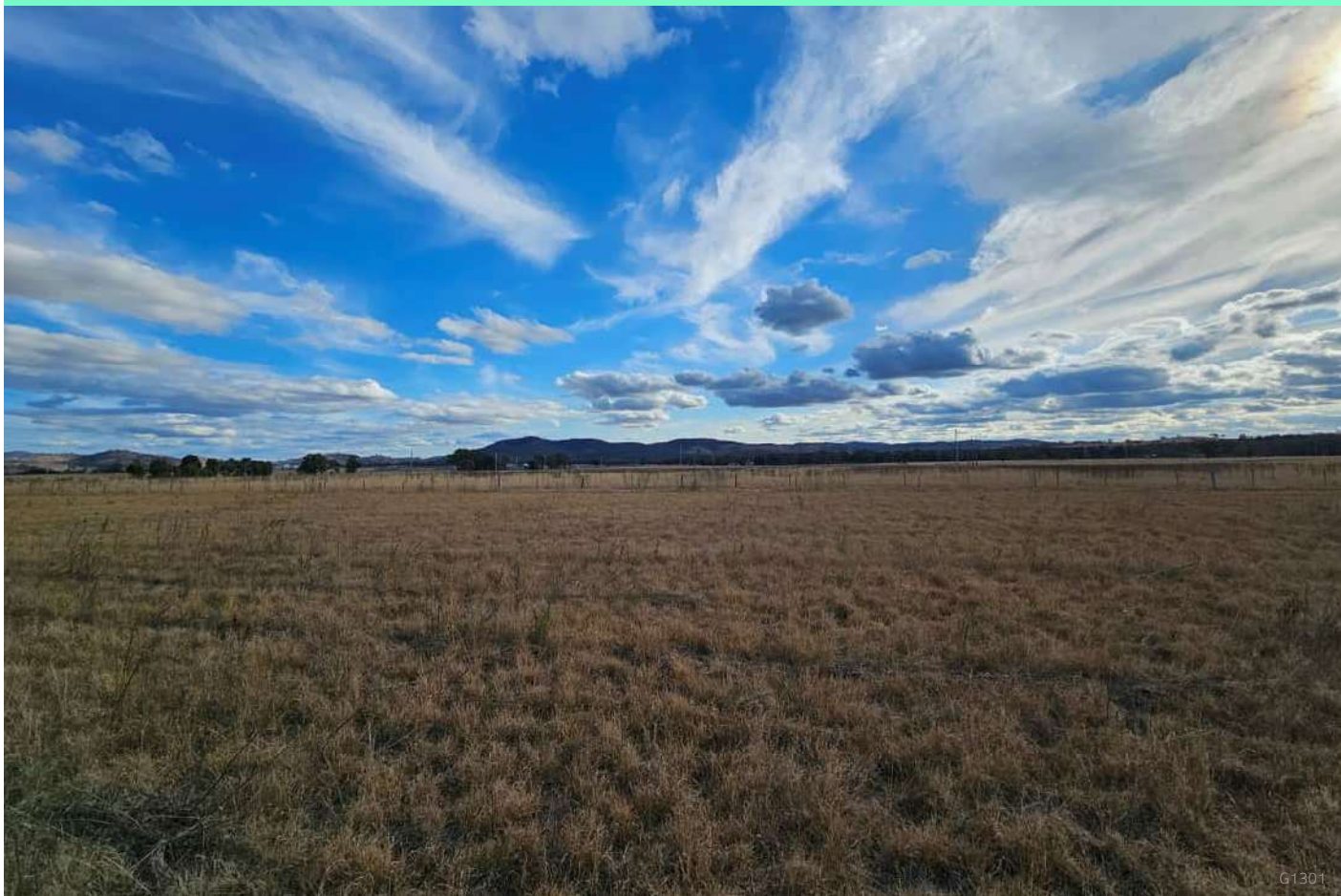




Ratch-Australia Corporation

Beryl Battery Energy Storage System

Environmental Impact Statement

SSD-61460977

12 July 2024

EIS declaration

Project details	
Project name	Beryl Battery Energy Storage System
Application number	SSD-61460977
Address of the land in respect of which the development application is made	5 Holleys Lane, Gulgong, NSW (Lot 297 DP 755434), Beryl Substation (Lot 1 DP 523876) and a portion of Beryl Road
Applicant details	
Applicant name	Ratch-Australia Corporation
Applicant address	Level 7/111 Pacific Highway, North Sydney NSW 2060
Details of person by whom this EIS was prepared	
Name	Melissa Laginha (ML) and Ada Zeng (AZ)
Address	7/177 Pacific Highway, North Sydney NSW 2060
Professional qualifications	ML - Masters of Marine Science and Management, Bachelor of Science AZ - Bachelor of Science (Environmental Studies), Bachelor of Arts (Socio-Legal Studies)
Declaration by registered environmental assessment practitioner	
Name	Tina Donovan
Organisation registered with	Environment Institute of Australia and New Zealand (R80036)
Declaration	The undersigned declares that this EIS: ▪ Has been prepared in accordance with sections 190 and 192 of the Environmental Planning and Assessment Regulation 2021 ▪ Contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates ▪ Does not contain information that is false or misleading ▪ Addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project ▪ Identifies and addresses the relevant statutory requirements for the Project, including any relevant matters for consideration in environmental planning instruments ▪ Has been prepared having regard to the Department's State Significant Development Guidelines - Preparing an Environmental Impact Statement (DPE, 2022e) ▪ Contains a simple and easy to understand summary of the Project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development ▪ Contains a consolidated description of the Project in a single chapter of the EIS ▪ Contains an accurate summary of the findings of any community engagement ▪ Contains an accurate summary of the detailed technical assessment of the impacts of the Project as a whole.
Signature	
Date	12 July 2024

