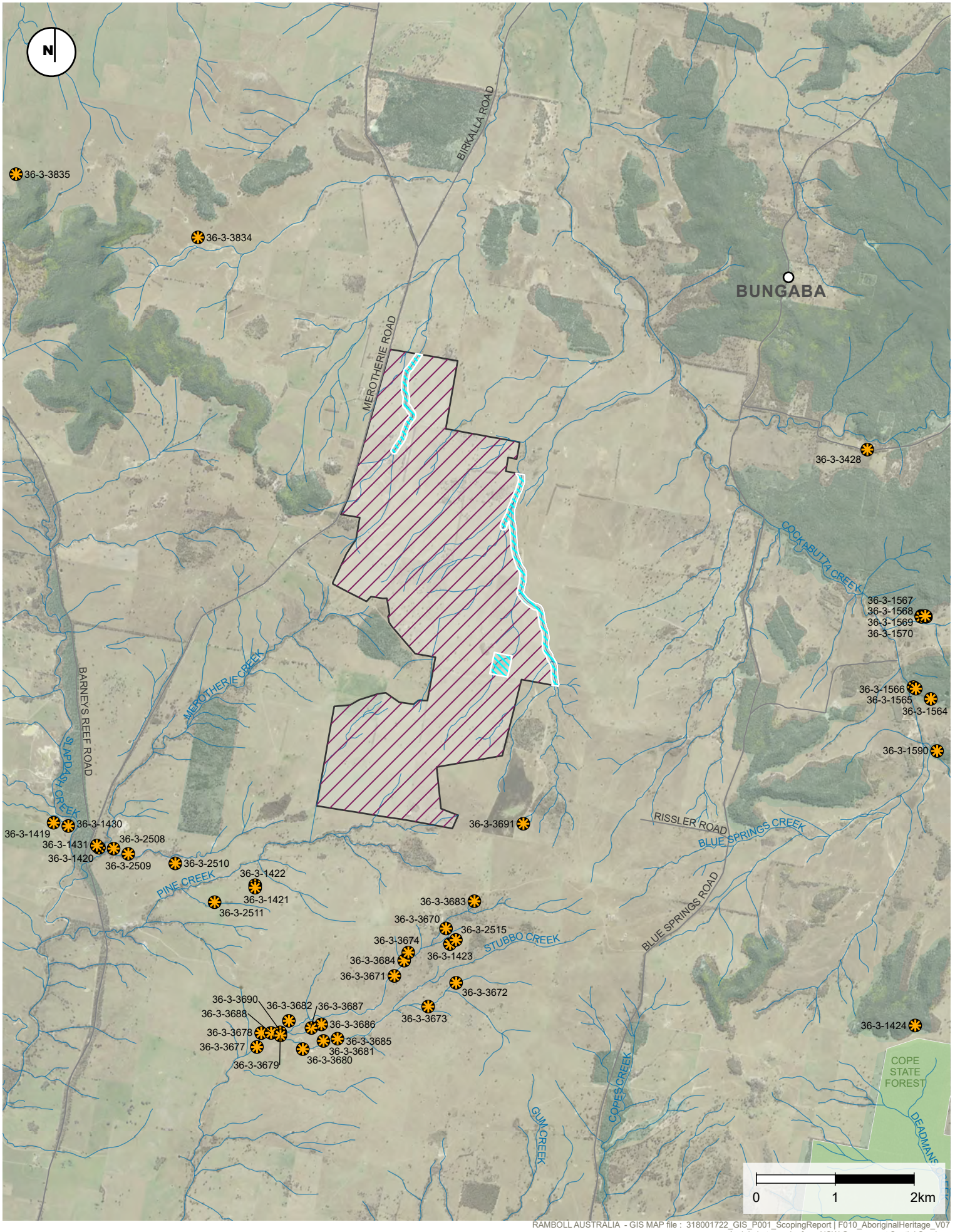
Native title

The study area is located within the Warrabinga-Wiradjuri #7 Native Title claim registered since 31 August 2018. As the study area is not situated on crown land, there are no known land claims under the *Aboriginal Land Rights Act 1983*.

8.3.3 Potential impacts

There is potential for unrecorded sites to be found within the study area, given the limited number of previous surveys within the search area, the proximity of the study area to permanent waterways, and the quantity of Aboriginal Sites recorded within proximity to the study area.

As a result of extensive land clearing that has occurred within the study area, it is less likely that culturally modified trees would be recorded. The presence of suitable stone would determine the likelihood of other site types, being grinding grooves or quarries, being found within the study area.



RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F010_AboriginalHeritage_V07
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- AHIMS site (DPE)
- Road
- Waterway
- State forest

Figure 8-11 | Aboriginal heritage - Registered sites

A summary of the potential Aboriginal heritage impacts from the project is provided in **Table 8-12**.

Table 8-12: Potential impacts – Aboriginal heritage

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Potential to impact on Aboriginal objects, sites, or culturally modified trees	High / Long term	Direct	Sensitive (social value)	Y	• Avoid – siting of infrastructure would be designed to avoid known sites and sensitive landforms • Minimise – an unexpected find procedure would be developed and implemented during construction • Offset – any sites that cannot be avoided would be salvaged by an archaeologist
Construction and operation	Potential to impact on social or cultural values of the study area	High / Long term	Perceived	Sensitive (social value)	Y	• Minimise – consultation with Aboriginal representatives to define and understand social and cultural values of the study area

8.3.4 Assessment level and approach

The assessment of Aboriginal cultural heritage values would be addressed in an Aboriginal Cultural Heritage Assessment Report (ACHAR). Preparation of the ACHAR would include consultation with Registered Aboriginal Parties (RAPs), Local Aboriginal Land Council/s and with the Native Title Claim group Warrabinga-Wiradjuri #7 (Tribunal No NC2018/002).

The assessment would follow the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Code of Practice), (Department of Environment, Climate Change and Water NSW, 2010b), the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment and Heritage, 2011) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs) (Department of Environment, Climate Change and Water NSW, 2010a).

The preparation of the ACHAR would include the following methodology:

- undertake background research to formulate a predicative model for the study area and land subject to disturbance outside the study area (such as road upgrade locations)
- conduct consultation with the Aboriginal community to establish RAPs for the project
- identify and record objects or sites of Aboriginal heritage significance within the study area as well as any landforms likely to contain further archaeological deposits with the assistance from the RAPs
- undertake an Aboriginal cultural values assessment in consultation with RAPs of tangible and intangible cultural heritage values that have potential to be impacted by the project
- undertake test excavation if warranted
- assess the significance of any recorded Aboriginal sites, objects, or places likely to be impacted by the project, in consultation with RAPs
- assess the likely impacts of the proposed work to Aboriginal cultural heritage and provide management recommendations, in consultation with RAPs.

8.4 Access – traffic and access

8.4.1 Preliminary investigations

A preliminary traffic and transport assessment was completed by SCT Consulting and is included in **Appendix 4**.

8.4.2 Existing environment

Road network

The local road network in the vicinity of the project is shown in **Figure 8-12**. Key roads relevant to the project include:

- **Golden Highway (B84)** – traversing east-west through Leadville north of the study area. The Golden Highway is a State Road movement corridor that connects to the New England Freeway near Maitland in the east and Dubbo to the west. It has one lane in each direction at the intersection with Merotherie Road and a posted speed limit of 100 kilometres per hour.
- **Merotherie Road** – traversing north-south through Merotherie on the western boundary of the study area. Merotherie Road is a local road that intersects with the Golden Highway to the north and Barneys Reef Road to the south. Satellite and street level imagery indicate that the road is unsealed with an approximate width in some locations of five metres and with no posted speed limit. The northern approximate 1.8-kilometre section of Merotherie Road is within the Warrumbungle Shire LGA with the remainder in the Mid-Western Regional LGA.

Access routes

Expected access routes from the Port of Newcastle for the project are described in **Section 4.1.8**. Locally, the project would be accessed from Merotherie Road via the Golden Highway (refer to **Figure 8-12**). Access would likely be from the northwest corner of the study area, however, would be confirmed in the EIS.

Any road upgrades would be appropriately designed, constructed, and maintained to allow for necessary access to solar and electrical infrastructure for all stages of the project. Access to the site including from public roads is subject to detailed design. The design would seek to avoid areas of high environmental impact where possible such as avoiding roadside native vegetation.

The project would also require an internal access track network connecting the solar arrays and associated infrastructure. The internal access track network would comprise internal tracks of approximately four metres wide between the solar arrays and PCUs to allow for sufficient vehicle manoeuvring, including large vehicle deliveries. Gates would be installed where the access tracks meet the perimeter road to restrict access. The access tracks would be established for construction and maintained for use as operational access tracks.

Haulage routes

Haulage routes for the project are described in **Section 4.2.2.3**. It is anticipated that construction materials and infrastructure would be largely transported to the study area via road from the Port of Newcastle. Deliveries may also come from Sydney or the North Coast (subject to resource supplier selection and port capabilities and fees etc).

It is anticipated that materials would primarily arrive via the most effective route and be transported to site by heavy vehicles up to B-double in size, however some oversize over mass vehicles may also be required.

Traffic volumes

It is estimated that the project would require around 250 light vehicles and 100 heavy vehicles per day during peak construction. Oversize over mass vehicles would also be required for for deliveries of transformers and other major equipment. These construction traffic volumes would be further investigated and refined in the EIS. The number of light and heavy vehicles accessing the site daily would be dependent on the potential provision of worker accommodation, transport arrangements to and from site for workers, and equipment, material and infrastructure delivery rates by vehicles.

Based on traffic data collected in 2021 along the Golden Highway just outside of Merriwa, about 85 kilometres from the site, the two-way traffic volume was about 270 vehicles per hour during the AM peak (8-9am) and about 330 vehicles per hour in the PM peak (3-4pm). No traffic data is currently available for Merotherie Road or the surrounding local roads.

The *Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods* indicate that rural roads can accommodate a two-way peak hourly volume of about 3,600 vehicles per hour. These roads would thus be operating with significant spare capacity; however, volumes would be confirmed by traffic surveys in the traffic and transport assessment to be undertaken as part of the EIS.

Road and intersection upgrades

The intersection of the Golden Highway and Merotherie Road is a priority-controlled T-intersection. There are no turning bays for vehicles wishing to turn into Merotherie Road from the Golden Highway. Similarly, Merotherie Road does not have turning bays, although the road widens at the intersection such that left and right turns can queue independently and simultaneously. Sight lines appear satisfactory, with sufficient sight distance of oncoming traffic, free from visual obstructions that could obscure potential hazards.

Some upgrades to public roads may be required to provide appropriate capacity and performance during construction. These would be confirmed during the EIS, but it is expected that these would include upgrades of Merotherie Road from its intersection with the Golden highway to the project site access.

Any road upgrade requirements would be considered in conjunction with any proposed road upgrades that would form part of the CWO-REZ Transmission Project (refer to discussion in **Section 1.1.5.3**) or any other proposed renewable generation projects in the area if relevant. It is expected the EIS for Narragamba Solar Project would refer to the assessment undertaken by EnergyCo for the haulage route between Newcastle and the intersection with Merotherie Road.

Rail

Part of the Sandy Hollow-Gulgong railway line owned by the Australian Rail Track Corporation is located approximately 8.7 kilometres south of the study area. No impact on rail corridor or level crossings is anticipated as the rail line does not intersect the haulage or worker access routes.

Public and active transport

There are no regular public bus services in the vicinity of the study area. Eastend Bus Service operates several school bus services to and from Gulgong, one of which travels in a loop along Cope Road, Blue Springs Road, Merotherie Road and Barneys Reef Road, with associated school bus stops located along the route. Hodgen's Bus Service (Dunedoo) operates a school bus service along Barneys Reef Road, Birriwa Bus Route South and Birriwa Bus Route North.

Given the rural setting of the area with very limited pedestrian demands, there are minimal active transport facilities within the vicinity of the study area. The Central-West Cycle Trail is a cycling route that runs in a loop through Mudgee, Gulgong, Birriwa, Dunedoo, Cobbora, Mendooran, Ballimore, Wondarbon, Dubbo, Guerie, Wellington, and Goolma. The Gulgong to Dunedoo section of the route runs partially adjacent to the study area along Merotherie Road for approximately 2.19 kilometres (refer to **Figure 8-12**).

RAMBOLL AUSTRALIA - GIS MAP file : 318001722_GIS_P001_ScopingReport | F011_Traffic_V09
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Indicative site access
- Transport route
- Central West Cycle Trail
- Road
- Railway
- Waterway
- LGA boundary
- State forest

Figure 8-12 | Traffic and access - Road network and proposed access

8.4.3 Potential impacts

During construction of the project, it is expected that potential impacts to the existing traffic on the local road network would be associated with the generation of light vehicles for worker movement and heavy vehicles for construction plant, equipment, materials, and waste removal. These impacts would be assessed in the EIS and may include:

- intersection performance impacts on the surrounding road network
- traffic performance on the surrounding road network
- temporary disruptions to traffic and active transport movements around the project including potential impacts to road user safety
- impacts on the condition of roads due to increase construction traffic
- temporary impacts to property access and active transport along the haulage and worker route associated with road widening or road intersection upgrades that may be required
- cumulative impacts with the Stubbo Solar and Battery Project, Birriwa Solar and Battery Project, Barneys Reef Wind Farm and Merotherie Energy Hub.

Site traffic demand would decrease after construction is complete and operations commence. Once the project is operational, most of the vehicles accessing the site would be light vehicles, aside from some heavy vehicles that may be required to undertake maintenance activities and repairs. Operational traffic would likely to be up to five vehicles per average day or 10 vehicle movements per day. Due to the expected low volume of vehicle movements associated with the project during operation, there would likely be minimal impact from operational traffic.

Traffic demand during decommissioning is expected to either be lower or equivalent to the construction period. Therefore, impacts are anticipated to be either be similar or less than those expected during construction with similar or reduced mitigation measures required.

A summary of the potential traffic and access impacts from the project is provided in **Table 8-13**.

Table 8-13: Potential impacts – traffic and access

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Increased traffic on the local road network affecting: • traffic performance • intersection performance • road user safety • the condition of roads.	Moderate / Short term	Direct Cumulative	Sensitive (environmental value)	Y	• Minimise – implementation of traffic controls • Minimise – implementation of road and intersection upgrades where required in consultation with road authorities, EnergyCo and the relevant councils
Construction	Temporary disruptions to traffic movements on the local road network	Moderate / Short term	Direct Cumulative	Sensitive (environmental value)	Y	• Minimise – implementation of traffic controls
Construction	Upgrades to roads and intersections required to accommodate oversize over mass vehicles	Low / Short term	Direct	Sensitive (environmental value)	Y	• Minimise – design of road and intersection upgrades will be undertaken in consultation with road authorities, EnergyCo and the relevant councils

8.4.4 Assessment level and approach

The traffic and transport impact assessment would be undertaken in accordance with:

- *Guide to Traffic Generating Developments version 2.2* (RTA, 2002)
- *Guide to Road Design Part 3: Geometric Design* (Austroads, 2016)
- *Guide to Road Design Part 4: Intersections and Crossings: General* (Austroads, 2017)
- *Guide to Traffic Management Part 3: Transport Study and Analysis Methods* (Austroads, 2020)
- *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (Austroads, 2020)
- *Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments* (Austroads, 2020)
- *Unsealed Roads Manual* (Australian Roads Research Board, 2009).

The traffic and transport impact assessment would include the following methodology:

- consultation with Mid-Western Regional Council, Warrumbungle Shire Council, Transport for NSW, EnergyCo, and other stakeholders where appropriate
- review of local council traffic and road policies
- conducting traffic surveys to assess existing road usage at key intersections
- assessment of existing traffic and transport network through:
  - traffic volumes along the access routes
  - review and safety assessment of crash data (along the access routes)
  - safe intersection sight distance assessment at site access points
  - assessment of critical intersections using Austroads intersection warrants
  - review of public transport / school transport services
  - review of active transport facilities
  - review of existing parking provisions and property access
- quantitative assessment of construction traffic impacts, including potential requirements for oversize over mass vehicles, to confirm the impacts on traffic and transport conditions and property access, and the requirement for any mitigation measures, such as roadway or intersection upgrades
- qualitative assessment of operational traffic impacts, due to the minimal impacts expected during the operational phase
- qualitative assessment of decommissioning traffic impacts due to the traffic volumes or future conditions being unknown for this phase
- assessment of potential cumulative impacts.

The traffic and transport assessment in the EIS would identify mitigation measures, which will include the development of a Construction Traffic Management Plan in consultation with Transport for NSW, Mid-Western Regional Council and Warrumbungle Shire Council. The Construction Traffic Management Plan would include any other required mitigation measures.

8.5 Amenity – noise and vibration

8.5.1 Preliminary investigations

A preliminary noise and vibration assessment was completed in the form of a desktop review. This included:

- identification of sensitive receivers within five kilometres of the study area
- identification of relevant noise and vibration criteria
- identification of noise and vibration sources associated with the project.

8.5.2 Existing environment

Noise catchment

As further discussed in **Section 8.7**, the study area and immediately surrounding land is largely characterised as rural and is primarily utilised for sheep and cattle grazing. The existing noise sources within proximity to the study area currently consists of:

- local traffic, particularly along Merotherie Road
- wildlife and farm animals
- noise from general farming activities.

Sensitive receivers

Sensitive receivers located within five four kilometres of the study area are shown in **Figure 2-1** and are listed in **Table 2-1**. These include residential receivers. No sensitive non-residential receivers as defined in the ICNG were identified near the study area. Non-residential receivers include classrooms and other educational institutions, hospitals, places of worship, active or passive recreational areas, or community centres, industrial premises, offices and retail outlets.