Executive summary

Ratch-Australia Corporation (RAC) is proposing to construct, operate and maintain the Beryl Battery Energy Storage System (BESS) (the Project). The Project would have a capacity of up to 100 megawatts (MW)/200 megawatt hours (MWh) and would connect to the grid via an underground cable to the existing Transgrid-managed Beryl Substation. When connected, the Project would store energy during periods of low demand and release it during peak demand, providing network stability and grid forming capabilities.

The Project would primarily be located on a rural residential property at 5 Holleys Lane, Gulgong, 6.3 kilometres (km) north-west of the township of Gulgong in New South Wales (NSW) in the Mid-Western Regional Local Government Area (LGA). The Project would also be located in the Central-West Orana Renewable Energy Zone (CWO REZ).

The Project is considered State Significant Development (SSD) under Section 2.6 (b) and Schedule 1(20) of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP), and so requires assessment in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This Environmental Impact Statement (EIS) has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for the Project (SSD-61460977) and assess potential environmental and social impacts associated with the construction, operation and decommissioning of the Project, and develop environmental management measures to minimise any impacts.

This EIS would be publicly exhibited for a minimum of 28 days and during this time government agencies, stakeholders and the community would have the opportunity to make a written submission to the Department of Planning, Housing and Infrastructure for consideration in its assessment of the Project.

The Project

The Project comprises of the following:

- Electrical infrastructure including:
 - A 100 MW/ 200 MWh BESS comprised of battery modules with associated ancillary infrastructure
 - A BESS compound comprising power inverters, cabling, transformers and switchgear
 - A switch room and transformer area comprising of two switch rooms, transformers, cabling and fire water tanks
 - 132 kilovolt (kV) underground cable connecting the Project to Beryl Substation
 - An upgrade of the existing Beryl Substation
 - A stormwater retention bund
- Other permanent ancillary infrastructure including:
 - An operation and maintenance facility
 - Designated car spots for vehicles (about four car spots)
 - Security fencing, lighting, signage and lightning protection
 - Vegetation screening
 - An internal access track and access off Beryl Road
 - Dedicated fire water tanks
- Temporary construction facilities including a:
 - Construction compound and workers car park
 - Laydown areas for stockpiles, equipment and materials.

The Project would require up to 40 full time equivalent (FTE) staff per day during peak construction and up to two FTE during operation.

Following the end of economic life (30 years of operation), the Project would either be decommissioned or refurbished with upgrades to power generation infrastructure.

Site suitability

The location of the Project is suitable for the following reasons:

- Location within the CWO REZ
- Energy generation including storage is a permissible land use within the land use zone and facilitates SSD application and planning approval for a BESS
- Availability of existing access to the Project area via an established road network
- Immediate proximity to the existing Beryl Substation and transmission lines to minimise impacts of easements and land fragmentation.
- The Project would be a continuation of the existing electricity generation infrastructure within the area, demonstrated by the existing Beryl Substation and transmission lines, and would not conflict with the existing or proposed land use, or ongoing operations
- Sufficient size of land within the Project area to avoid and/or minimise impacts to biodiversity, Aboriginal cultural heritage and visual amenity impacts
- Sufficient buffers to minimise impacts to surrounding privately or publicly owned land and properties.

Alternatives considered

The development of the BESS options considered several alternatives before settling on the current Project as described in this EIS:

- Do Nothing: This option would avoid construction impacts but fail to meet the energy storage needs, thereby missing out on the benefits of stabilising the grid with renewable energy
- Alternative energy development: Considered the possibility of developing other renewable energy sources like solar or wind, but was deemed less suitable due to the existing saturation of such projects in the area and the specific need for energy storage
- Alternative locations: Different locations were assessed, but the current site was chosen for its optimal proximity to the existing Beryl Substation, minimising the need for extensive new infrastructure and reducing environmental disturbance
- BESS at a different location in the same area: This involved placing the Project infrastructure along the northern boundary to maximise distance from Beryl Road and minimise visual and noise impacts; however, it was not favoured due to preferences for proximity to existing electrical infrastructure
- Preferred Option (current Project): This involves constructing the BESS at the selected site, using a refined layout to minimise environmental impacts, especially in terms of visual amenity and biodiversity, while also ensuring proximity to the Beryl Substation for effective grid connection.