Construction hours

Construction would likely be undertaken during standard daytime construction hours consistent with the ICNG with the addition of work on Saturday afternoons from 1pm to 6pm, as follows:

- 7am to 6pm Monday to Friday
- 8am to 6pm on Saturdays
- no works on Sunday or public holidays.

ACEN Australia proposes exceptions to these hours without the approval of the Secretary under the following circumstances:

- activities that are inaudible at non-associated residences
- the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons
- emergency work to avoid the loss of life, property and/or material harm to the environment.

Noise criteria

A summary of the noise criteria that would apply to construction and operational activities is provided in **Table 8-14**.

Table 8-14: Noise criteria that would apply to the project

Guidelines	Criteria
Construction activities	
ICNG (Department of Environment and Climate Change, 2009)	Noise management measures are required to be implemented where predicted or measured construction noise level ($L_{eq,15min}$) exceeds: • **During standard hours** (7am to 6pm Monday to Friday, 8am to 1pm Saturday): – Noise affected – rating background level (RBL) + 10 decibels (dB) – Highly noise affected – 75 dB(A) • **Outside standard hours**: – RBL + 5 dB.

Guidelines	Criteria
Construction road traffic	
Road Noise Policy (Department of Environment, Climate Change and Water, 2011) (RNP)	Recommended that external road traffic noise levels at sensitive receivers are limited to: • Freeway/arterial/sub-arterial roads: – 60 dB $L_{Aeq,15h}$ during the daytime (7am to 10pm) – 55 dB $L_{Aeq,9h}$ during the night time (10pm to 7am). • Local roads: – 55 dB $L_{Aeq,1h}$ during the daytime (7am to 10pm) – 50 dB $L_{Aeq,1h}$ during the night time (10pm to 7am). Where the above criteria are already exceeded, the RNP recommends limiting the increase in road traffic noise levels to no more than 2 dB of the corresponding 'no build option'.
Ancillary infrastructure noise	
NSW *Noise Policy for Industry* (NPI)	The NPI establishes project noise trigger levels as the lower of the following: • **Amenity level**: a criterion established with reference to the land zoning of an area and with the aim of not increasing industrial noise levels in an area. In the area surrounding the project, which is characterised as rural, it is likely that the amenity level would be 35 dB at night • **Intrusiveness level**: 5 dB above the RBL for each time of day. The minimum intrusiveness criterion that can apply is 35 dB at evening and night.

Vibration criteria

The potential vibration impacts would be assessed for human exposure and building damage in accordance with the following criteria:

- **Cosmetic and structural damage to buildings**: German Standard DIN 4150: Part 3-1999 Structural vibration – Effects of vibration on structures 1999 (DIN 4150)
- **Human comfort**: NSW Assessing Vibration – A Technical Guideline (Department of Environment and Conservation, 2006) and Transport for NSW Construction Noise and Vibration Strategy (CNVS).

8.5.3 Potential impacts

Noise generating activities

It is expected that noise and vibration generating activities from the project during construction may include:

- site preparation and establishment
- concrete batching plant activities
- pile driving (or chosen mounting footings of photovoltaic panels) and foundations for substations
- instillation of underground electrical reticulation
- installation of photovoltaic modules and associated infrastructure

- construction of onsite permanent infrastructure (BESS, operational and maintenance facility, spare parts storage facility SCADA facilities, workshop and associated infrastructure)
- grading around lower order streams and drainage channels
- construction of access roads, including to the project and internal access roads and carparking area
- installation of security fencing and landscaping
- installation and removal of temporary construction compounds
- construction and removal of potential temporary workers accommodation.

Noise generating activities during operation may include, but are not limited to:

- tracker motors (photovoltaic modules)
- BESS (if included in the project)
- inverters with integrated transformers
- operational and maintenance facility
- workshop and associated infrastructure
- maintenance vehicles
- substation transformers.

All phases of the project, being construction, operation, and decommissioning, would be assessed in the EIS due to the proximity of sensitive receivers to the study area. It is expected that noise and vibration impacts generated in the construction period would far exceed those during operation and decommissioning. It is expected that impacts would be able to be appropriately controlled to an acceptable level.

A summary of the potential noise and vibration impacts from the project is provided in **Table 8-15**.

Table 8-15: Potential impacts – noise and vibration

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Noise and vibration impacts from the operation of construction equipment and machinery	Moderate / Short term	Direct	Sensitive (social value) Sensitive (environmental value)	Y	• Minimise – use best available technologies to reduce noise and vibration emissions
Construction	Noise impacts from road traffic	Low / Short term	Direct	Sensitive (social value) Sensitive (environmental value)	Y	• Avoid – planning site access routes to minimise the impact on sensitive land uses as much as is feasible • Minimise – restricting deliveries to site to daytime hours where possible
Operation	Noise impacts from operation infrastructure	Low / Long term	Direct	Sensitive (social value) Sensitive (environmental value)	Y	• Minimise – use best available technologies to reduce noise and vibration emissions

8.5.4 Assessment level and approach

A noise and vibration impact assessment would be completed for the project in accordance with the Noise Bulletin. The assessment would also include consideration of:

- *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009)
- *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011)
- *Noise Policy for Industry* (Environment Protection Authority, 2017)
- *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006)
- *British Standard BS7385.2 – 1993 Evaluation and Measurement for Vibration in Buildings, Part 2 – Guide to damage levels from ground borne vibration*
- German Standard DIN 4150: Part 3-1999 Structural vibration – Effects of vibration on structures 1999 (DIN 4150)
- Transport for NSW Construction Noise and Vibration Strategy (CNVS).

The noise and vibration assessment would include the following methodology:

- desktop review of sensitive receivers
- noise monitoring of ambient and background noise levels
- identify likely principal noise sources associated noise levels
- assess the potential impacts associated with construction, operational and decommissioning of the project using a noise prediction method
- provide feasible and reasonable noise and vibration mitigation and management measures.

Cumulative impacts with other projects in the locality would also be considered.

8.6 Social

8.6.1 Preliminary investigations

A preliminary social impact assessment is included in **Appendix 5**. The social impact assessment was undertaken in accordance with *Social Impact Assessment Guideline for State Significant Projects* (Department of Planning, Industry and Environment, 2021d).

The scoping of likely social impacts was informed by:

- understanding the project context and activities
- reviewing the outcomes of engagement activities conducted by ACEN Australia to date
- reviewing the existing environment and outcomes of preliminary assessments completed as part of the scoping report for the project
- considering community opinions and sentiment towards the project activities through
  - desktop research and review of other comparative projects
  - social commentary of comparative projects and issues in the social locality
  - review of submissions and research from comparative projects including the Stubbo Solar and Battery Project.

8.6.2 Existing environment

<u>Social locality</u>

Defining the social locality involves consideration of who is most likely to experience direct and indirect impacts because of the project and where those groups of people are located. The social locality will be further refined and updated according to project changes and further investigation of impacts during the assessment phase.

The social locality is shown in **Figure 8-13** and is inclusive of:

- property owners and residents of associated dwellings and properties to be used for the study area including any ancillary facilities
- property owners and residents surrounding the proposed study area, including those most directly affected suburbs and localities (SAL) as per the Australian Bureau of Statistics' (ABS) statistical areas of Merotherie, Bungaba, Cope, Stubbo and Tallawang
- the nearest town of Gulgong (15 kilometres south) and Dunedoo (25 kilometres northwest) and the host LGA of the Mid-Western Regional Council
- transportation routes along the Golden Highway and the proposed access to the study area via Merotherie Road (heavy and light vehicles).

The social locality may extend beyond these boundaries as the project considers cumulative impacts, places of residence of future construction and operational workforce and the use of services and social infrastructure for example, along with where materials may be sourced for the project.

Social baseline

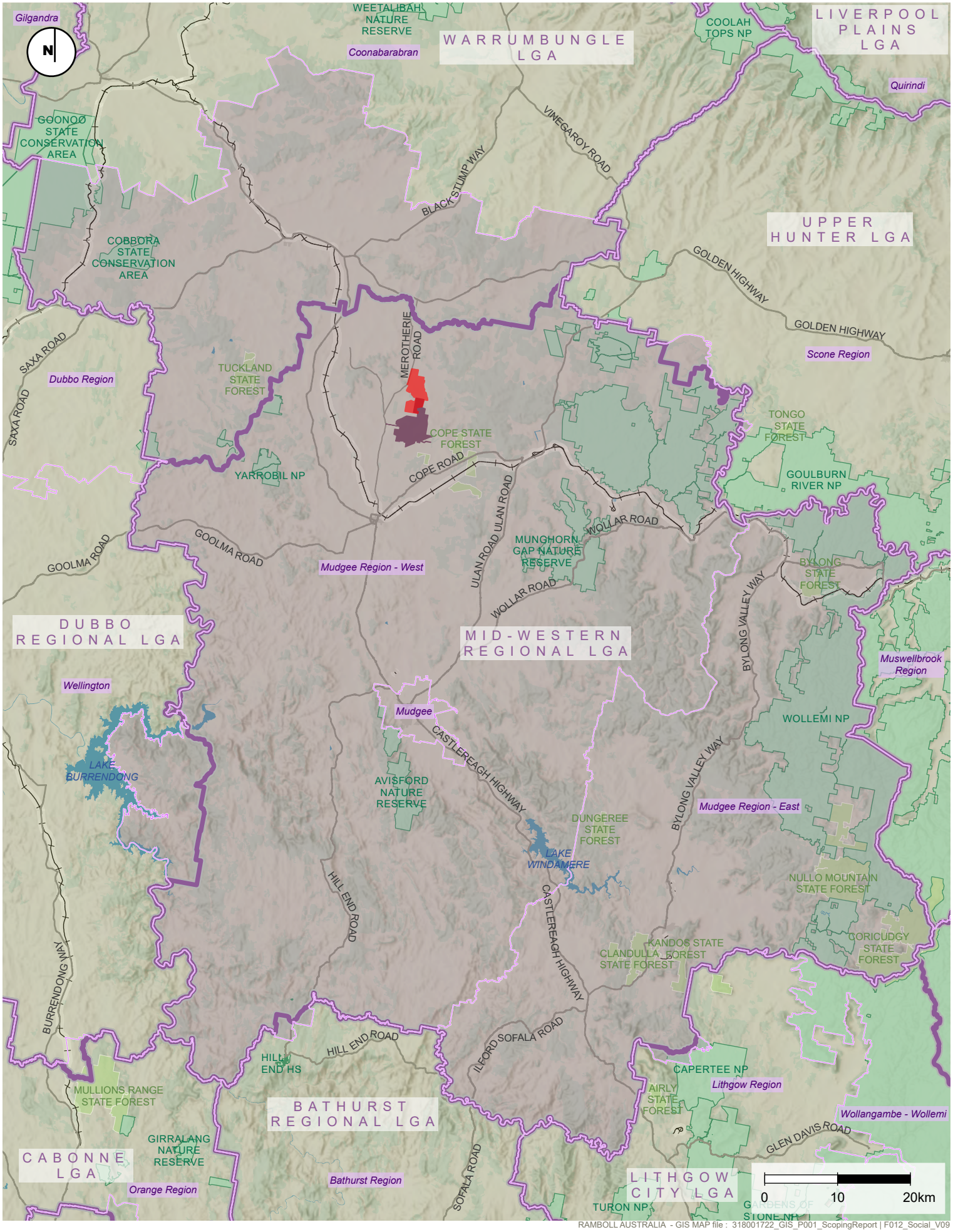
The social baseline defines the social context without the project. It documents the existing social environment, conditions and trends relevant to the project and defines characteristics of the communities within the project's social locality, including any vulnerable groups.

To define the baseline of the social locality, the following aspects were considered:

- the site and regional context (refer to **Chapter 2**)
- planning policies and strategies relevant to the region (refer to **Chapter 5**)
- the project context and activities (refer to **Chapter 4**)
- community opinions and sentient towards the project identified during engagement activities (refer to **Chapter 6**)
- cumulative impacts with other projects in the region (refer to **Section 8.10**).

The key characteristics identified for the social locality include:

- rural community with an ageing population
- notable economic growth and steady reliance on rural based industries
- strong social ties with higher-than-average volunteer rates
- strong connection to country, with Aboriginal persons accounting for a higher proportion of the population when compared to NSW
- strained access to reliable nearby health services.



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KEY

- Narragamba Solar Project study area
- Stubbo Solar and Battery Project
- Social locality (ABS 2021)
- Suburb and locality areas (ABS 2021)
- LGA boundary
- Road
- Railway
- National Parks and Reserves
- State forest

Figure 8-13 | Social - Social locality

The social profile analysis undertaken for the project identified several population groups as potentially having vulnerability to the social or economic changes that the project, and the cumulative effects of other developments across the region, may bring. These include:

- **Low-income earners:** people who live in the Mid-Western Regional LGA earn lower than average personal, family and household incomes, when compared to NSW. The median household income is $1,486 when compared int $1,829 in NSW, and median weekly personal income is $703, compared to $813 a week.
- **The elderly:** The area has an ageing population. In 2021 the 70-79 years cohort in the LGA recorded the largest population change, showing an 18.1 percent increase from 2016. The 50-59 years cohort is the most common with 3,551 people. The median age of residents is 42 years, which is notably higher than the state average of 36 years and over 40 percent of the population is above the age of 50, compared to 35 percent in NSW.
- **First Nations, Aboriginal and Torres Strait Islanders:** Aboriginal people account for approximately 6.8 percent of the Mid-Western Regional LGA, compared to 3.4 percent of NSW. Understanding and respecting their cultures, histories, and values are import aspects of engaging with Aboriginal people in a respectful and culturally appropriate way.
- **Those with a disability, or of ill-health, requiring medical attention:** according to the 2021 census, over 44 percent of those living in the LGA are living with a long-term health condition, ranging from arthritis (10.3 percent) and asthma (9.2 percent) to a mental health condition (9.2 percent). This is compared to 39 percent of those people living in NSW. Overall, a long-term health condition can have a significant impact on a person's perception of their surroundings, both physically and emotionally.

Stakeholder identification

Stakeholders may be affected groups or individuals that live, work, or recreate near the project, have an interest in the proposed action or change, use or value a resource associated with the project or are affected by the project.

A stakeholder identification process was undertaken during the scoping phase for the project to support the planning and delivery of community engagement to inform the broader EIS, including the social impact assessment. **Chapter 6** includes a description of the key groups identified during the scoping phase, the initial engagement undertaken and the proposed engagement to further inform the social impact assessment.

8.6.3 Potential impacts

Preliminary social impacts

The scoping of likely social impacts resulting from the project has been guided by the social impact assessment guideline and with reference to the social impact categories presented in **Table 8-16**.

Table 8-16: Social impact categories

Categories	Definition
Way of life	How people live, how they get around, how they work, how they play, and how they interact each day.
Community	Community composition, cohesion, character, how the community functions, 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.

Categories	Definition
Culture	Aboriginal and non-Aboriginal, including shared beliefs, customs, 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, and 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	Including the extent to which people can have a say in decisions that affect their lives, and have access to complaint, remedy and grievance mechanisms.

The level of assessment required for the scoped likely social impacts is defined as follows:

- **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 would have no social impact, or the social impacts of the project would be negligible.

The scoping phase determined a number of social impacts that require further investigation during the EIS phase. **Table 8-17** provides a summary of these impacts and demonstrates the interrelationships that exist between scoped impacts and the social impact categories.

Table 8-17: Scoped likely social impacts

Social impact category	Duration	Impact to people	Affected people	Impact type	Level of assessment in EIS
Surroundings Way of life	Construction	• Changes to amenity resulting from construction, affecting how people live (i.e., because of construction dust, noise and increases in traffic)	• Nearby neighbours • Vulnerable persons living near the project including elderly and those with an existing health condition	Negative	Detailed
Culture	Construction	• Likelihood of project to cause intangible harm through cultural and physical loss and tangible harm to items of heritage and cultural significance	• Aboriginal and Torres Strait Islanders • Community within the social locality	Negative	Detailed
Livelihoods	Construction	• Economic stimulus to local business owners resulting from the procurement opportunities and increased patronage • Enhanced wellbeing from job opportunities and training, including increased opportunities for vulnerable groups	• Local business • Vulnerable persons living within the social locality including low-income earners, youth and Aboriginal and Torres Strait Islanders • Broader community with the social locality	Positive	Standard
Community Access	Construction	• Decline in access to affordable housing, accommodation, and community services (including medical facilities) due to the temporary increase in population • Cumulative impacts associated with the broader REZ and access to affordable accommodation and community services	• Community within the social locality • Vulnerable persons living within the social locality including low-income earners, elderly and Aboriginal and Torres Strait Islanders • Tourists and accommodation providers	Negative	Detailed
Health and well-being	Construction and operation	• The potential for a decline in safety for those living near the Project due to fire risks and other health-related impacts (electromagnetic fields/dust/road safety etc.)	• Community within the social locality, including those with vulnerabilities (i.e. the elderly or suffering from health conditions) • Road users	Negative	Standard

Social impact category	Duration	Impact to people	Affected people	Impact type	Level of assessment in EIS
Decision making systems	Planning and assessment	• The perceived inability of people to have a say in changes that impact them, including access to public information and opportunities for engagement	• Council • Community within the social locality • Nearby neighbours	Negative	Standard
Way of life Surroundings	Operation	• Changes to the visual landscape, something that people value, including impacts from glint and glare	• Nearby neighbours • Those in the visual catchment	Negative	Detailed
Community	Operation	• Community investment initiatives leading to improved sustainability and enhancing resilience	• Community within the social locality	Positive	Minor
Livelihoods	Operation	• Changes to land use affecting the availability of land for agricultural purposes • Fear that the presence of the Project will contribute to the devaluation of properties	• Council • Community within the social locality • Nearby neighbours	Negative	Minor
Way of life	Operation	• Benefits of intergenerational equity due to solar farms being used as an alternate energy source	• Community within the social locality	Positive	Minor
Health and well-being	Operation	• The potential for a decline in safety for those living near the Project due to fire risks and other health-related impacts (electromagnetic fields/dust/road safety etc.)	• Community within the social locality, including those with vulnerabilities (i.e. the elderly or suffering from health conditions) • Road users	Negative	Standard
Health and wellbeing	Operation	• Increase in anxiety and stress regarding scale of development and perceived inability of people to influence change that may affect their lives	• Community within the social locality	Negative	Standard
Livelihoods	Operation	• Changes to existing land use generating an alternate revenue stream for host landholders and to a lesser degree, nearby neighbours, leading to improved resilience through income diversification	• Associated property owners • Nearby neighbours	Positive	Minor

Cumulative impacts

The scoping phase found that almost all the scoped social impacts identified in **Table 8-17** are likely to combine with other impacts from either this project or with impacts from other projects (refer to list of projects in **Section 8.10**). This is primarily due to the implications of the CWO-REZ and the likelihood that concurrent projects may be constructed and be in operation over similar timeframes.

Examples of cumulative social impacts relating to the project include:

- **Linked impact**: construction of the solar project may generate noise and dust, impacting on how people live work and play while they are also experiencing an increase in traffic on local roads
- **Temporal impact**: multiple concurrent projects occurring in the CWO-REZ, leading to impacts on the road network and increasing travel times
- **Temporal impact**: this project, combined with the construction of multiple large projects within the CWO-REZ may create a cumulative shortage of accommodation in the area and increase the pressure on existing services.

While the CWO-REZ has the potential to bring economic benefits to the region, there are a range of views and perception on the CWO-REZ and how surrounding communities would be impacted. Some people are supportive, seeing it as an opportunity to create jobs, attract investment, drive economic growth in the region, and view the shift towards renewable energy as a positive step towards addressing climate change and reducing Australia's dependence on fossil fuels. Others have concerns about the impact of the CWO-REZ on the environment (particularly on biodiversity, water resources, and agricultural land), visual impacts of the large-scale infrastructure, and around the impacts on their communities, particularly the strain on existing community services and infrastructure (i.e. accommodation, access to medical services and the local road network), changes to the local economy, community cohesion and other social dynamics. There are also concerns around the impact on property values, noise levels, and other quality-of-life issues associated with the construction and operation of renewable energy infrastructure.

Summary of potential social impacts

A summary of the potential social impacts from the project is provided in **Table 8-18**.

Table 8-18: Potential impacts – social

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Impacts to items of heritage value and cultural significance	High / Long term	Direct	Sensitive (social value)	Y	• Avoid – siting of infrastructure would be designed to avoid known sites and sensitive landforms • Minimise – consultation with Aboriginal representatives to define and understand social and cultural values of the study area
Construction	Changes to traffic conditions and public safety risks	Moderate / Short term	Direct Cumulative	Sensitive (social value) Sensitive (environmental value)	Y	• Minimise – implementation of traffic controls
Construction and operation	Reduced community cohesion	Moderate / Short term	Perceived	Sensitive (social value) Vulnerable to change	Y	• Minimise – strong community engagement throughout the duration of the project
Construction and operation	Increase in anxiety and stress	Moderate / Short term	Perceived	Sensitive (social value)	Y	• Minimise – strong community engagement throughout the duration of the project
Construction and operation	Changes to community composition	Moderate / Short term	Indirect	Sensitive (social value) Vulnerable to change	Y	• Minimise – adopt workplace strategies that encourage the integration of incoming populations with local communities
Construction and operation	Changes to existing land uses	Moderate / Short term	Direct	Sensitive (social value)	Y	• Minimise – minimise the disturbance footprint of the project

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction and operation	Changes to the amenity (visual, noise, dust, traffic)	Moderate / Long term	Direct	Sensitive (social value)	Y	• Avoid – locate project infrastructure away from sensitive receptors where possible • Minimise – use best available technologies to reduce air, noise and vibration emissions
Construction and operation	Potential decline in safety for those living near the project due to fire risks and other health-related impacts (electromagnetic field/dust/road safety etc.)	Moderate / Short term	Indirect	Sensitive (social value) Vulnerable to change	Y	• Minimise – implementation of hazard and risk minimisation measures as described in **Section 8.8**
Construction and operation	Distributive equity in landholder compensation	Low / Short term	Direct	Sensitive (social value) Sensitive (economic value)	N	• Avoid – adopt neighbouring property benefit sharing scheme
Construction and operation	Decline in access to affordable housing, accommodation, and community services	Moderate / Long term	Indirect	Sensitive (social value) Vulnerable to change	Y	• Minimise – provide temporary accommodation onsite for construction workforce
Construction and operation	Economic stimulus in the locality	Low / Short term	Indirect	Sensitive (economic value)	Y	• n/a
Construction and operation	Community investment initiatives	Low / Short term	Indirect	Sensitive (social value) Sensitive (economic value)	N	• n/a

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction and operation	Job opportunities and training	Low / Short term	Indirect	Sensitive (social value) Sensitive (economic value)	N	• n/a

8.6.4 Assessment level and approach

The social impact assessment would be undertaken in accordance with the *Social Impact Assessment Guideline* (Department of Planning and Environment, 2023c). The social impact assessment would:

- demonstrate an understanding of the project's social locality
- consider the characteristic of the communities within the social locality
- identify likely social impacts for different groups in the social locality
- identify and assess social impacts and propose arrangements to manage residual impacts
- recommend arrangements to monitor and manage residual social impacts.

Data to support the social impact assessment would be sourced from:

- existing data sources such as ABS data, published research, relevant strategic plans, and data from similar project
- discussions with State agencies
- interviews, community workshops or focus groups
- written and oral stories, first-hand testimonies or community histories
- community surveys.

8.7 Land

8.7.1 Preliminary investigations

A preliminary land assessment was completed in the form of a desktop review. This included consideration of:

- property features of the study area
- land use features of the study area and surrounding locality
- built features within the study area
- soil properties and characteristics of the study area
- potential for contamination.

8.7.2 Existing environment

Land ownership

Properties that would be directly involved with the project are privately owned by three landholders. ACEN Australia have entered into land agreements with the associated property owners allowing the option to have rights over the land for the construction, operation and decommissioning of the project.

There are no Crown land parcels within the study area. 15 parcels are subject to reservations and conditions in favour of the Crown. These parcels fall across three private land holdings. Seven of the parcels may be Crown land tenure (i.e. leasehold) and one land holding (two parcels) are subject to a lease to Telstra.

Land zoning

Land within and surrounding the study area is zoned as RU1 Primary Production under the Mid-Western Regional LEP (refer to **Figure 8-14**). The objectives of the RU1 (Primary Production) under the Mid-Western Regional LEP are:

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base
- to encourage diversity in primary industry enterprises and systems appropriate for the area
- to minimise the fragmentation and alienation of resource lands
- to minimise conflict between land uses within this zone and land uses within adjoining zones
- to maintain the visual amenity and landscape quality of Mid-Western Regional LGA by preserving the area's open rural landscapes and environmental and cultural heritage values
- to promote the unique rural character of the Mid-Western Regional LGA and facilitate a variety of tourist land uses.

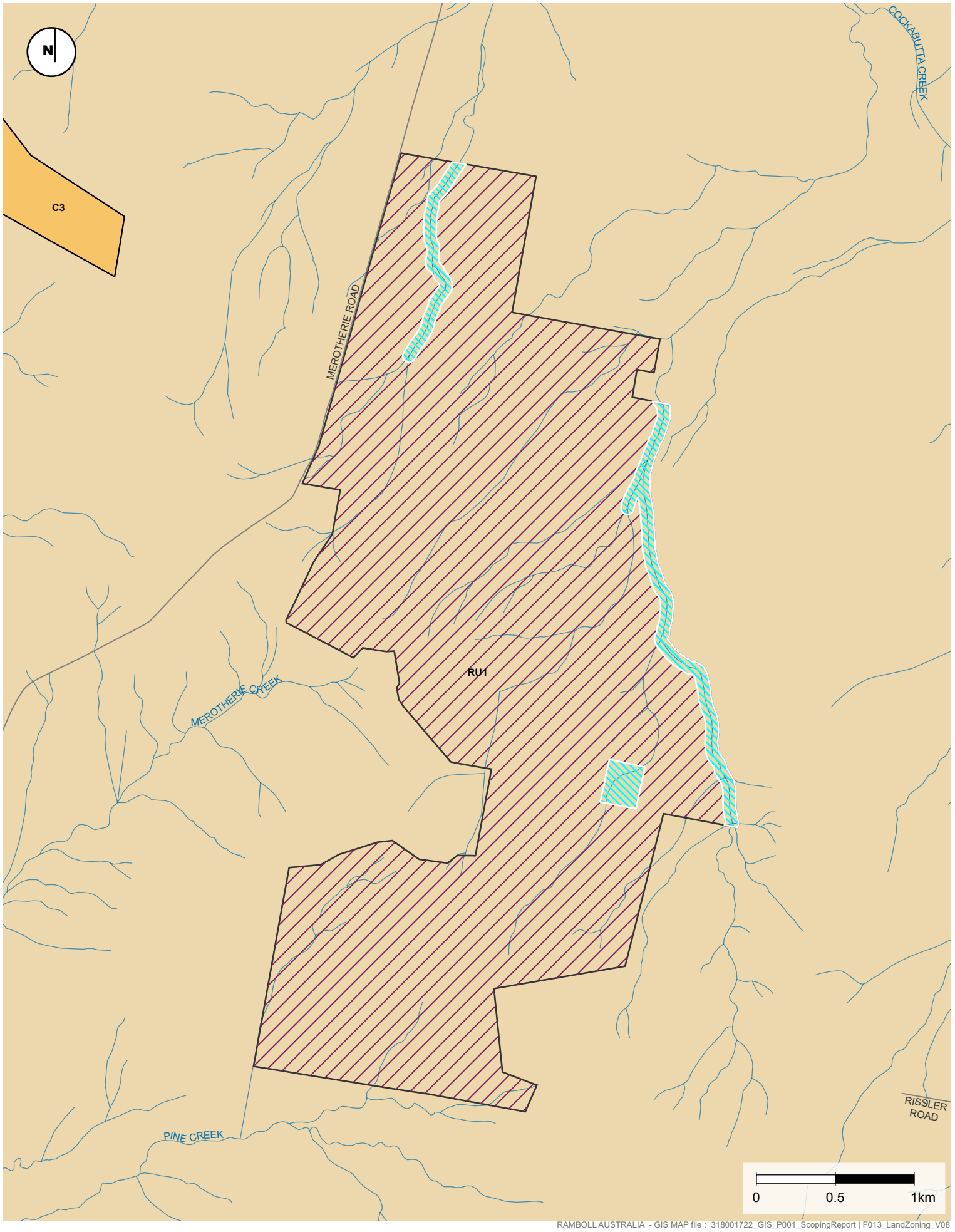


Figure 8-14 | Land - Land zoning

Subdivision

The development footprint is located within zone 'AD' for subdivision under the Mid-Western Regional LEP. Section 4.1 of the Mid-Western Regional LEP states that the size of any lot resulting from a subdivision of land in zone AD is not to be less than 100 hectares. Clause 4.1E applies to subdivision of land in zone RU1 for non-agricultural land uses. Sub-clause 2 states:

> "*Land in Zone RU1 Primary Production may be subdivided to create a lot of a size that is less than the minimum size shown on the Lot Size Map in relation to that land if the consent authority is satisfied that the use of the land after the subdivision will be the same use permitted under the existing development consent for the land (other than for the purpose of a dwelling house or dual occupancy*)."

The land on which the substation is constructed is likely to require subdivision, resulting in lots that are less than the minimum 100 hectares. However, the proposed subdivision would be permissible under Section 4.38 of the EP&A Act subject to the approval of the Minister for Planning.

At the end of the operational life of the substation, the infrastructure on the subdivided lot will be decommissioned and the lot will be reconsolidated back into the residual lot. the proposed subdivision will be the subject of ongoing discussion with Mid-Western Regional Council, DPE and the project landholders.

Land use

The study area is generally characterised as rural and is predominantly utilised for agricultural purposes, mostly cattle and sheep grazing. It is anticipated that landholders would continue to use their remaining properties not involved in the project for agricultural activities during operation of the project, as well as trialling the grazing of sheep within the study area.

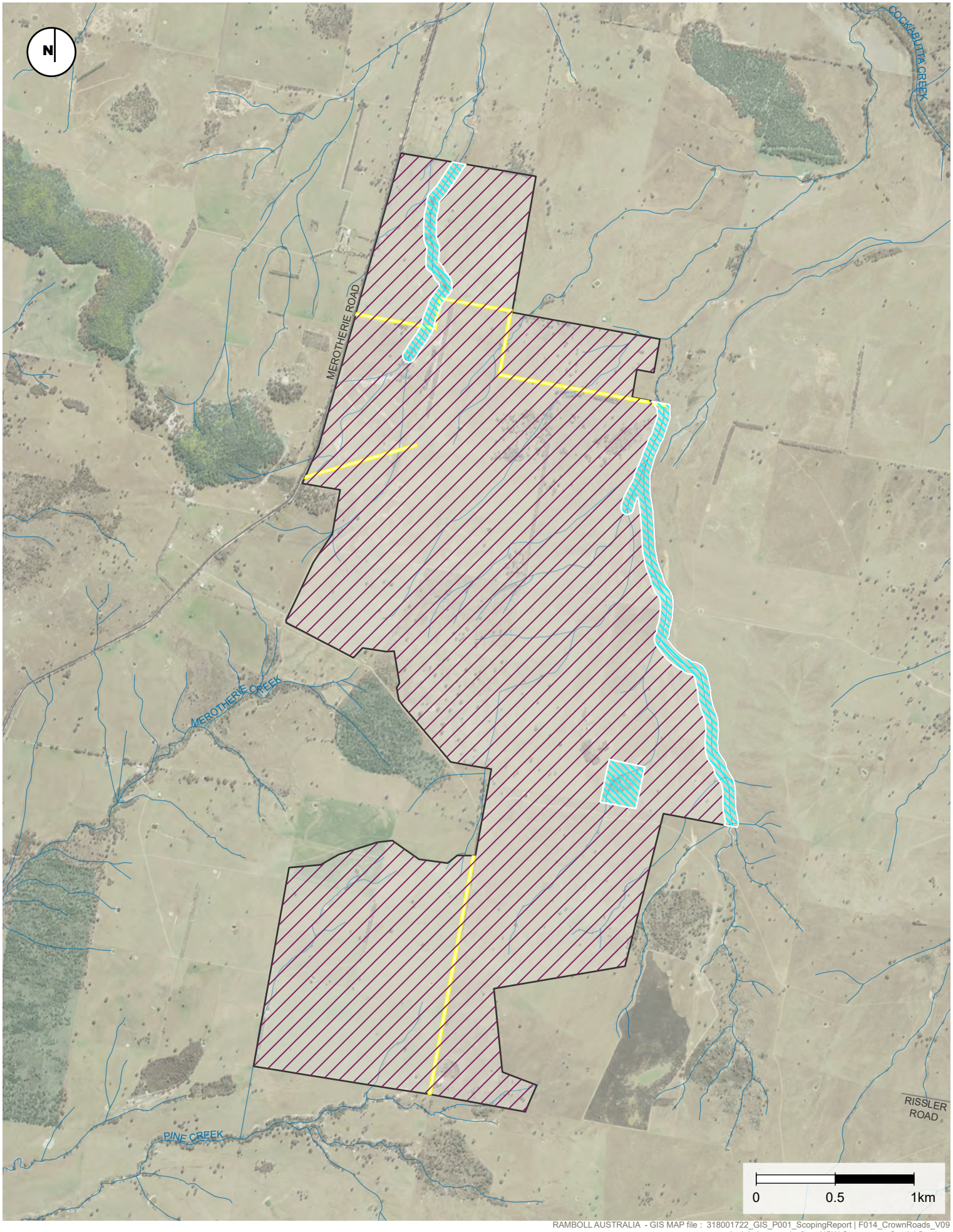
There are some small localities near the study area including Bungaba, Cope, Stubbo, Tallawang, and Beryl (refer to **Figure 2-1** and description of the local context in **Section 2.2**). Larger towns near the study area include Gulgong located approximately 15 kilometres south, and Dunedoo located approximately 25 kilometres northwest. Dubbo is located approximately 90 kilometres west of the study area.

Key land uses in the local and broader region include agriculture, consisting primarily of sheep and cattle grazing and dry land cropping, with areas of mining, viticulture and production forestry located within the broader region (Australian Bureau of Statistics, 2021h). Renewable energy development is a growing land use in the area, with multiple renewable energy projects located in the vicinity and many more proposed due to the declaration of the CWO-REZ (refer to **Section 8.10** for a discussion on cumulative considerations for the project).

There are no commercial airports close to the study area. Gulgong aeropark is located approximately 8 kilometres south of the study area and is used for recreational sporting aviation.

Crown land

There are no Crown land parcels within the study area, however there are some Crown roads (refer to **Figure 8-15**). Crown roads outside the study area may require upgrade to facilitate the project. These will be identified in the EIS. Consultation with DPE – Crown Lands will be undertaken as appropriate for any impacts to Crown roads.



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Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Crown land (DPE)
- Road
- Waterway

Figure 8-15 | Land - Crown land within the study area

Mining and minerals
There are no exploration or mining titles intercepting the study area.

National parks and reserves
No national Parks or reserves have been identified near the study area with the closest being the Goulburn River National Park located approximately 20 kilometres east of the study area and the Yarrobil National Park located approximately 18.5 kilometres southwest of the study area.

The Cope State Forest is located approximately six kilometres southeast of the study area (refer to **Figure 2-1**).