Assessment and management of impacts

This EIS includes a detailed assessment of the potential environmental, social and economic outcomes of the Project in response to the Project SEARs and identifies the environmental management measures that will be implemented. A summary of the key findings of the EIS is provided in **Table ES-1**.

Table ES-1. Summary of key impacts

Aspect	Summary of findings
Biodiversity	The Project has refined the disturbance footprint to avoid remnant trees and reduce impacts to the native grassland. The Project would result in the removal of approximately 4.07 hectares (ha) of native vegetation, which is comprised of the plant community type (PCT) the <i>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</i> (PCT 281). This PCT does not correspond with any listed threatened ecological communities (TECs) under the <i>Biodiversity Conservation Act 2016</i> or <i>Environment Protection and Biodiversity Conservation Act 1999</i>. No threatened flora or fauna species were detected in the field survey carried out for the Project, and therefore no impacts to these species are anticipated. In addition, no Matters of National Environmental Significance would be significantly impacted by the Project. Given the poor condition of the associated vegetation, potential impacts do not generate a requirement to offset any ecosystem credits. All species credit species generated by the BAM-C were either surveyed for or could be excluded due to habitat constraints, with the exception of the Southern Myotis (<i>Myotis macropus</i>). In total, 21 species credits for the Southern Myotis must be retired prior to commencement of construction. The overall risk to biodiversity values is generally considered to be low and manageable.
Aboriginal heritage	No Aboriginal sites were recorded and no intangible heritage values have been identified during the site surveys within the Project area. One registered Native Title Claim covers the Project area: Warrabinga-Wiradjuri #7 (NC2018/002, NSD857/2017). As the Project area does not include any Crown land, no land within the Project area is applicable to 'future acts' under the <i>Native Title Act 1993</i>. Based on the above, the Project is not expected to have any impact to Aboriginal cultural heritage values.
Historical heritage	There are no listed items located in the Project area. As such, the Project is not expected to have any impact to historical heritage items.
Land	The majority of the Project area is currently utilised for low intensity agriculture limited to light grazing. The Project would be located on land mapped as Land and Soil Capability (LSC) Class 5 with severe limitations. The Project would not impact on Biophysical Strategic Agricultural Land (BSAL), State Significant Agricultural Land (SSAL) or Crown Land. The Project area and surrounding land are subject to a mineral exploration licence EL8160 held by Bowdens Silver Pty Ltd. Bowdens Silver has confirmed that the Project can co-exist with EL8160. During construction and operation, the Project area would continue to be used for grazing and following decommissioning the Project area would be returned to its original state in consultation with the Associated Landowner.
Visual amenity	The Project design has sought to consolidate visual impacts associated with electrical infrastructure in consultation with adjacent residents and included vegetation screening and native vegetation and landscape management plan to minimise potential visual impacts during operation. The Project area is located in a rural agricultural landscape within a homogenous landscape character zone, which contains features with generally low sensitivity and has capacity to absorb visual changes. During construction, visual impacts would be temporary in nature and would be managed where possible. During operation, vegetation screening around the perimeter of the Project would result in negligible visual impacts to surrounding receivers and the public domain.

Aspect	Summary of findings
Noise and vibration	There are 28 Non-associated receivers within two km of the Project. The majority of construction activities would be limited to standard construction hours. During most construction stages all but the furthest receivers are expected to experience noise at least a couple of dB(A) greater than the standard hours noise management levels (NML). During the noisiest months (months three to five of the 12 month program), noise impacts could be up to 20 dB(A) above the standard hours NML. A draft construction noise and vibration management plan has been prepared for the Project. No vibration impacts are anticipated. To attenuate noise impacts during operation, the Project design includes silencers on the inverters. The noise assessment investigated four operational scenarios, operational assessment (full load charging, full load discharging, half load charging and half load discharging) against the Project intrusiveness noise level (PINL) and Project amenity noise level (PANL). Based on the outcomes of the operational assessment, a noise management strategy involving the Project operating at full power charging and/or discharging during the day period, half power charging and/or full power discharging during the evening period and half power charging and/or discharging during the night period would result in noise which achieves the PANLs during all periods of time. Further mitigation to address operational noise impacts, such as the usage of noise barrier was also explored, however due to the terrain and location of the Non-associated receivers, a noise barrier was unable to provide adequate noise mitigation. It should be noted that the noise assessment considers the worst-case BESS noise impacts, however in practice, BESS' generally charge during the Day period when prices are lower and discharge during the Evening period when prices are higher for only a short duration and lower temperatures than the 'worst case noise enhancing meteorological conditions' that are being conservatively used. During detailed design, the selection of components will be re-explored to determine if quieter equipment could be adopted to allow full load operation during all times (Day, Evening and Night periods) while producing noise which achieves the PANLs at all nearby receivers.
Traffic and transport	The Project would have primary access via Castlereagh Highway and Beryl Road. During the construction (and lesser extent decommissioning) phase there would be an increase in traffic movements to and from the Project area, including heavy vehicles transporting materials and equipment, light vehicles transporting personnel and oversize and over mass (OSOM) vehicles. The existing road network is expected to have ample capacity to accommodate the traffic demand during the peak construction of the Project. Traffic movements associated with the operation of the Project would be minimal and would typically involve operational and maintenance staff accessing the area. The Project would not impact on any train services, bus services, formal pedestrian or cycling facilities in the vicinity of the Project area.
Water	There is one mapped waterway and one unmapped waterway that flows through the Project area in a westerly direction towards Wialdra Creek about 600 metres (m) west, and both waterways are ephemeral flow paths with shallow depressions. There is one farm dam within the Project area near the centre that forms part of the mapped waterway. Flood modelling demonstrated that the Project area and surrounds are partially inundated in the 1% Annual Exceedance Probability (AEP) event from surface water flow paths, however the Project area is flood free from the regional flooding zone of Wialdra Creek.