Aboriginal land claims
The study area is subject to a native title claim by the Warrabinga-Wiradjuri #7 (Tribunal No NC2018/002) registered in 2018. Native Title is expected to have been extinguished on all freehold parcels and road reserves within study area.

Built features
No built features have been identified within the study area. The CWO-REZ Transmission Project study corridor occurs within the northeast corner of the study area and traverses north and west of the study area (refer to **Figure 2-1**). Within this study corridor, EnergyCo is proposing to construct the Merotherie Hub and transmission infrastructure (500 kilovolt and 330 kilovolt double circuit transmission lines) (refer to discussion in **Section 1.1.5.3**).

Topography
The topography of the study area comprises a gently undulating area with the elevation generally ranging between approximately 450 metres and 550 metres AHD. The topography is steeper in the south-western portion of the study area, reaching approximately 550 metres AHD, and gradually decreases towards the southwestern corner and north towards Narragamba Swamp and the alluvial flats of Cockabutta Creek..

Geology
The surface geology of the study area is predominantly categorised as within the Carboniferous in the southwest, namely the Gulgong Granite, and the Quaternary in the northeast, namely the Colluvial and residual deposits (Raymond, Liu, Gallagher, Zhang, & Highet, 2012). Gulgong Granite is described as leucocratic medium to coarse grained porphyritic megracrystic granite with minor aplite phases and minor quartz monzonite (Raymond, Liu, Gallagher, Zhang, & Highet, 2012). The colluvium and residual deposits are described as sheetwash, talus, scree or boulder, gravel, sand that may include minor alluvial or sand plain deposits, local calcrete and reworked laterile (Raymond, Liu, Gallagher, Zhang, & Highet, 2012).

Mitchell landscapes
Mitchell Landscapes, otherwise known as NSW Landscapes, are defined ecosystem units based upon geologic, geomorphic and pedologic (soil) factors. Mitchell Landscapes within the study area include Cope Hills Granite within the south-western portion of the study area, and the Talbragar - Upper Macquarie Terrace Sands and Gravels within the north-eastern portion of the study area (refer to **Figure 8-16**) (Department of Planning and Environment, 2017). A description of the Mitchell Landscapes is provided in **Table 8-19**.

Table 8-19: Characterisation of the Mitchell Landscapes in the site

Landscape	**Description** (Mitchell, 2002)
Cope Hills Granite	
Geology	Undulating and rolling hills on Carboniferous granite and granodiorite
Landform	General elevation 500 to 740 metres, local relief 150 metres
Soils	Gritty gradational red earth and red texture-contrast soils
Vegetation	Forest of yellow box (*Eucalyptus melliodora*), Blakely's red gum (*Eucalyptus blakelyii*), red stringybark (*Eucalyptus macrorhyncha*), apple box (*Eucalyptus bridgesiana*), mountain gum (*Eucalyptus dalrympleana*) and black cypress pine (*Callitris endlicheri*)
Talbragar - Upper Macquarie Terrace Sands and Gravels	
Geology	Sandy Quaternary alluvial sediments on the floodplains and terraces of the Talbragar River
Landform	General elevation 350 to 500 metres, local relief 30 to 40 metres
Soils	Red-brown and red-yellow earthy sands with some yellow texture-contrast soils on the valley margins
Vegetation	River red gum (*Eucalyptus camaldulensis*) along the channels, yellow box (*Eucalyptus melliodora*) and rough-barked apple (*Angophora floribunda*) with white cypress pine (*Callitris glaucophylla*) on the plain

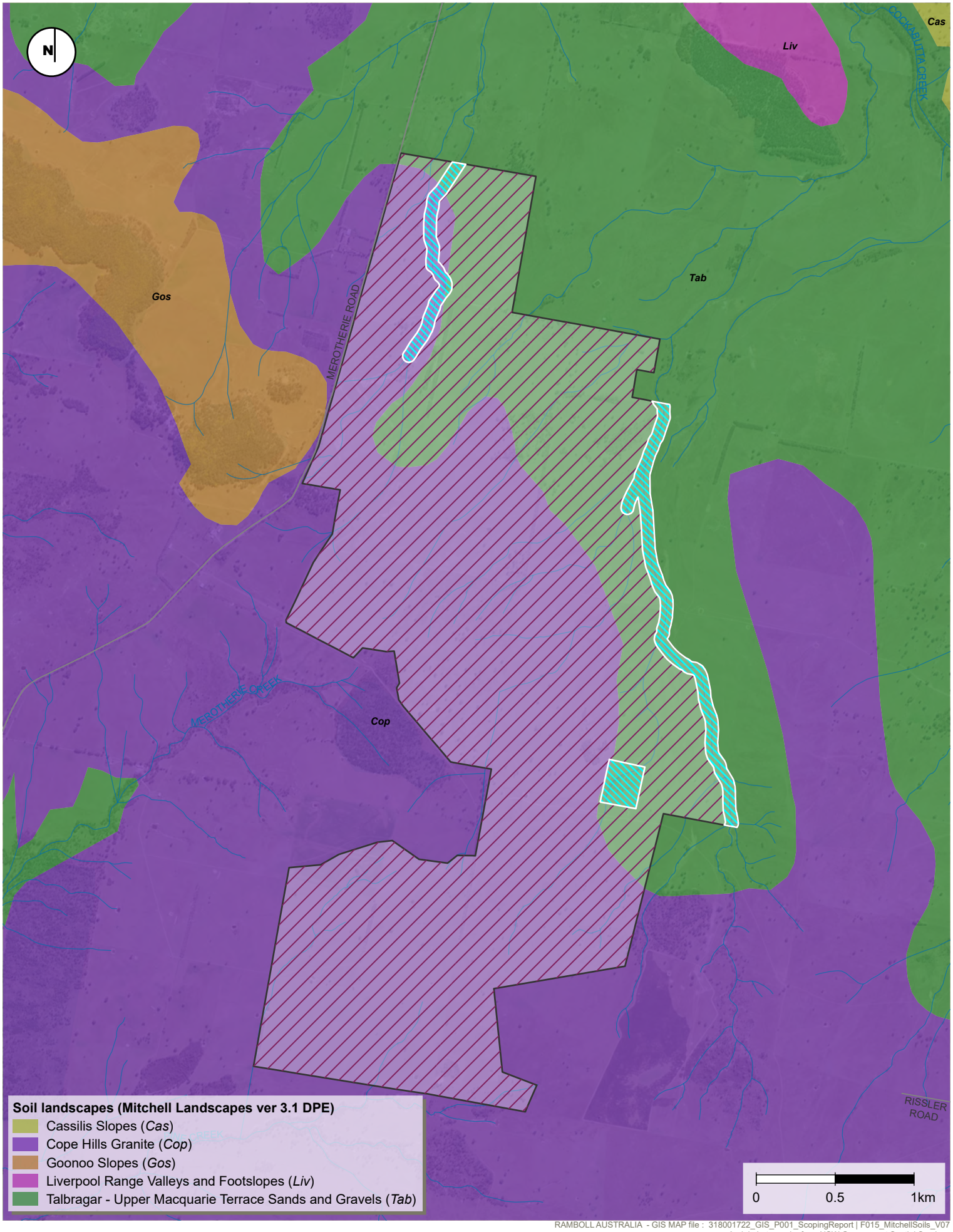
Soil landscapes

Soil landscapes within the study area include Rouse, covering the majority of the study area, , Home Rule generally within the northern portion of the study area, and some Turill in the east (refer to **Figure 8-17**).

The Rouse soil landscape is characterised by yellow soloths and yellow solodic soils on lower slopes which are associated with the study area. The Home Rule soil landscape is characterised by yellow podzolic soils and yellow solodic soils on lower slopes and flats which are associated with the study area. Limitations of these landscapes include very low fertility, acidic surface soils, low available water-holding capacity, seasonal waterlogging, sodic subsoils on lower slopes, and high to very high erosion hazard under cultivation.

Australian soils classification

The Australian Soil Classification type mapping identifies the dominant soil types across NSW at Order level. The Australian Soil Classification identifies the site as largely dominated by sodosols with some tenosols in the west. Sodosols are described as soils with a strong texture contrast between A horizons and sodic B horizons that are not strongly acidic (Isbell, 2021). Tenosols encompass a diverse range of soils generally with only weak pedologic organisation apart from the A horizon, and excluding those with a field texture of sand, loamy sand or clayey sand (Isbell, 2021).



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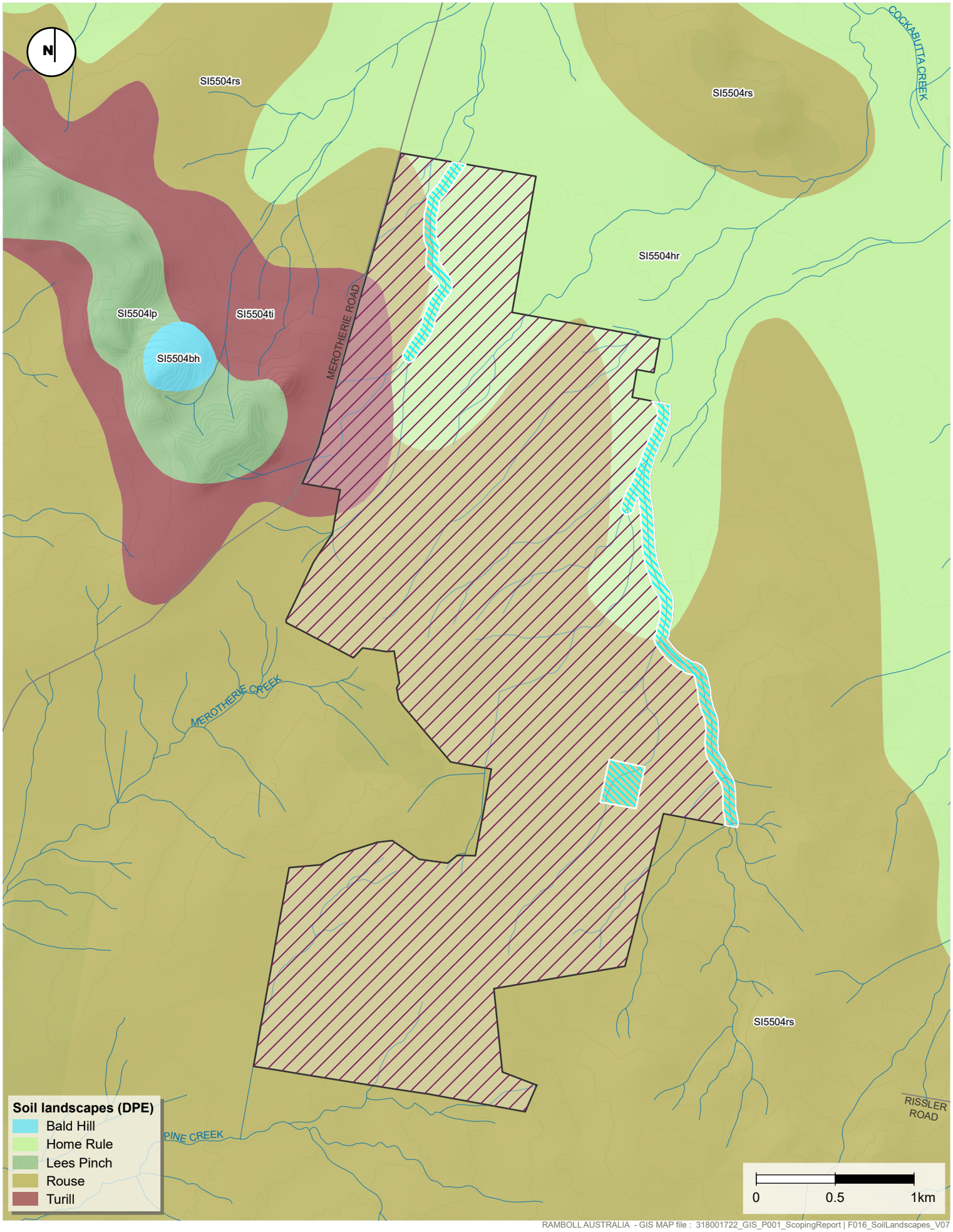
Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Road
- Waterway

Figure 8-16 | Land - Mitchell landscapes



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KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Road
- Waterway

Figure 8-17 | Land - Soil landscapes

Erosion hazard

The modelled soil erosion hazard of the site is low to moderate, ranging between less than 20 tonnes per hectares per year to 500 tonnes per hectares per year (Yang, 2020). Based on the soil types within the study area, areas within the study area that have low surface cover and experience higher flows would be prone to rill and gully erosion.

Land and soil capability

The land and soil capability classes outlined in the Land and Soil Assessment Capability Scheme (Office of Environment and Heritage, 2012) range from class 1 (extremely high capability land which has no limitations and requires no special land management practices), to class 8 (extremely low capability land with limitations that are so severe that the land is incapable of sustaining any land use aside from natural conservation).

The study area includes land mapped as land capability class 5. Class 5 lands have severe limitations for high impact land management uses such as cropping. This land is generally more suitable for grazing with some limitations or very occasional cultivation for pasture establishment (Department of Planning, Industry and Environment, 2021c).

Although the study area may be mapped as class 5, this constitutes one of the higher value classes within the Mid-Western Regional LGA and therefore is considered to be valuable agricultural land.

Biophysical strategic agricultural land

Biophysical strategic agricultural land (BSAL) is defined as land that has high quality soil and water resources that is capable of sustaining high levels of productivity. A total of 2.8 million hectares of BSAL have been mapped across the state (NSW Department of Planning, Industry and Environment, 2019). The study area is not located in an area of mapped BSAL under the *State Environmental Planning Policy (Resources and Energy) 2021*.

Acid sulfate soils

There are no known occurrences of acid sulfate soils within the study area. Based on a review of the Australian Soil Resource Information System mapping tool, there is extremely low probability that acid sulfate soils occur within or surrounding the study area.

Contamination

A search of the EPA's contaminated land public record of notice and list of sites notified to the EPA under Section 60 of the *Contaminated Land Management Act 1997* undertaken in March 2023, did not return any information on reported contamination or any regulatory notices issued for the land within or surrounding the study area.

The contaminated land planning guidelines *Managing Land Contamination Planning Guidelines: SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning, 1998) identifies 'agricultural/horticultural activities' as an activity which potentially causes contamination. The study area is located on land that is zoned Primary Production (RU1) under the Mid-Western Regional LEP and is currently used for agricultural purposes including grazing of cattle and sheep. The primary chemicals of concern associated with these historic land uses include organochlorine pesticides and arsenic. The potential for contamination to occur within the development footprint would be further considered in the EIS.

8.7.3 Potential impacts

A summary of the potential land impacts from the project is provided in **Table 8-20**.

Table 8-20: Potential impacts – land

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction and operation	Change in land use from agriculture to electricity generation	Moderate / Short term	Direct	Sensitive (social value) Sensitive (economic value)	Y	• Minimise – minimise the disturbance footprint of the project • Minimise – investigate potential for sheep grazing to occur within the study area during operations
Construction	Disturbance of soils / sediments	Low / Short term	Direct	Sensitive (environmental value)	N	• Avoid – avoid ground disturbance where possible • Minimise – install sediment and erosion controls in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004)
Construction	Compaction of soils	Low / Short term	Direct	Sensitive (environmental value)	N	• Avoid – use dedicated access tracks where possible
Construction	Disturbance of unknown contaminated areas	Low / Long term	Direct	Sensitive (environmental value)	N	• Avoid – avoid ground disturbing activities where possible • Minimise – implement an unexpected finds protocol for the management of contamination if encountered

8.7.4 Assessment level and approach

A land and soils impact assessment would be prepared as part of the EIS and would assess potential erosion risks associated with the development footprint. The assessment would include ways to minimise land use conflict risks during construction and operation of the project and would be in accordance with *Large-Scale Solar Energy Guideline* (Department of Planning, Industry and Environment, 2022b).

The land assessment would involve:

- soil sampling and survey to determine the soil characteristics and to verify the agricultural capability and land and soil capability class of the land in accordance with *Large-Scale Solar Energy Guideline* (Department of Planning, Industry and Environment, 2022b) and the *Land and Soil Capability Assessment Scheme* (Office of Environment and Heritage, 2012). A Level 1 basic soils assessment would be undertaken in accordance with Appendix A of the *Large-Scale Solar Energy Guideline* (Department of Planning and Environment, 2022b) as the study area is mapped as land and soil capability class 5 and contains no BSAL
- assessment of agricultural impacts including determination of stocking rates and gross margins for cattle and sheep production
- a Land Use Conflict Risk Assessment (LUCRA) in accordance with the LUCRA Guidelines (Department of Planning, Industry and Environment, 2011)
- outline strategies to minimise and mitigate potential impacts on agricultural land and minimise land use conflict.

8.8 Hazards and risks

8.8.1 Preliminary investigations

A preliminary hazards and risks assessment was completed in the form of a desktop review. This included consideration of:

- battery storage
- electromagnetic fields
- bushfire risk
- flooding
- dangerous goods
- biosecurity.

8.8.2 Existing environment

Battery storage

The *Large-Scale Solar Energy Guideline for State Significant* (Department of Planning and Environment, 2022b) identifies battery storage (and associated chemicals) as a key element of a solar farm to be considered in a hazards and risk assessment.

Appendix 3 of the *Applying SEPP 33* (Department of Planning, 2011) lists the industries that may fall within the Resilience and Hazards SEPP (former SEPP 33), which do not include solar farms or energy storage facilities. However, the BESS facilities, which may form part of the project, would likely use lithium-ion batteries, which are listed as Class 9 – Miscellaneous dangerous goods. While Class 9 materials are excluded from the SEPP 33 screening test, the hazards related to these materials should be considered in accordance with the Applying SEPP 33 Guidelines.

Electromagnetic fields

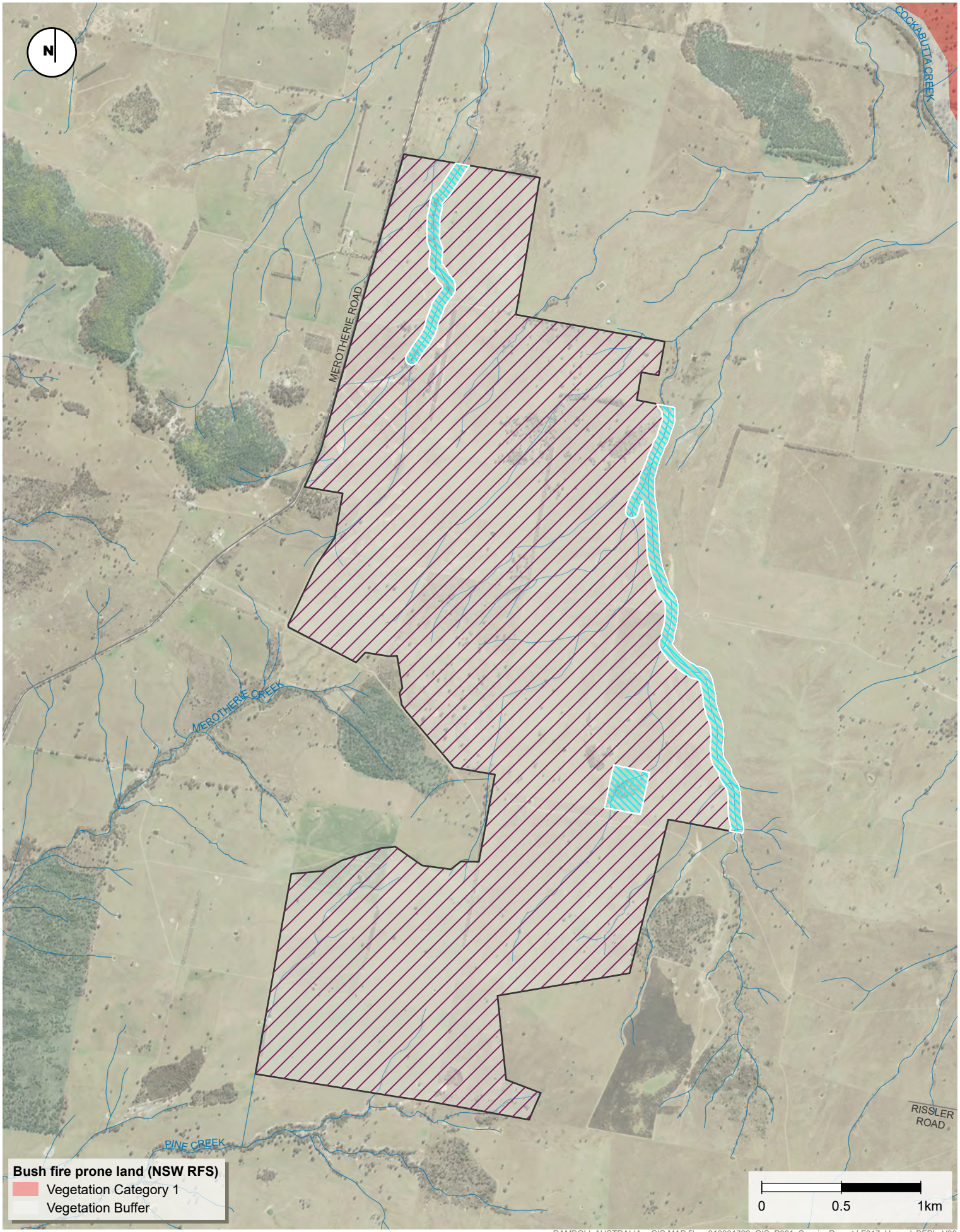
Electromagnetic field associated with the generation, distribution and use of electricity is classified as extremely low frequency electromagnetic field. Short term exposure to very high levels of electromagnetic field can be detrimental to human health. As the electrical equipment would be designed and installed in accordance with the relevant guidelines for electromagnetic field exposure, the electromagnetic field levels produced by the project would be expected to be within the recommended exposure limits at all publicly accessible locations.

Bushfire risk

The *Large-Scale Solar Energy Guideline for State Significant Development* (Department of Planning and Environment, 2022b) lists bushfire hazard and risk associated with construction and operation of a solar farm as an issue to be considered. In particular, the potential for fire spreading to the solar development or being caused by the onsite solar equipment and associated cables, panels or transmission lines.

The study area is not identified as bushfire prone land (refer to **Figure 8-18**), however the grass and woodland vegetation within the study area can pose a bushfire risk. Bushfire events have historically occurred within the region including most recently a fire at Beryl Solar Farm on 24 April 2023. The fire affected the grass between the solar panels and was contained by the NSW Rural Fire Service. The cause of the fire is unknown at this stage (PV Magazine, 2023).

Bushfire protection zones around critical infrastructure would be required to be established as part of the project.



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Aerial photography from NSW Government Spatial Services

KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- Road
- Waterway

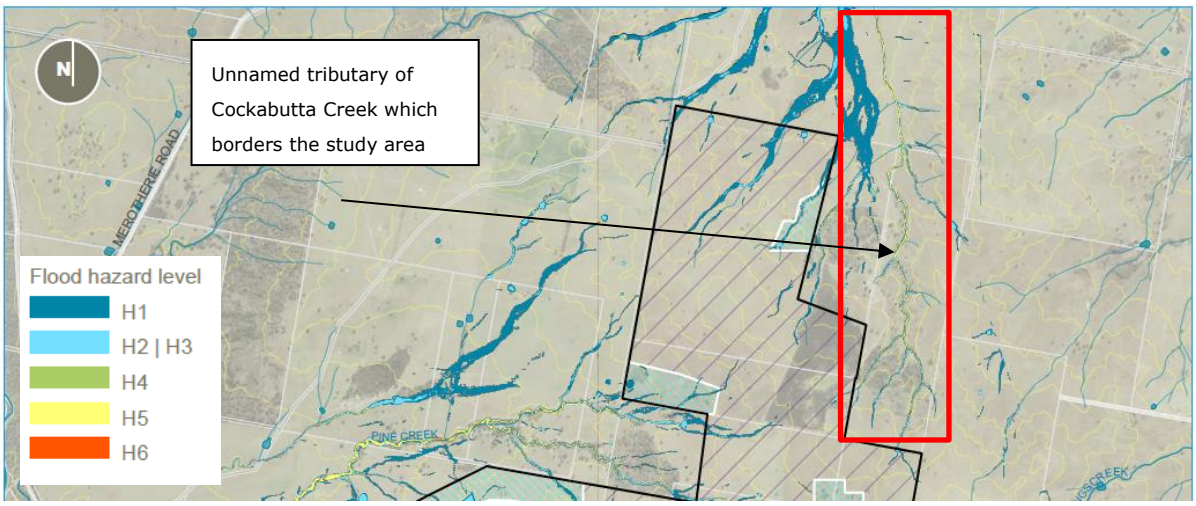
Figure 8-18 | Hazards and risks – Bushfire prone land

Flooding

The study area is traversed by a number of waterways, farm dams and overland flow paths which may be subject to minor flooding.

The study area is not identified as flood prone land. No flood studies were identified relevant to the entirety of the study area. However, the flood study completed by Water Technology for the Stubbo Solar and Battery Project (located immediately south of the study area) (Water Technology, 2020) includes some overlap with the southern portion of the study area.

The flood hazard of the Stubbo Solar and Battery Project site was generally characterised as H1: '*Generally safe for vehicles, people and buildings*' with the exception of some waterways and confined drainage lines. This included the lower reaches of the unnamed tributary of Cockabutta Creek which borders the study area which was characterised as H5: '*Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure*' under five percent annual exceedance probability (AEP) conditions. This tributary is included as an environmental exclusion zone (refer to **Figure 8-19**).



Source: (Water Technology, 2020)

Figure 8-19: Hazards and risks – Five percent AEP flood hazard modelling for Stubbo Solar and Battery Project

Dangerous goods

'Hazardous materials' are defined in *Applying SEPP 33* (Department of Planning, 2011), as substances that fall within the classification of the Australian Dangerous Goods Code (ADGC) and have a Dangerous Goods (DG) classification. The project would likely include the use of dangerous goods such as liquified petroleum gas, refrigerants and gasoline.

Biosecurity

If not adequately managed, the project has the potential to introduce and transport weeds as a result of increased vehicle movements to and from the study area during construction. This could lead to the further invasion of weeds to the local area, thereby resulting in changes to vegetation communities over time and associated loss of habitat for native species.

The project may also encourage pest animals to the local area as a result of potential increase in food sources associated with the construction activities and ground disturbance.

8.8.3 Potential impacts

A summary of the potential hazards and risks associated with the project is provided in **Table 8-21**.

Table 8-21: Potential impacts – hazards and risks

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Battery storage (if applicable)						
Operation	Failure of BESS safety features resulting in electric shock, fire, flash burns, explosion or exposure to hazardous chemicals and released gases	High / Short term	Indirect	Sensitive (environmental value)	N	• Avoid – locate BESS away from sensitive receptors where possible • Minimise – design BESS in accordance with relevant guidelines and standards • Minimise – the BESS would be monitored during operations and regularly maintained
Electromagnetic fields						
Operation	Short term exposure to very high levels of electromagnetic field can be detrimental to human health	High / Short term	Direct	Sensitive (social value)	Y	• Avoid – locate electrical infrastructure away from sensitive receptors where possible • Minimise – design electrical infrastructure in accordance with relevant guidelines and standards

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Bushfire						
Construction and operation	Potential for bushfire starting from the project or potential for construction to be affected by an external bushfire	High / Long term	Indirect	Sensitive (environmental value) Vulnerable to change	N	• Avoid – avoid operating machinery with the potential to spark near vegetated areas • Minimise – management of the solar project site to reduce available fuel loads during high fire danger periods • Minimise – establish bushfire protection zones around critical infrastructure
Flooding						
Construction and operation	Potential for construction to be affected by an external flood	Moderate / short term	Indirect	Sensitive (environmental value) Vulnerable to change	N	• Avoid – avoid operating machinery within adverse weather conditions which may result in flooding • Minimise – management of the solar project site to minimise obstruction of waterway flows • Minimise – monitor weather forecast and prepare site in the event of high rainfall and potential flooding
Dangerous goods						
Construction and operation	Risks to public safety from incorrect transport, handling, storage and use of hazardous materials	Low / Short term	Indirect	Sensitive (social value)	N	• Avoid – minimise the quantity of hazardous materials kept onsite • Minimise – transport, store and handle materials in accordance with EPA guidelines

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Biosecurity						
Construction	Introduction of weeds as a result of the increase in vehicle movements to and from the project land	Low / Short term	Indirect	Sensitive (environmental value)	N	• Minimise – implement site hygiene protocols such as washing down vehicles before entering or leaving the site
Construction	Encouragement of pest animals to the local area as a result of potential increase in food sources associated with the construction activities and ground disturbance	Low / Short term	Indirect	Sensitive (environmental value)	N	• Avoid – remove food scraps from the study area on a regular basis • Minimise – keep food scraps in a contained area to prevent odours from attracting fauna

8.8.4 Assessment level and approach

A preliminary hazards assessment would be undertaken for the project in accordance with *Hazard Industry Planning Advisory Paper No. 6 –Guidelines for Hazard Analysis* (Department of Planning, 2011) and *Multi-Level Risk Assessment* (Department of Planning, 2011). If included in the project, the assessment would consider risks from the BESS such as electric shock, fire, flash burns, explosion or exposure to hazardous chemicals and released gases.

An electromagnetic field assessment would be prepared to assess the potential impacts and risks to human health associated with the electromagnetic fields generated by the project. Typical exposure levels to electromagnetic field for the project infrastructure would be assessed against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* (2020).

The bushfire assessment would consider environmental factors that increase the risk of fire (fuel quantity and type, topography and weather patterns), as well as specific activities (such as hot works and construction activities) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines and other electrical components). The assessment would aim to demonstrate that the project can be designed, constructed and operated to minimise ignition risks and provide for asset protection consistent with the NSW Rural Fire Service Guidelines – *Planning for Bushfire Protection 2019*.

The flood assessment would consider the likely impacts of the project on flood prone land. The assessment would identify any management measures that may need to be implemented to manage flood risks both within the study area and on adjacent land.

Dangerous goods required to be transported during construction and operations would be identified and quantified within the EIS and all required licences and approvals obtained prior to the commencement of relevant construction activities. This EIS would evaluate the likely risks to public safety, by focusing on the transport, handling and use of hazardous materials.

Biosecurity risks would be considered in the EIS with consideration to the *Biosecurity Act 2015*. A weed assessment of the study area would be undertaken as part of the biodiversity assessment (refer to **Section 8.1.4**).

8.9 Other issues

8.9.1 Water

8.9.1.1 Existing environment

Hydrology

The majority of the study area is located within the Upper Talbragar River Water Source, with the southwestern portion of the site being within the Cooyal Wialdra Creek Water Source. Both water sources are regulated under the Water Sharing Plan for the *Macquarie Bogan Unregulated Rivers Water Sources 2012* (Department of Planning and Environment, 2022d).

The project is located within the Macquarie-Bogan catchment within the Murray-Darling Basin. The catchment encompasses 74,800 square kilometres and facilitates a range of water uses including livestock grazing, dryland agriculture, some irrigated agriculture, such as cotton, and local councils, and water utilities. The headwaters of the Macquarie River originate in the Great Dividing

Range south of Bathurst, with the river flowing north-westerly until it joins the Barwon River near Brewarrina (Department of Planning and Environment, n.d.)

The Talbragar River is located approximately six kilometres north of the study area and runs east-west to the north of Dunedoo and Leadville. There are 15 tributaries that join the river over its 277 kilometres course. One of its tributaries, Cockabutta Creek, is located approximately 1.8 kilometres northeast of the study area at its closest point.

Several tributaries of Cockabutta Creek cross the study area generally in a north-south direction. These tributaries generally range from first to third order streams, with one fourth order stream occurring adjacent to the eastern boundary of the study area (refer to **Figure 8-20**). The unnamed fourth order stream borders the Narragamba Swamp, which occurs adjacent to the northeastern boundary of the study area (Spatial Services, 2023). The third and fourth order streams (inside and adjacent to the study area respectively) have been included within the restricted development areas with a buffer of 40 metres either side, which is defined at 'waterfront land' by the Natural Resources Access Regulator.

Within the southwestern portion of the study area, several tributaries of Pine Creek cross the study area. The tributaries consist of first and second order streams that generally cross the study area in a north-south direction (Spatial Services, 2023).

Other named creeks near the study area include Pine Creek and Merotherie Creek, located approximately 60 metres south of the study area and 160 metres southwest of the northern portion of the study area. . Both discharge to Slapdash Creek, which eventually flows into the Cudgegong River, connecting to Lake Burrendong, located south of Gulgong.

Groundwater

The study area is located within the Lachlan Fold Belt MDB Groundwater Source and is regulated under the Water Sharing Plan for the *NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020.*

Small areas of the study area are within the southwest, west and east are mapped as being groundwater vulnerable under the Mid-Western Regional LEP (refer to **Figure 8-20**).
Clause 6.4(3) of the Mid-Western Regional LEP states that before determining a development application the consent authority must consider:

a) *The likelihood of groundwater contamination from the development (including from any onsite storage or disposal of solid or liquid waste and chemicals),*
b) *any adverse impacts the development may have on groundwater dependent ecosystems,*
c) *the cumulative impact the development may have on groundwater (including impacts on nearby groundwater extraction for a potable water supply or stock water supply),*
d) *any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.*

Although extraction of groundwater is not proposed for the project and therefore impacts to the groundwater resource or supported ecology from extraction are unlikely, the above matters would be considered in the EIS.

Searches of the BOM Groundwater Explorer database have identified two groundwater supply wells (ID GW805723; ID GW073385) and one stock and domestic well (ID GW016372) located within two kilometres of the study area (refer to **Figure 8-20**) (Bureau of Meteorology, 2023a).

The groundwater supply wells (ID GW805723; ID GW073385) are located to the west of the study area, approximately 70 metres and 695 metres respectively, while the stock and domestic well (ID GW016372) is located on the southeastern boundary of the study area.

The depth of the water bearing zone was not recorded for the identified wells however the depth of the groundwater bore can be an indication of the depth of drilling required to establish a water supply. Given this, the bore depth of the two supply wells (ID GW805723; ID GW073385) are 22 metres and 61 metres respectively, while the stock and domestic well (ID GW016372) is 1.9 metres deep.