Aspect	Summary of findings
	The total water demand during construction is estimated to be 8.5 megalitres (ML)/year (0.089ML/day) of non-potable water and 1.46ML/year of potable water for site personnel. During operation, water demand would be minimal. No impacts to groundwater are anticipated. Drainage swales and diversion would be installed to convey runoff and flows around the Project. A Construction Soil and Water Management Plan (CSWMP) will be prepared to manage soil and water impacts associated with the construction works.
Hazards	The State Environmental Planning Policy (Resilience and Hazards) 2021 thresholds are not exceeded for any material and the Project would not be considered potentially hazardous. The preliminary hazard assessment concluded that the nominated capacity of the BESS would be able to be accommodated within the designated area. The identified medium or low risks associated with the Project were associated with thermal runaway, external fires, potential contamination and other pollution pathways. These hazards and associated risks can be effectively managed by implementing environmental management measures and adhering to Project design requirements. The Project includes a number of design features to reduce bush fire risk including, dedicated water supply, asset protection zones (APZ), alternate access, access suitable for emergency response vehicles and vegetation management to reduce fuel load. Based on these design inclusions and specific management measures outlined in this EIS, the Project is not expected to introduce any new bush fire risks to the Project area. The electric and magnetic fields (EMF) generated by the Project are small in publicly accessible areas and well below the International Commission on Non-Ionising Radiation Protection reference levels.
Social	The Project would provide employment opportunities for local and regional workers and increased patronage for local businesses, particularly during construction. Potential negative social impacts identified by the local community and stakeholders include reduction in community cohesion, impact of traffic, impact on amenity, perceived potential loss of collective memories and cultural values and fear of health risks including bush fire risk. Potential negative impacts can be managed, and positive impacts can be further enhanced through continued consultation with relevant stakeholders. A Community and Stakeholder Engagement Plan will be implemented and updated to help provide timely and accurate information to the community during all phases of the Project.
Economic	The economic impacts of the Project are expected to be broadly positive at a regional and State level in supporting the renewables transition and injecting investment into the sector. Specifically: ▪ The Project would provide annual contributions to a community benefit fund, regular lease payments and financial contributions under a voluntary planning agreements (VPA) with Council ▪ The Project would generate up to 105 FTE (direct and indirect) during construction and up to 7 FTE during operation ▪ The total operational economic stimulus over 30 years of operation would be approximately \$20 million ▪ At a state-level, the Project would provide \$55 million of capital investment, 45 FTE during construction and up to 6 FTE jobs during operation. Potential negative impacts would be associated with reduced availability of local accommodation. As such a Construction Workforce Accommodation Strategy has been prepared for the Project which would prioritise already established worker camps from nearby renewable energy projects, exploring the potential of housing non-local workers in homes within the local region that are currently vacant or significantly underutilised. The Strategy will also include a program to monitor and review the effectiveness of the strategy over the life of the Project.

Aspect	Summary of findings
Waste	The quantities of recovered materials and residual materials requiring disposal associated with the Project is very low. Where possible, the Project would seek to re-use and recycle prior to disposal. A preliminary Waste Management Plan has been prepared for the Project, which includes strategies consistent with the waste hierarchy, the principles of the circular economy and the principles of Smart Waste Management, thereby minimising an adverse impact on the environment or the Council's existing waste management infrastructure.
Cumulative impacts	There are currently more than 30 proposed or approved energy infrastructure SSDs in the CWO REZ, with the closest one to the Project being 1.1 km east. The EIS included an assessment of cumulative impacts related to biodiversity, visual, noise, traffic, social and economic impacts based on publicly available information. For developments with overlapping construction timeframes there is potential for cumulative impacts, however these would be temporary, and management measures have been provided to mitigate Project-specific impacts. During operation, cumulative impacts would be negligible.

Need and benefit of the Project

The Project is necessary to provide flexible dispatchable electricity supply to firm up the variable output from renewable sources and provide storage of surplus generation to be discharged in times of higher demand. Specifically for the region, the Project would provide both voltage and reactive power support for the Beryl area, which was identified as having voltage constraints (Transgrid, 2022).