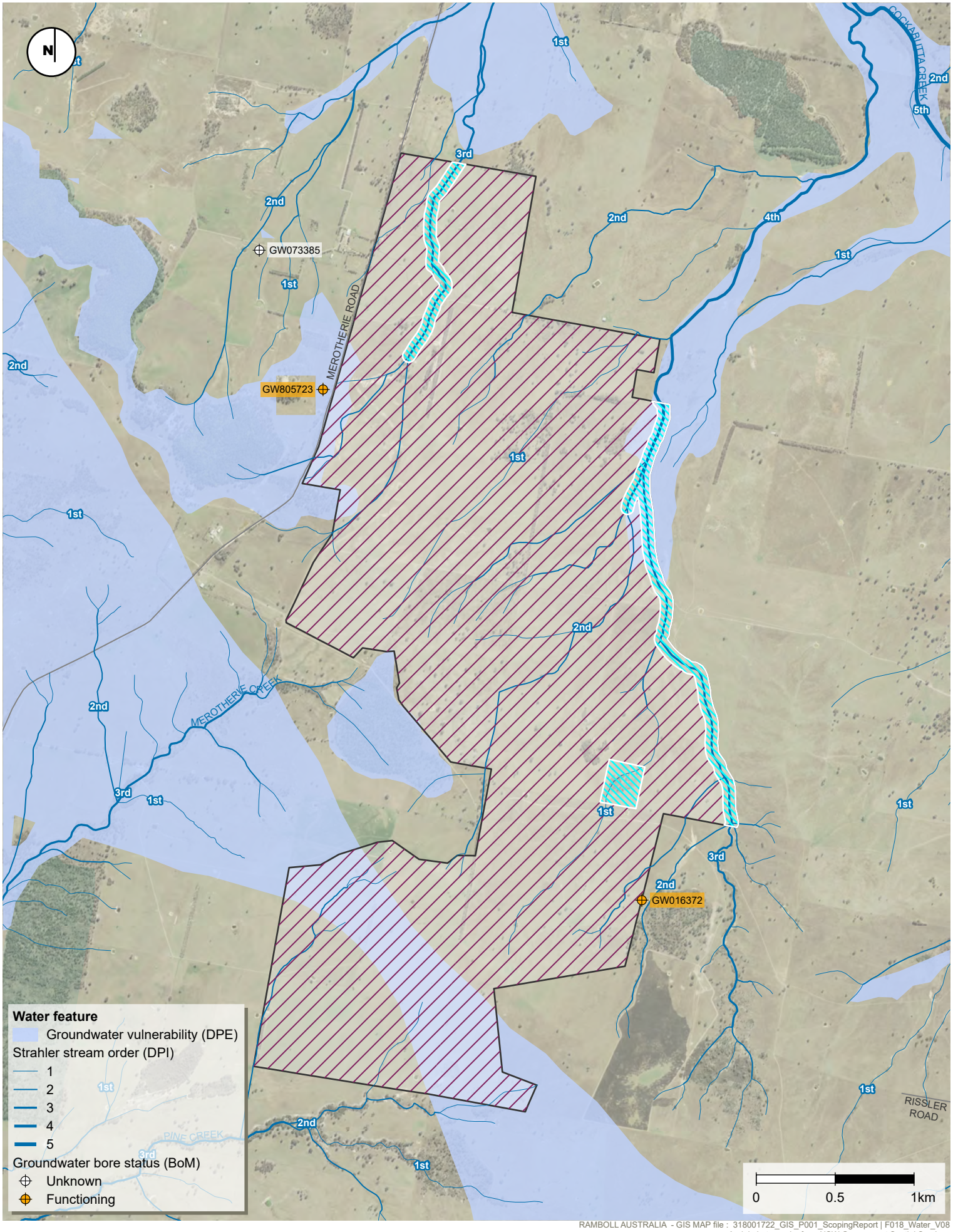
Water use and supply

During construction, water would be used for:

- dust suppression (during the construction and decommissioning phases)
- potable water supply
- concrete batching plant
- ongoing maintenance activities such as cleaning the photovoltaic modules (indicatively once a year)
- vegetation management
- emergency requirements such as fire protection.

Water required for the project would likely be sourced from commercial treated wastewater, opportunistically from farm dams within the study area as agreed with the host landowners, and from town water as a last resort.

The main water supply for the Mid-Western region is from the Cudgegong River, Burrundulla bore field, and Rylstone Dam (Mid-Western Regional Council, 2023b). The Rylstone Dam has a capacity of 3,038 megalitres (Mid-Western Regional Council, 2023a).



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Aerial photography from NSW Government Spatial Services

KEY

Narragamba Solar Project study area
Road
Development footprint
Restricted development area

Figure 8-20 | Water - Water features

8.9.1.2 Potential impacts

A summary of the potential water impacts from the project is provided in **Table 8-22**.

Table 8-22: Potential impacts – water

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction and operation	Increase to impervious fraction of the development footprint	Low / Long term	Direct	Sensitive (environmental value)	Y	• Minimise – keep paved areas to a minimum to maximise site drainage potential
Construction	Mobilisation of sediments from ground disturbing activities which could enter waterways via runoff	Low / Short term	Direct	Sensitive (environmental value)	N	• Avoid – avoid ground disturbance where possible • Minimise – install sediment and erosion controls in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004)
Construction and operation	Water pollution risks (e.g. hydrocarbon spills, concrete spills, chemical use and storage)	Low / Short term	Direct	Sensitive (environmental value)	N	• Avoid –avoid hydrocarbon and chemical use and storage within 40 metres of any watercourses • Minimise – use spill protection
Construction	Interception of groundwater and impacts to the quality, quantity or recharge	Low / Short term	Direct	Sensitive (environmental value)	N	• Avoid – minimise depth of excavations where possible

8.9.1.3 Assessment level and approach

An assessment of the potential impacts the project could have in relation to water would be addressed at the EIS stage. The assessment would include:

- desktop review of the existing environment conditions of the development footprint
- an assessment of potential impacts of the development with regard to flooding, surrounding watercourse, groundwater resources
- assess the water management issues with regard to the *Large-Scale Solar Energy Guideline 2022* (Department of Planning and Environment, 2022b)
- identification of mitigation measures.

8.9.2 Heritage – historic

8.9.2.1 Existing environment

Historical context

The first European settlement in the area occurred in the 1822 when a cattle run, called 'Guttawang', was established in Gulgong located approximately 15 kilometres south of the study area. The Gulgong goldfield was gazetted in 1866 with the area experiencing growth during the 1870s due to a goldrush. The town was gazetted in 1872, when it reportedly had a population of 20,000 people in the area and became a municipality in 1876 with the population reducing to 1,212 by 1881.

Land use context

The current land use is for grazing. There is potential for historic heritage sites relating to the historic use of the land to be present inside the study area. Such sites could include items such as old farming equipment or the physical remains of huts, sheds and historic homesteads. These would be investigated in the EIS.

Local heritage

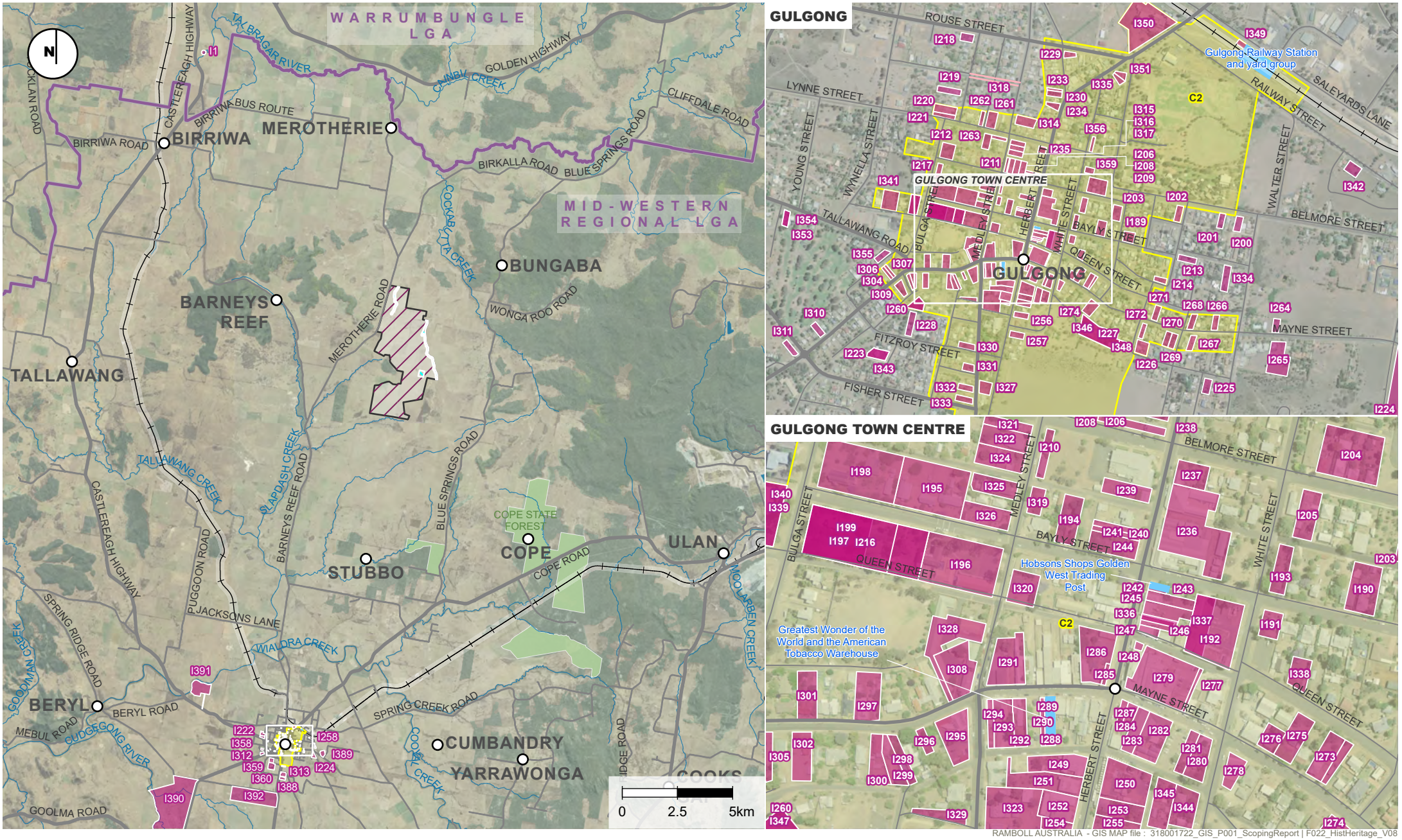
There are no locally listed historic heritage items currently identified within proximity to the study area. The closest locally listed site is listed under the *Warrumbungle Local Environmental Plan 2013 and* is located over 13.4 kilometres northwest of the study area, with an additional three items located between approximately 15 and 17 kilometres northwest of the study area. Additionally, there are 178 locally listed sites under the Mid-Western Regional LEP, including the Gulgong Heritage Conservation Area, located over 14 kilometres south of the study area.

State heritage

There are no State heritage sites located within proximity to the study area. There are four State listed heritage items located approximately 14 kilometres south of the study area, and one heritage item located at Dunedoo approximately 25 kilometres northwest of the study area.

Commonwealth, National and World heritage

There are no Commonwealth, National or World heritage listed places located within proximity to the study area. The closest National heritage item, which is currently an area under assessment, is the Greater Blue Mountains Area – Additional Values Areas, located approximately 18 kilometres east of the study area. The closest Commonwealth listed historic heritage site, the Mudgee Post Office, is located approximately 40 kilometres south of the study area. The closest World Heritage Area to the study area is the Great Blue Mountains Area located approximately 59 kilometres southeast of the study area.



KEY

- Narragamba Solar Project study area
- Development footprint
- Restricted development area
- State heritage register (DPC)
- LEP local heritage items (DPE)
  - Conservation Area - General
  - Item - General
- Road
- Railway
- Waterway
- LGA boundary
- State forest

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Aerial photography from NSW Government Spatial Services

Figure 8-21 | Historic Heritage - Heritage sites

8.9.2.2 Potential impacts

A summary of the potential historic heritage impacts from the project is provided in **Table 8-23**.

Table 8-23: Potential impacts – historic heritage

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Ground disturbance works associated with vegetation clearance, grading of the site and construction of project infrastructure.	Low - Moderate / Short term	Direct	Sensitive (social value) community value, heritage value, landscape Sensitive (economic value) Sensitive (environmental value) natural habitat	N	• Avoid – identified areas of historical significance • Minimise – implement stop works procedure and historic investigation protocol
Decommissioning	Ground disturbance works associated with vegetation clearance and the removal of project infrastructure.	Low - Moderate / Short term	Direct	Sensitive (social value) community value, heritage value, landscape Sensitive (economic value) Sensitive (environmental value) natural habitat	N	• Avoid –identified areas of historical significance • Minimise – implement stop works procedure and historic investigation protocol

8.9.2.3 Assessment level and approach

Although historic heritage is considered unlikely to pose a risk to the project, a heritage impact assessment would be conducted at the EIS stage and would include:

- desktop analysis of state and federal databases
- conduct historic research of any listed or potentially significant items
- plot desktop search/research results and produce a constraints map
- if required, a field assessment of the development footprint would be undertaken by an experienced and qualified archaeologist. The assessment would be undertaken in accordance with the Heritage Council's *Historical Archaeology Code of Practice* (Heritage Council, 2006)
- test excavations will be undertaken if required.

A Statement of Heritage Impact (SoHI) and/or an Archaeological Assessment would be conducted if required. If a SoHI is required, the assessment would be conducted in accordance with the following guidelines:

- Burra Charter 2013 (Australia International Council on Monuments and Sites, 2013)
- Part 4 of the EP&A Act 1979
- The EPBC Act by way of the National Heritage List and Commonwealth Heritage List established under the Act
- NSW *Heritage Act 1977*.

8.9.3 Economic

8.9.3.1 Existing environment

Regional economic profile

The Mid-Western Regional LGA supports 10,095 jobs and has an annual economic output of $5.902 billion. Mid-Western Regional Council's gross regional product is estimated at $3.165 billion (Remplan Economy, 2022).

Some of the key characteristics that contribute to the economic profile of the Mid-Western Regional LGA compared to NSW are summarised in **Table 8-24** (Australian Bureau of Statistics, 2021i).

Table 8-24: Economic profile – key characteristics

Attribute	Units	Mid-Western Regional LGA	NSW
Population and people			
Population	No.	25,713	8,072,163
Working age population (aged 15-64 years)	%	59.4	64.2
Median age	No.	42	39
Unemployment rate	%	4	4.9
Income			
Median household weekly income	$	1,486	1,829
Average weekly household rent	$	330	420

Attribute	Units	Mid-Western Regional LGA	NSW
Average monthly household mortgage	$	1,733	2,167
Occupations			
Technicians and trades workers	%	17.5	11.9
Professionals	%	14.1	25.8
Managers	%	13.9	14.6
Machinery operators and drivers	%	12.9	6.0
Labourers	%	11.4	8.2
Community and personal service workers	%	11.0	10.6
Clerical and administrative workers	%	9.7	13.0
Sales workers	%	7.8	8.0

The top five industries of employment with the Mid-Western Regional LGA are (Australian Bureau of Statistics, 2021i):

- mining (15%)
- wholesale trade (10.5%)
- health care and social assistance (9.9%)
- accommodation and food services (7.8%)
- education and training (7.6%).

Local economic profile

The study area is located within the Statistical Area Level 2 of Mudgee Surrounds – West, which encompasses the area surrounding Mudgee (excluding Mudgee township) including the communities of Dunedoo, Gulgong, and Wollar.

At the last census there was a total of 1,370 business within the locality (Australian Bureau of Statistics, 2021j). The top industries for employment in the locality are identified in **Table 8-25**.

Table 8-25: Top industries of employment within the Mudgee Surrounds - West Statistical Area as of 2021

Industry	Number of businesses	Proportion of employed people
Agriculture, forestry, and fishing	734	17.3%
Mining	10	12.4%
Health care and social assistance	21	9.7%
Retail trade	19	8.2%
Education and training	11	7.6%
Construction	168	7.6%

Source: (Australian Bureau of Statistics, 2021j)

In 2021, the gross value of agricultural production of the locality was $101.1 million, with livestock slaughtered and other disposals grossing $58.3 million, and crops grossing $26.6 million (Australian Bureau of Statistics, 2021j).

Within the locality, the median equivalised total household weekly income is $884 (Australian Bureau of Statistics, 2021j) compared to the median weekly household income of $2,484 for NSW (Australian Bureau of Statistics, 2021b). The weekly rent ($280) and median monthly household mortgage ($1,651) for the Statistical Area is also below the NSW medians ($660 and $3,467 respectively) (Australian Bureau of Statistics, 2021b).

8.9.3.2 Potential impacts

A summary of the potential economic impacts from the project is provided in **Table 8-26**. The project would provide the region with economic benefits through both direct and indirect employment, and economic activity during both the construction and operation phases.

Table 8-26: Potential impacts – economic

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction and operation	Loss of economic activity from foregone potential agricultural activity	Moderate / Short term	Direct	Sensitive (economic value)	Y	• Minimise – continue agricultural activities around solar panels • Offset – investment back into the local economy
Construction	Competition for skilled local labour force with other projects in the region	Moderate / Short term	Cumulative	Sensitive (social value)	Y	• Offset – support traineeship programs to bring new skilled personnel into the workforce
Construction and operation	Decline the value of neighbouring private land	Moderate / Short term	Indirect	Sensitive (economic value)	Y	• Minimise – minimise amenity impacts with potential to reduce property values • Offset – monetary compensation to directly affected landholders

8.9.3.3 Assessment level and approach

The following would be undertaken for the economic assessment:

- characterisation of the regional economy based on published data and statistics
- input-output analysis of the construction and operation of the project on the regional and State economy
- input-output analysis of the reduction in agricultural activity on the regional and State economy as a result of the project
- qualitative analysis of other economic issues, such as potential impact on land values, based on application of economic principles and review of the literature.

An assessment of the project's impact on agricultural production would be undertaken as described in **Section 8.7.4**.

8.9.4 Air

8.9.4.1 Existing environment

Climate

The study area is located within climate zone six and experiences mild temperate weather (Australian Building Codes Board, 2019).

The nearest meteorological station that provides long-term climate statistics is the Bureau of Meteorology's (BoM) Dunedoo Post Office station (site number 064009), located approximately 24 kilometres northwest of the study area. The station provides data from 1921 to 2023 (Bureau of Meteorology, 2023d).

Data recorded from the BOM meteorological station indicates that temperatures are highest in January, with a mean maximum temperature of 32.2 degrees Celsius. Temperatures are lowest in July, with a mean minimum temperature of 2.1 degrees Celsius (Bureau of Meteorology, 2023d).

Data recorded from the BOM meteorological station indicates that the average annual rainfall is 618 millimetres, with the highest mean monthly rainfall occurring in January (70.7 millimetres) and the lowest mean monthly rainfall occurring in August (40.2 millimetres) (Bureau of Meteorology, 2023d).