Strategically, the Project aligns with state and national goals aimed at increasing renewable energy usage and reducing carbon emissions, supporting the NSW Government's clean energy targets. The Project is expected to facilitate regional economic growth by creating jobs and stimulating local economies during its construction and operational phases. The Project would also enhance the network resilience in the Central-West Orana region—which is a key area designated for energy investment. Moreover, by complementing existing and future renewable developments, the Project can contribute to the transition towards a more sustainable energy future.

As described above, the Project would also provide a range of social and economic benefits, including:

- Opportunities for local and regional investment
- Opportunities for local contractors, suppliers and businesses
- Increased employment opportunities
- Annual contributions to the community benefit fund focussed on the Gulgong region, regular lease payments and financial contributions under a VPA with Council.

Overall, the Project would be consistent with the principles of ecologically sustainable development, and the objectives of legislation, including the EP&A Act. Based on the above, the Project should be approved under the EP&A Act.

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Terms and definitions

Term	Definition
ADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
AEMO	Australian Energy Market Operator
AEP	Annual Exceedance Probability
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AIMD	Active Implantable Medical Devices
APZ	Asset Protection Zone
ASS	Acid Sulfate Soils
Associated Landowner	<i>Landowners that have a negotiated agreement in place with the Applicant regarding Project impacts and, as such, are associated with the Project</i>
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BCD	Biodiversity Conservation Division
BDAR	Biodiversity Development Assessment Report
BEMOP	Bushfire Emergency Management and Operations Plan
BESS	Battery Energy Storage System
BOM	Bureau of Meteorology
BSAL	Biophysical Strategic Agricultural Land
CCTV	Closed-Circuit Television
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CIA	Cumulative Impact Assessment
CIV	Capital Investment Value
CLM	Contaminated Land Management
CSEP	Community and Stakeholder Engagement Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSWMP	Construction Soil and Water Management Plan
CTMP	Construction Traffic Management Plan
CWO REZ	Central-West Orana Renewable Energy Zone
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water

Term	Definition
Disturbance footprint	<i>The area that would be directly impacted during Project construction and operation (e.g. where structures would be sited and the area around that would be required to construct it) (refer to Figure 2-1)</i>
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DUAP	Department of Urban Affairs and Planning
EIA	Economic Impact Assessment
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
EMM	Environmental Management Measure
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
ESOO	Electricity Statement of Opportunities
ETMHC	Electricity Transmission Ministerial Holding Corporation
FAQ	Frequently Asked Questions
FDI	Fire Danger Index
FRNSW	Fire and Rescue NSW
FTE	Full-Time Equivalent
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
Ha	Hectares
HAZOP	Hazard and Operability Study
HSE	Health, Safety, and Environment
HV	High Voltage
HVAC	Heating, Ventilation, and Air Conditioning
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	Interim Construction Noise Guideline
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISP	Integrated System Plan
KFH	Key Fish Habitat
kV	Kilovolt
LALC	Local Aboriginal Land Council

Term	Definition
LCVIA	Landscape Character and Visual Impact Assessment
LCZ	Landscape Character Zone
LEP	Local Environmental Plan
LGA	Local Government Area
LoS	Level of Service
LSC	Land and Soil Capability
LUCRA	Land Use Conflict Risk Assessment
MEG-GSNWS	Mining, Exploration and Geoscience – Geological Survey of NSW
ML	Megalitres
MNES	Matters of National Environmental Significance
MOD	Modification (Development Application)
MP	Members of Parliament
MW	Megawatt
MWh	Megawatt hours
MWRC	Mid-Western Regional Council
NEM	National Electricity Market
NHVR	National Heavy Vehicle Regulator
NML	Noise Management Level
NNTT	National Native Title Tribunal
NOA	Naturally Occurring Asbestos
Non-associated Landowner	<i>Landowners that are not associated with the Project</i>
NPI	Noise Policy for Industry
NPW Act	National Parks and Wildlife Act
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NVIA	Noise and Vibration Impact Assessment
OEMP	Operational Environmental Management Plan
OSOM	Over Size Over Mass
PAD	Potential Archaeological Deposit
PANL	Project Amenity Noise Level
PCS	Power Conversion System
PCT	Plant Community Type
PCU	Passenger Car Unit
PHA	Preliminary Hazard Analysis
PINL	Project Intrusiveness Noise Level

Term	Definition
PMF	Probable Maximum Flood
PNTL	Project Noise Trigger Level
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PRL	Protected Riparian Land
Project	100 MW/ 200 MWh battery energy storage system including associated infrastructure for network connection
Project area	5 Holleys Lane, Gulgong, NSW (Lot 297 DP 755434), a portion of Beryl Road and a section of Beryl Substation in the Transgrid managed landholding (Lot 1, DP 523876).
PSL	Primary Social Locality
RAC	Ratch-Australia Corporation
RAP	Registered Aboriginal Party
RBL	Rating Background Noise Level
REF	Review of Environmental Factors
REZ	Renewable Energy Zone
RFS	Rural Fire Service
RNP	Road Noise Policy
RTS	Response to Submissions
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEED	Sharing and Enabling Environmental Data
SEIA	Social and Economic Impact Assessment
SEIFA	Socio-Economic Indexes for Areas
SEPP	State Environmental Planning Policy
SIA	Social Impact Assessment
SSD	State Significant Development
SSL	Secondary Social Locality
Study area	<i>Describes the area investigated as part of this EIS. References to study area varies according to the specific environmental matter under consideration (e.g. traffic, heritage, visual amenity etc) and is described within each relevant section of the EIS.</i>
Subject land	In the context of the BDAR, subject land corresponds to the land proposed for Project (also the disturbance footprint)
TEC	Threatened Ecological Community
TTIA	Transport and Traffic Impact Assessment
VPA	Voluntary Planning Agreement
WM Act	<i>Water Management Act 2000</i>