The annual 9am and 3pm wind roses recorded at the BoM meteorological station are included as **Figure 8-22**. The prevailing winds are from the east in the morning period and the west in the afternoon period (Bureau of Meteorology, 2023d).

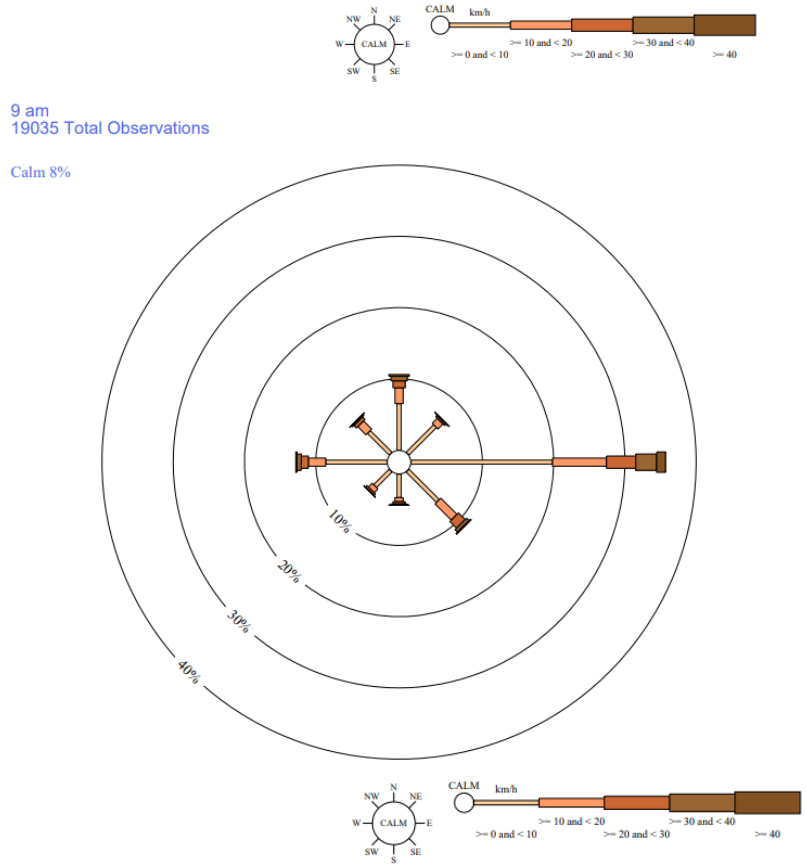

Figure 8-22: Air – Annual 9am and 3pm wind rose

Particulate matter (dust)

Sensitive receptors located near the study area are shown in **Figure 2-1**. Based on the prevailing winds recorded at the Dunedoo Post Office meteorological station, dust emissions would generally be transported to the west in the morning period and to the east in the afternoon period.

The Merriwa air quality monitoring station maintained by DPE is the closest publicly accessible station to the study area and is located approximately 81 kilometres east of the study area. Data from the station reports an annual average particulate matter (PM) of less than 2.5 microns aerodynamic diameter ($PM_{2.5}$) of 4.2 µg/m^3 in 2021 and 3.4 µg/m^3 in 2022, and an annual average particulate matter of less than 10 microns diameter (PM_{10}) of 15.8 µg/m^3 between 2012 to 2022 (Department of Planning and Environment, 2023a).

8.9.4.2 Potential impacts

A summary of the potential air impacts from the project is provided in **Table 8-27**.

Table 8-27: Potential impacts – air

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Generation of dust from construction activities	Moderate / Short term	Direct	Sensitive (environmental value) Sensitive (social value)	Y	• Avoid – cease construction activities during high wind periods • Minimise – implement best practice controls and management to minimise dust generation
Construction and operation	Release of emissions from use of construction vehicles and machinery	Low / Long term	Indirect	Sensitive (environmental value) Sensitive (social value)	Y	• Avoid – turn equipment and machinery off when not in use • Minimise – use low emission technology where possible
Operation	Wind erosion of exposed areas	Low / Short term	Indirect	Sensitive (environmental value)	Y	• Avoid – cover exposed surfaces to minimise exposure to wind

8.9.4.3 Assessment level and approach

Air quality and dust management will generally be assessed in the EIS, including qualitatively considering potential impacts and proposing appropriate management and mitigation measures for the construction and operational phases of the project. The assessment would be carried out in accordance with relevant guidelines and policies including:

- National Greenhouse Accounts Factors (Department of Climate Change, Energy, the Environment and Water, 2022)
- NSW Climate Change Policy Framework (Office of Environment and Heritage, 2016).

8.9.5 Waste and resources

8.9.5.1 Existing environment

Waste

Several waste streams would be produced from both the construction and decommissioning phases of the project, while only minor quantities would be generated through operation and maintenance. Primary waste sources expected to be generated during construction include:

- paper and cardboard
- wood
- plastic
- green waste
- surplus topsoil and excavated material
- electrical
- metals
- liquid waste
- sewage
- general domestic
- commercial waste.

Majority of waste generated by the project would be classified under general solid waste in accordance with the *Waste Classification Guidelines Part 1: Classifying Waste* (Environment Protection Authority, 2014). Hazardous waste, such as lithium-ion cell batteries, would be required to be transported for disposal or recycling in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (National Transport Commission, 2018).

ACEN Australia would engage with Mid-Western Regional Council and suppliers servicing facilities in local regional centres such Dubbo and Muswellbrook to identify suitable recycling and landfill centres for the project. It is likely packing / transport materials for large components would be returned to the manufacturer.

Resources

Most required resources would be used during the construction phase. Resources expected to be required are:

- glass for photovoltaic panels
- metal for mounting systems, containers, and fencing
- sand for cable bedding
- concrete for foundations and general construction
- gravel for internal access roads and carparking
- wood for general building construction
- water for dust suppression and maintenance.

8.9.5.2 Potential impacts

A summary of the potential waste and resource impacts from the project is provided in **Table 8-28**.

Table 8-28: Potential impacts – waste and resources

Phase	Potential impact	Scale of impact	Nature of impact	Sensitivity of receiving environment	Cumulative impacts (Y/N)	Potential mitigation measures
Construction	Pollution of land and water resulting from poor management of wastes	Moderate / Long term	Indirect	Sensitive (environmental value)	Y	• Minimise – management of wastes in accordance with a waste management plan
Construction	Decreased availability of local resources including water, gravel and sand etc	Low / Short term	Direct	Sensitive (economic value)	Y	• Minimise – consultation with Mid-Western Regional Council to determine appropriate sources of resources
Construction and operation	Decreased amenity resulting from poor management of wastes	Low / Short term	Direct	Sensitive (social value)	Y	• Minimise – management of wastes in accordance with a waste management plan
Construction and operation	Disposal of wastes contributing to landfill	Low / Long term	Direct	Sensitive (environmental value)	Y	• Minimise – wastes would be recycled where possible
Decommissioning	Disposal of solar photovoltaic panel components	Moderate / Long term	Direct	Sensitive (environmental value)	Y	• Minimise – consider reasonable and feasible alternative disposal methods for the components based on the industry standards at the time of decommissioning

8.9.5.3 Assessment level and approach

To understand the projects potential impacts on waste and resourcing, an assessment of waste and resources would be undertaken, that would include:

- identification of key resources required throughout the construction, operation and decommissioning phases of the project and their availability
- understanding the statutory context for waste management
- identification of waste streams that would be produced over the project lifecycle and their waste classification in accordance with relevant legislation
- identification of existing waste management facilities in the vicinity and their capacity to accept different waste streams
- estimating quantities for key waste streams that would be produced
- consultation with Mid-Western Regional Council and other suppliers to determine appropriate sources and disposal of resources and waste.

The waste and resource assessment would be conducted in accordance with relevant polices, legislation and guidelines, including:

- *Protection of the Environment Operations (Waste) Regulation 2014* (Waste Regulation)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Waste Avoidance and Resource Recovery Act 2001* (WARR Act)
- *Waste Classification Guidelines* (Environment Protection Authority, 2014)
- *Large Scale Solar Guidelines* (Department of Planning and Environment, 2022b).

8.10 Cumulative impacts

8.10.1 Existing environment

Cumulative impact screening

There are a number of proposed, approved or operational renewable energy projects located in proximity to the study area which are shown on **Figure 8-23**.

The cumulative impact assessment levels are defined in **Table 8-29**. Relevant cumulative impact assessment matters have been categorised in **Table 8-30** for each identified project, which is based on the cumulative impact assessment scoping summary table in Appendix B of the *Cumulative Impact Assessment Guidelines for State Significant Project* (Department of Planning, Industry and Environment, 2021b). Projects located within a 50-kilometre radius from the study area were considered in the cumulative impact screening.

Table 8-29: Cumulative impact assessment level definitions

Assessment level	Description
Detailed assessment (D)	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 (e.g. Project A) 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 (S)	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 (e.g. Project A) and the proposed project that would warrant any consideration in the cumulative impact assessment.

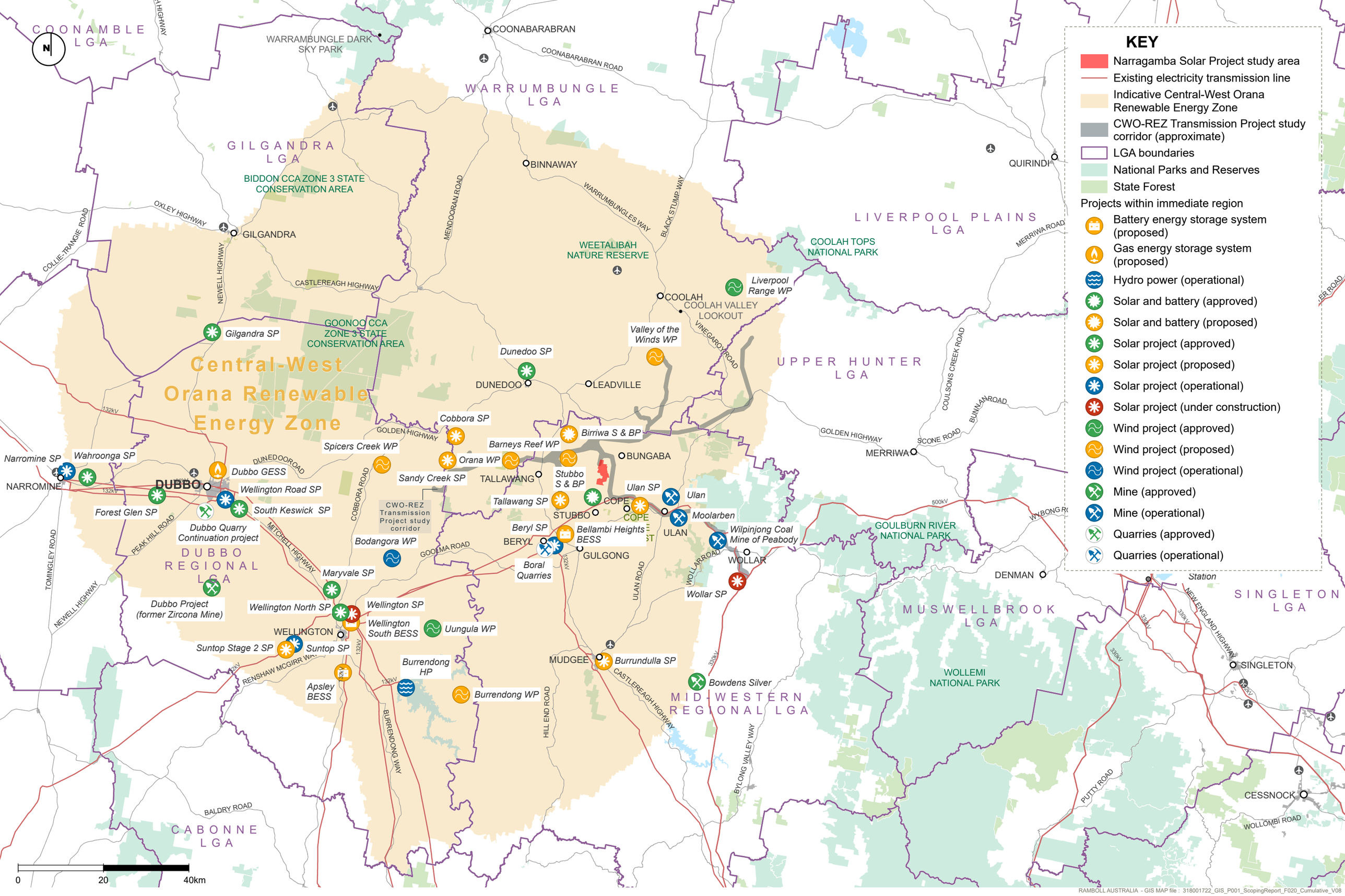

Figure 8-23 | Cumulative projects within the region

Table 8-30: Major renewable energy projects in the locality and cumulative considerations

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
Existing projects														
Ulan Coal Mine	11 km east	Operational (modification for extension, status is response to submissions)	• Operations overlap • Social impacts of cumulative large-scale project operations	S	S	S	S	N/A	S	N/A	N/A	S	S	S
Moolarben Coal Mine	17 km southeast	Operational (Moolarben OC3 Extension Project current status is response to submissions)	• Operations overlap • Social impacts of cumulative large-scale project operations	S	S	S	S	N/A	S	N/A	N/A	S	S	S
Beryl Solar Project	15.7 km south-west	Operational	• Operations overlap • Social and economic impacts to Gulgong and Stubbo which are located between the two projects • Temporary changes from agricultural land	S	S	S	S	N/A	S	N/A	N/A	S	S	S

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
			use to electricity generation • Impacts to landscape character of the region											
Boral Quarries, Gulgong	21.2 km southwest	Operational	• Operations overlap • Potential cumulative air quality emissions • Social impacts of cumulative large-scale project operations	N/A	N/A	N/A	S	N/A	S	N/A	N/A	N/A	S	N/A
Wilpinjong Coal Mine	24.5 km southeast	Operational	• Operations overlap • Social impacts of cumulative large-scale project operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	S	N/A
Wollar Solar Project	36.4 km southeast	Construction commenced July 2022	• Operations overlap • Social impacts of cumulative renewable projects in the CWO-REZ	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	S	N/A
Bodangora Wind Farm	42.8 km southwest	Operational	• Operations overlap • Social impacts of cumulative renewable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	S	N/A

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
			projects in the CWO-REZ											
Approved projects														
Stubbo Solar Project	Adjacent to southern boundary of study area	Approved Construction commenced November 2022	• Operations overlap • Social and economic impacts to Dunedoo which is north of the two projects and Gulgong which is located south of the two projects • Temporary changes from agricultural land use to electricity generation • Impacts to landscape character of the region	D	D	D	D	N/A	S	D	D	D	D	S
Liverpool Range Wind Farm	15 km east	Approved (modification to increase capacity current status	• Potential construction overlap • Operations overlap • Social impacts of cumulative renewable	S	S	S	S	N/A	S	N/A	N/A	S	S	N/A

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
		at response to submissions)	projects in the CWO-REZ • Social and economic impacts on Bungaba which is located between the projects											
Dunedoo Solar Project	24.7 km north	Approved (construction was to commence in 2022)	• Operations overlap • Social and economic impacts to Dunedoo • Temporary changes from agricultural land use to electricity generation • Impacts to landscape character of the region	S	S	S	S	N/A	S	N/A	N/A	S	S	N/A
Bowdens Silver Mine	49.5 km southeast	Approved	• Operations overlap • Social impacts of cumulative large-scale project operations	S	S	S	S	N/A	S	N/A	N/A	S	S	N/A

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
Projects under assessment														
Barney's Reef Wind Farm	Adjacent to northern and western boundary of study area	SEARs issued	• Potential construction overlap • Operations would overlap for up to 25 years • Social and economic impacts to Dunedoo and Merotherie which are located north of the two projects, and Gulgong which is located south of the two projects	D	D	D	D	N/A	S	D	S	S	S	S
Birriwa Solar Project	3.9 km west	Response to submissions	• Potential construction overlap in 2025 • Operations overlap for upto 25 years • Impacts to Dunedoo which is located north of the two projects, Gulgong which is located south of the two projects, and Merotherie and	D	D	D	D	N/A	S	D	S	S	S	S

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
			Barneys Reef which are located between the two projects to the north and south respectively											
Ulan Solar Project	8 km southeast	SEARs issued	• Potential construction overlap in 2025 • Operational overlap of up to 25 years • Impacts to Dunedoo and Bungaba which are located north of the two projects and Gulgong which is located south of the two projects	S	S	S	S	N/A	S	S	N/A	S	S	N/A
Tallawang Solar Project	8 km southwest	Response to Submissions	• Construction overlap • Operations overlap of upto 25 years • Impacts to Dunedoo which is located north of the two projects and Gulgong which is located south of the two projects	S	S	S	S	N/A	S	N/A	N/A	N/A	S	N/A

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
Valley of the Winds Wind Farm	12.3 km north	Response to submissions	• Potential construction overlap • Operations overlap • Social and economic impacts to Dunedoo which is located between the two projects	S	S	S	S	N/A	S	N/A	N/A	N/A	S	N/A
Bellambi Heights Battery Project	13 km southwest	SEARs issued	• Potential construction overlap • Operations overlap of up to 25 years • Social and economic impacts to Dunedoo which is located north of the two projects and Gulgong which is located south of the two projects	S	S	S	S	N/A	S	N/A	N/A	N/A	S	N/A
Spicers Creek Wind Farm	28.1 km west	SEARs issued	• Potential construction overlap • Operational would overlap of upto 25 years	S	N/A	S	S	N/A	S	N/A	N/A	N/A	S	N/A

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
			• Social impacts of cumulative renewable projects in the CWO-REZ											
Cobbora Solar Project	28.5 km west	SEARs issued	• Potential construction overlap • Operations overlap of up to 25 years • Social impacts of cumulative renewable projects in the CWO-REZ	S	N/A	S	S	N/A	S	N/A	N/A	N/A	S	N/A
Sandy Creek Solar Project	29.4 km west	SEARs issued	• Potential construction overlap • Operations overlap of up to 25 years • Impacts to Dunedoo which is Social impacts of cumulative renewable projects in the CWO-REZ	S	N/A	S	S	N/A	S	N/A	N/A	N/A	S	N/A
Burrendong Wind Farm	31.6 km southwest	SEARs issued	• Potential construction overlap • Operations overlap	S	N/A	S	S	N/A	S	N/A	N/A	N/A	S	N/A

Project	Approx. distance to the project study area	Status	Indicative timing / potential overlap	Relevant cumulative impact assessment matters										
				Traffic and access	Air	Amenity	Biodiversity	Built environment	Economic	Hazards and risks	Heritage	Land	Social	Water
			• Social impacts of cumulative renewable projects in the CWO-REZ											
Dapper Solar Project	31.7 km west	SEARs issued	• Construction overlap • Operations overlap of up to 25 years • Social impacts of cumulative renewable projects in the CWO-REZ	S	N/A	S	S	N/A	S	N/A	N/A	N/A	S	N/A
Related development to the project														
CWO-REZ Transmission Project	Overlapping the study area	Prepare EIS	• Potential construction overlaps in 2025-2027 • Social impacts of cumulative renewable projects in the CWO-REZ • Impacts to Dunedoo which is north of the two projects and Gulgong which is south of the two projects	D	D	D	D	S	N/A	S	N/A	S	D	S

CWO-REZ

EnergyCo is coordinating whole of the CWO-REZ studies including road upgrades, training and skills development, workforce accommodation, telecommunication improvements, and waste management, among others (Energy Corporation of NSW, 2023a). These studies would identify measures to manage CWO-REZ-wide cumulative impacts and would inform the level of assessment required in the EIS.