1. Introduction

1.1 Overview

Ratch-Australia Corporation (RAC) is proposing to develop the Beryl Battery Energy Storage System (BESS) including associated infrastructure for network connection in Gulgong, New South Wales (NSW) (the Project). The BESS would have a capacity of up to 100 megawatts (MW) with two hours of storage (100 MW/200 megawatt hours (MWh)). The Project would connect to the National Energy Market (NEM) via a 132 kilovolt (kV) underground cable to the existing Transgrid Beryl 132/66 kV Substation (Beryl Substation).

The Project would primarily be located at 5 Holleys Lane, Gulgong (Lot 297 DP755434) approximately 6.3 kilometres (km) north-west of the Gulgong township, in the Mid-Western Regional Council (MWRC) local government area (LGA) and Central-West Orana Renewable Energy Zone (CWO REZ). The Project would also include upgrade works to Beryl Substation in the Transgrid-managed landholding (Lot 1 DP523876) and parts of Beryl Road managed by MWRC.

The Project would be located about 100 metres (m) north of the existing and operational Beryl Solar Farm (not owned by the Applicant).

The location and regional context of the Project is shown in **Figure 1-1**. The local context of the Project is shown in **Figure 1-2**.

The Project description and proposed layout is presented in **Chapter 3**. The Project area is about 38 hectares (ha), and the disturbance footprint for construction and operation is 4.2 ha and 2.5 ha respectively.

The Project is considered State Significant Development (SSD) under Section 2.6 (b) and Schedule 1(20) of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP), and so requires assessment in accordance with Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The consent authority for Project would be the Independent Planning Commission or the Minister for Planning and Public Spaces under Division 4.7 of the EP&A Act.

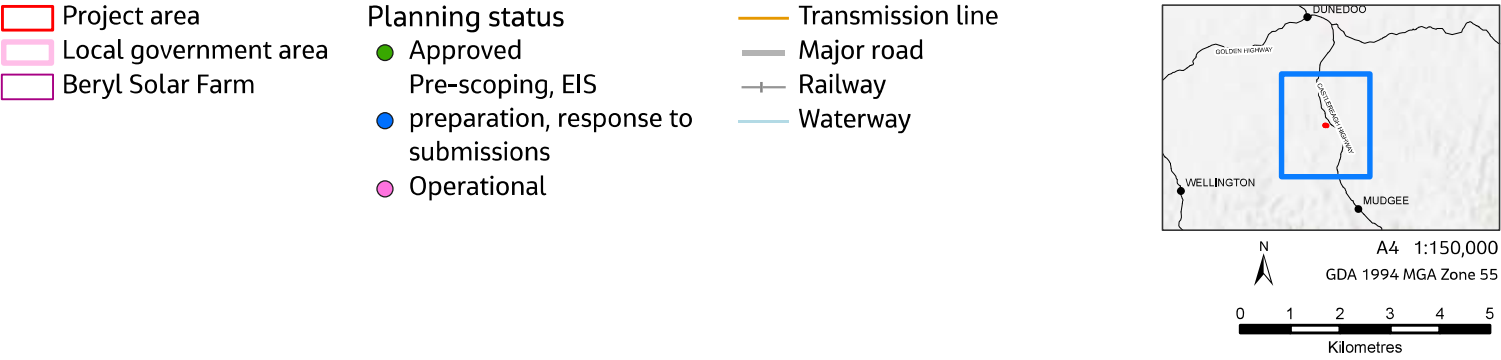
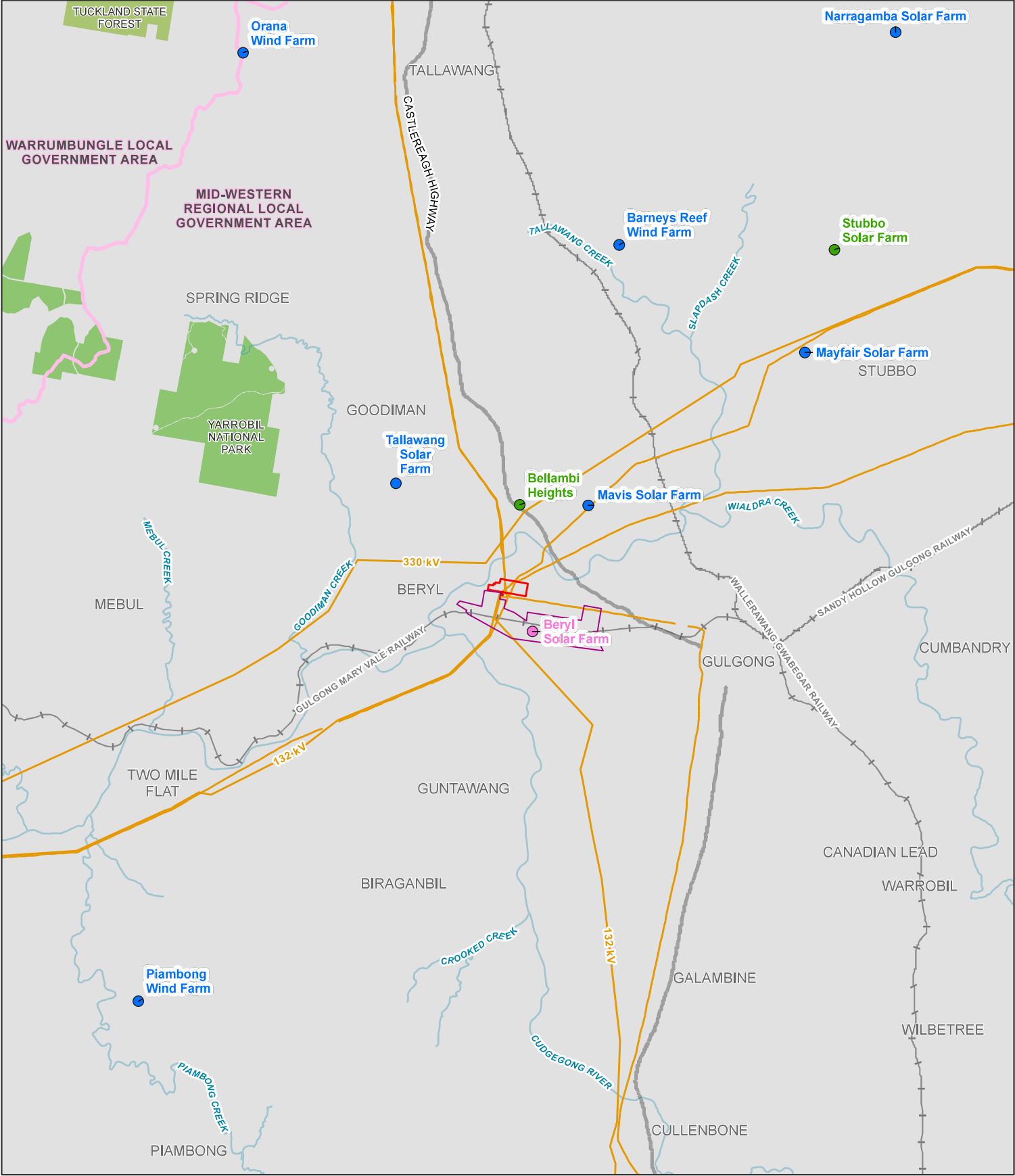


Figure 1-1: Regional context

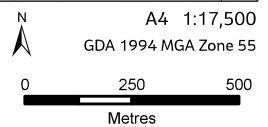
Data Sources: NSW Department of Planning and Environment (2024); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2024), Australian Bureau of Statistics (2021); EnergyCo (2024); TransGrid (2024)



 Project area
 1km Project area buffer
 Beryl Substation
 Beryl Solar Farm

- Proposed 132kV electricity transmission line
- BESS compound
- Entry road
- Laydown area
- O&M area
- Screening
- Switchroom & transformer

-  Transmission line
-  Major road
-  Minor road
-  Railway
-  Mapped waterway
- Unmapped waterway
-  Farm dam



Data Sources: NSW Department of Planning and Environment (2023); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2023), Australian Bureau of Statistics (2021), TransGrid (2023)

1.2 Project objectives

The overarching objective of the Project is to store variable renewable energy when supply exceeds demand in the NEM. The stored energy can be dispatched when there is a higher demand as well as provide network stability and grid forming capabilities. The Project would enhance the grid function and operate like a 'virtual synchronous generator', which offers flexibility and maintain system strength in the NEM as coal fired power plants are progressively phased out.

More specifically, the Project seeks to:

- Contribute to achieving Commonwealth and NSW Government targets related to renewable energy, dispatchable storage capacity and net-zero emissions
- Support the successful development of the CWO REZ through the provision of dispatchable energy supply and network services
- Support voltage requirements for the Beryl transmission network
- Maximise the sustainable use of land in immediate proximity to existing infrastructure while avoiding, minimising and mitigating adverse impacts on the environment and community during construction and operation.

1.3 Project background

The Project has been under development since early 2022, during which time RAC has considered preliminary options and siting to identify the optimal Project area and layout. The alternatives considered for the Project are presented in **Section 2.7**, with Option 5 being progressed as part of this environmental impact statement (EIS):

- Option 1: Do nothing
- Option 2: Alternative renewable energy development
- Option 3: Alternative location for the BESS Project
- Option 4: BESS at the Project area, different location
- Option 5: BESS at the Project area, nominated location (preferred option).