ACEN Australia is part of the Generator Project Interface Group, which has been established to manage the interface and cumulative impacts of the major renewable energy generators and the proposed CWO-REZ Transmission Project. Other participants of the Generator Project Interface Group include:

- CWP Renewables
- Lightsource BP
- Marble Energy
- Origin Energy
- RES Group
- Tilt Renewables
- ACCIONA Energia.

ACEN Australia would continue to work in consultation with EnergyCo to minimise the cumulative impacts of the project within the CWO-REZ on the wider community.

8.10.1.2 Potential impacts

A summary of the potential cumulative impacts from the project is provided in **Table 8-31**.

Table 8-31: Potential impacts – cumulative

Phase	Potential impact	Scale of impact	Sensitivity of receiving environment	Potential mitigation measures
Biodiversity				
Construction and operation	Cumulative removal of vegetation and impacts to flora and fauna	Moderate / Short term	Sensitive (environmental value)	• Minimise – minimise vegetation clearing where possible
Amenity				
Construction and operation	Changes to the landscape character from cumulative project infrastructure	High / Long term	Sensitive (social value)	• Avoid – avoid placing large infrastructure in locations where high visual impacts would be perceived
Traffic and access				
Construction	Increased traffic on local roads	Moderate / Short term	Sensitive (social value) Sensitive (environmental value)	• Avoid – avoid using the same local roads as other projects in the locality where possible
Noise and vibration				
Construction	Noise and vibration emissions from concurrently construction activities	Moderate / Short term	Sensitive (social value) Sensitive (environmental value)	• Minimise – coordinate with neighbouring developments to reduce operations occurring concurrently within the same locality
Social				
Operation	Social impacts of cumulative renewable projects in the region	High / Long term	Vulnerable to change	• Minimise – ongoing consultation with the local community

Phase	Potential impact	Scale of impact	Sensitivity of receiving environment	Potential mitigation measures
Air				
Construction	Dust emissions from concurrently construction activities	Moderate / Short term	Sensitive (social value) Sensitive (environmental value)	• Minimise – coordinate with neighbouring developments to reduce operations occurring concurrently within the same locality
Waste and resources				
Construction and operation	Availability of resources and waste disposal facilities with capacity to accept wastes	Moderate / Short term	Sensitive (environmental value)	• Minimise – reuse or recycle materials where possible • Minimise – outsource resources that may be in short supply in the locality

8.10.1.3 Assessment level and approach

Cumulative impacts will be assessed in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Project* (Department of Planning, Industry and Environment, 2021b). This process starts at the scoping phase.

The project-level cumulative impact assessment considers the following assessment approaches:

- **Incremental assessment**: this involves adding the incremental impacts of the project to the baseline condition of each relevant matter
- **Combined incremental assessment**: this is the combined effect of the different impacts of the project, normally on a sensitive area or receiver
- **Issue-specific CIA**: the cumulative impacts of the project on key matters with other relevant future projects
- **Combined CIA**: the combined effect of the different cumulative impacts of the project on key matters, sensitive receptors, or important features with other relevant future projects.

The key questions to answer in scoping the cumulative impact assessment from the *Cumulative Impact Assessment Guidelines for State Significant Project* (Department of Planning, Industry and Environment, 2021b) are listed in **Table 8-32** along with a response on the proposed scope of the assessment to be undertaken for the EIS.

Table 8-32: Key questions to answer in scoping the cumulative impact assessment

Question	Response
What to assess?	Key matters that would be considered in the CIA would include: • landscape character and visual amenity • noise and vibration • traffic and access • biodiversity • land use • air quality • social • economic.
What study area?	The study area will vary depending on the specific characteristics of the assessment matter and the scale and nature of the potential impacts on the matter resulting from the project with other relevant future projects. Each CIA will be undertaken in accordance with the relevant guidelines, where applicable, and broad enough to capture all relevant cumulative impacts.
Over what time period?	The CIA would consider the life of the project including construction, operation and decommissioning. The relevant projects to consider as part of the CIA will be those within the relevant study area that have concurrent project timelines with the project through all phases of development.
What projects to include?	The CIA would consider the projects identified in **Table 8-30** and other proposed developments advertised in the public arena at the time of preparing the EIS. This would include changes to existing projects, approved projects or projects under assessment

Questions	Response
What is the approach to assessment	The CIA would be undertaken in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Project* (Department of Planning, Industry and Environment, 2021b) and with the approved assessment methods for relevant matters
What are the key uncertainties?	Key uncertainties to undertaking the CIAs will include availability and quality of data on proposed future projects at the time of preparation of assessments

8.11 Matters requiring no further assessment in the EIS

Matters that have been identified as requiring no further assessment in the EIS in accordance with Scoping Report Guideline are presented in **Table 8-33**.

Table 8-33: Matters requiring no further assessment in the EIS

Matter	Justification
Access – rail, port and airport facilities	The project does not involve the development of, or affect access to rail, port or airport facilities
Amenity – odour	The project would not produce odorous emissions
Biodiversity – conservation areas	There are no conservation areas within or within proximity to the site
Hazard and risks – coastal hazards	The site is not located near the coast, so coastal hazards are not relevant to the project
Hazard and risks - environmental hazards	Environmental risks associated with the project will be assessed in other relevant environmental assessments
Hazard and risks - land movement	The site is generally flat, resulting in a low risk of landslide. Erosion risks will be addressed in an assessment of soils and land capability to be undertaken for the EIS
Land – stability	The site is generally flat, resulting in a low risk of landslide. Erosion risks will be addressed in an assessment of soils and land capability to be undertaken for the EIS
Land – soil chemistry	The project would not involve activities that alter the soil chemistry of the site. Contamination would be assessed as part of the land assessment
Land – topography	Given the site is already generally flat, the project would not alter the typical topography of the site
Social – decision making systems	The project would have no impact on decision making systems but would be undertaken in accordance with those systems

9. Conclusion

This scoping report has outlined the proposed Narragamba Solar Project that would be assessed under Part 4 of the EP&A Act and the Planning Systems SEPP. The project forms an important part of Australia's transition to renewable energy generation and would positively contribute to meeting Commonwealth and State targets. The project would enhance the reliability and security of electricity supply by helping to fill the anticipated capacity gaps in the electricity market following the closure of major coal-fired power generators within NSW.

This scoping report has been prepared to assist the development of the SEARs for the project, which would guide the preparation of the EIS. The key environmental matters identified that would be considered in the EIS include:

- biodiversity
- landscape character and visual
- Aboriginal heritage
- traffic and access
- noise and vibration
- social
- land
- hazards and risks.

Other matters that would be considered include:

- water
- historic heritage
- economic
- air
- waste and resources.

Cumulative impacts with other projects (both existing and proposed) would also be considered and assessed.

The EIS would be prepared in accordance with the SEARs to be issued by DPE in response to this scoping report. All assessments (including specialist assessments) would be completed by taking into consideration consultation with stakeholders, industry best practice guidelines, and the experiences from other solar farm projects.

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Appendix 1
Scoping Summary Table

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
Access					
Access to property	Detailed	N	Specific	• *Guide to Road Design Part 3: Geometric Design* (Austroads, 2016) • *Guide to Road Design Part 4: Intersections and Crossings: General* (Austroads, 2017)	**Section 8.4**
Traffic and parking	Detailed	Y	Specific	• *Guide to Traffic Generating Developments version 2.2* (Roads and Traffic Authority, 2002) • *Guide to Traffic Management Part 3: Transport Study and Analysis Methods* (Austroads, 2020) • *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (Austroads, 2020) • *Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments* (Austroads, 2020)	**Section 8.4**
Port and airport facilities	No further assessment	n/a	n/a	n/a	n/a
Road and rail facilities	No further assessment	n/a	n/a	n/a	n/a
Air					
Atmospheric emissions	Standard	Y	General	• *Protection of the Environment Operations Act 1997*	**Section 8.9.4**
Particulate matter	Standard	Y	General	• *Protection of the Environment Operations Act 1997*	**Section 8.9.4**
Gases	Standard	Y	General	• *NSW Climate Change Policy Framework* (Office of Environment and Heritage, 2016)	**Section 8.9.4**

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
				• *National Greenhouse Accounts Factors* (Australian Government, 2021)	
Amenity					
Noise	Detailed	Y	Specific	• *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009) • *NSW Road Noise Policy* (Department of Environment, Climate Change and Water, 2011) • *Noise Policy for Industry* (NPfI) (Environment Protection Authority, 2017)	**Section 8.5**
Vibration	Detailed	N	General	• *Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) • *British Standard BS7385.2 - 1993 Evaluation and Measurement for Vibration in Buildings, Part 2 - Guide to damage levels from ground borne vibration* • *DIN 4150: Part 3-1999 Structural vibration – Effects of vibration on structures 1999*	**Section 8.5**
Odour	No further assessment	n/a	n/a	n/a	n/a
Visual	Detailed	Y	Specific	• *Technical Supplement - Landscape and Visual Impact Assessment, Large-Scale Solar Energy Guideline August 2022*	**Section 8.2**
Biodiversity					
Conservation areas	Detailed	N	General	• *Environment Protection and Biodiversity Conservation Act 1999*	**Section 8.1**

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
				• Commonwealth *EPBC 1.1 Significant Impact Guidelines – Matters of National Environmental Significance* (Commonwealth of Australia, 2013)	
Terrestrial flora and fauna	Detailed	Y	General	• *Biodiversity Conservation Act 2016* • *Environment Protection and Biodiversity Conservation Act 1999* • *Biodiversity Conservation Regulation 2017* • Biodiversity Offset Scheme • Biodiversity Assessment Methodology (Department of Planning, Industry and Environment, 2020) • Commonwealth *EPBC 1.1 Significant Impact Guidelines – Matters of National Environmental Significance* (Commonwealth of Australia, 2013)	**Section 8.1**
Aquatic flora and fauna	Detailed	N	General	• *Fisheries Management Act 1991* • *Biodiversity Conservation Act 2016* • *Environment Protection and Biodiversity Conservation Act 1999*	**Section 8.1**
Built environment					
Public infrastructure	No further assessment	n/a	n/a	n/a	n/a
Design quality	No further assessment	n/a	n/a	n/a	n/a
Private property	Standard	N	Specific	n/a	**Section 8.7**
Public land	Standard	N	General	n/a	**Section 8.7**

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
Economic					
Natural resource use	Standard	Y	General	n/a	**Section 8.9.3**
Opportunity cost	No further assessment	n/a	n/a	n/a	n/a
Livelihood	Standard	Y	Specific	n/a	**Section 8.9.3**
Hazards and risks					
Biosecurity	Standard	N	General	• *Biosecurity Act 2015* • *Biosecurity Regulation 2016*	**Section 8.8**
Bushfire	Standard	Y	General	• *NSW Rural Fire Service Planning for Bushfire Protection 2019* (NSW Rural Fire Service, 2019)	**Section 8.8**
Coastal hazards	No further assessment	n/a	n/a	n/a	n/a
Dams safety	No further assessment	n/a	n/a	n/a	n/a
Dangerous goods	Detailed	N	General	• *Dangerous Goods Act 1985* • *Dangerous Goods (Road and Rail Transport) Act 2008* • *Dangerous Goods (Road and Rail Transport) Regulation 2014* • *Australian Code for the Transport of Dangerous Goods by Road and Rail* (Commonwealth of Australia, 2018)	**Section 8.8**

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
Environmental hazards	No further assessment	n/a	n/a	n/a	n/a
Flooding	Standard	N	General	• *State Environmental Planning Policy (Resilience and Hazards) 2021*	**Section 8.8**
Groundwater contamination	No further assessment	n/a	n/a	n/a	n/a
Hazardous and offensive development	Detailed	N	General	• *Hazardous Industry Advisory Paper No. 4 – 'Risk Criteria for Land Use Safety Planning* (Department of Planning, 2011) • *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (Department of Planning, 2011) • *Assessment Guideline - Multi-Level Risk Assessment* (Department of Planning and Industry, 2011) • *Hazardous and Offensive Development Application Guidelines Applying SEPP 33* (Department of Planning, 2011)	**Section 8.8**
Land contamination	Standard	N	General	• *Protection of the Environment Operations Act 1997* • *Contaminated Land Management Act 1997* • *State Environmental Planning Policy (Resilience and Hazards) 2021* • *Guidelines on the Duty to Report Land Contamination* (Environment Protection Authority, 2015)	**Section 8.7**
Land movement	No further assessment	n/a	n/a	n/a	n/a

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
Waste	Standard	N	General	• *Waste Classification Guidelines* (Environment Protection Authority, 2014) • *Protection of the Environment Operations (Waste) Regulation 2014* • *Waste Avoidance and Resource Recovery Act 2001*	**Section 8.9.5**
Battery storage[1]	Detailed	N	General	• *Hazardous Industry Advisory Paper No. 4 – 'Risk Criteria for Land Use Safety Planning* (Department of Planning, 2011) • *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (Department of Planning, 2011) • *Assessment Guideline - Multi-Level Risk Assessment* (Department of Planning and Industry, 2011) • *Hazardous and Offensive Development Application Guidelines Applying SEPP 33* (Department of Planning, 2011)	**Section 8.8**
Electromagnetic fields[1]	Detailed	Y	General	• *Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields* (International Commission on Non-Ionizing Radiation Protection, 2020)	**Section 8.8**
Heritage					
Aboriginal	Detailed	N	Specific	• *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Department of Environment, Climate Change and Water NSW, 2010)	**Section 8.3**

[1] Additional matter not included in the *State Significant Guidelines – Preparing a Scoping Report* (Department of Planning, Industry and Environment, 2021e)

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
				• *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment and Heritage, Department of Premier and Cabinet, 2011) • *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Department of Environment, Climate Change and Water, 2010)	
Historic	Standard	N	General	• *Burra Charter 2013* (Australia International Council on Monuments and Sites, 2013) • Part 4 of the EP&A Act 1979 • *NSW Heritage Act 1977*	**Section 8.9.2**
Natural	No further assessment	n/a	n/a	n/a	n/a
Land					
Stability	Standard	N	General	• *Managing Urban Stormwater: Soils and Construction 4th Edition* (Landcom, 2004)	**Section 8.7**
Land capability	Detailed	N	General	• *Land Use Conflict Risk Assessment Guide* (Department of Primary Industry, 2011) • *Agricultural Land Use Mapping Resources in NSW - User's guide* (Department of Primary Industries, February 2017) • *The land and soil capability assessment scheme* (Office of Environment and Heritage, October 2012)	**Section 8.7**
Soil chemistry	No further assessment	n/a	n/a	n/a	n/a

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
Topography	Standard	N	General	• *The land and soil capability assessment scheme* (Office of Environment and Heritage, October 2012)	**Section 8.7**
Social					
Way of life	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**
Health and wellbeing	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**
Community	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**
Surroundings	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**
Accessibility	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**
Livelihoods	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**
Culture	Detailed	Y	Specific	• *Social Impact Assessment Guidelines for State Significant Projects* (Department of Planning Industry and Environment, 2021)	**Section 8.6**

Matter	Level of assessment	Cumulative impact (Y/N)	Level of Engagement	Relevant government plans, policies, and guidelines	Scoping report Section
Decision-making systems	No further assessment	n/a	n/a	n/a	n/a
Water					
Hydrology	Standard	N	General	• *Water Management Act 2000* • *Protection of the Environment Operations Act 1997* • *Managing urban stormwater: soils and construction* (Landcom, 2004)	**Section 8.9.1**
Water availability	Standard	Y	General	• *Water Management Act 2000*	**Section 8.9.1**
Water quality	Standard	Y	General	• *Water Management Act 2000* • *Protection of the Environment Operations Act 1997* • *Australian & New Zealand Guidelines for fresh & Marine Water quality*	**Section 8.9.1**