The Project area and surrounds have been subject to grazing or dry land cropping with scattered rural residences and agricultural buildings and infrastructure. The Beryl Substation south of the Project was commissioned in 1976 and forms part of the electricity transmission network that serves the central west NSW area. Beryl Solar Farm south of the Project area commenced construction in 2018 and subsequently entered into commercial operation in June 2019. The Project would be consistent with the electricity generating infrastructure in the immediate area.

A number of environmental and social constraints were identified during the Project's scoping phase and the Project design has sought to avoid these constraints by:

- Siting of Project area in close proximity to the road network and the existing electricity network, i.e. Beryl Substation, to avoid the need for longer transmission lines or easement that may fragment properties or fauna habitat
- Mapping preliminary biodiversity and heritage constraints to refine the disturbance footprint (i.e. area that will be disturbed as a result of the Project) to avoid impacts on identified constraints including remnant vegetation and areas of moderate archaeological potential
- Locating Project infrastructure at a maximum set back distance from nearby dwellings to minimise potential amenity impacts
- Locating permanent Project infrastructure outside of the existing Essential Energy easements within the Project area to ensure the Project is compliant with Essential Energy requirements
- Proposing development on land that is compatible with existing land use, in agreement with the landowner, while avoiding land mapped as Biophysical Strategic Agricultural Land (BSAL)
- Minimising impacts to existing land use by clustering Project infrastructure in one area close to existing transmission infrastructure and Beryl Substation

- Locating the Project away from town centres and where there is lower population density to avoid impacts to sensitive receivers.

The indicative layout of the Project within the Project area as it is presented in this EIS and shown in **Figure 3-2** has been selected as it would have a number of benefits over alternative options (discussed further in **Section 2.7**).

1.4 Applicant details

The Applicant is RAC which is an Australian company founded in 2011 with 1.7 gigawatts (GW) of energy generation assets, including solar, wind farms and gas plants across NSW, Queensland, Victoria, South Australia and Western Australia. The Applicant details are provided in **Table 1-1**.

Table 1-1. Applicant details

Item	Details
Applicant	Ratch-Australia Corporation Pty Ltd
ABN	31 106 617 332
Postal address	Level 7, 111 Pacific Highway, North Sydney NSW 2060

1.5 Restrictions or covenants

The following restrictions and covenants apply to the Project area:

- The Project area contains four 30 m wide easements for existing 66 kV electricity transmission lines operated by Essential Energy. The Project has avoided placing any permanent infrastructure within the easements
- The Project area and surrounds are subject to a mineral exploration licence EL8160 held by Bowdens Silver Pty Ltd which covers a large area in the local region. RAC has engaged with Bowdens Silver during the preparation of the EIS as discussed in **Section 5**. Bowdens Silver has confirmed that the Project can co-exist with EL8160.

1.6 Related development

Related development refers to any existing or approved development that would be incorporated into the Project, or development that is required for the Project but would be subject to a separate assessment process.

There are no existing or approved developments that would need to be incorporated into the assessment of the Project. The Project development application includes all development required to construct and operate the Project and no separate assessment processes are proposed.

1.7 Purpose of this report

The Project is SSD under the Planning Systems SEPP and approval for the Project is required under Part 4, Division 4.7, of the EP&A Act.

This EIS has been prepared to address the Secretary's environmental assessment requirements (SEARs) for the Project issued by the Department of Planning, Housing and Infrastructure (DPHI) (formerly Department of Planning and Environment (DPE)) on 28 September 2023. A table listing the SEARs and where each SEAR is addressed within this EIS is included in **Appendix A**. The Project SEARs also make specific reference to MWRC comments on the SEARs which are also provided in **Appendix A**, with a response to each item.

This EIS has been prepared by Jacobs in general accordance with the State Significant Development Guidelines – Preparing an Environmental Impact Statement (DPE, 2022e), Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2022d), Undertaking Engagement Guidelines for State Significant Projects (DPE, 2022f), and the Social Impact Assessment Guideline for State Significant Projects (DPE, 2023). It has also been prepared in accordance with the form and content requirements specified in the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation).

2. Strategic context

2.1 Strategic justification

The NEM is undergoing a transition away from fossil fuels in energy generation to an increasing variable renewable energy mix. The NEM requires stable, dispatchable generation to balance network requirements as variable renewable resources such as solar and/or wind fluctuates. Technologies such as a BESS provide the ability to firm the renewable energy supply, enable flexible dispatchability of renewable energy and maintain grid stability. The Project would provide firming capacity and form a critical part of the renewables transition in the NEM. The Project also represents a private investment to help achieve the NSW Government's targets in emissions reduction and improving energy security.

The Project is aligned with the NSW Government's strategic policy direction for the electricity sector, with benefits such as:

- Aligning with Commonwealth and NSW climate change commitments such as the Paris Agreement, the Large-Scale Renewable Energy Target Scheme, Integrated System Plan 2022 (ISP) (AEMO, 2022), the Draft ISP 2024 (AEMO, 2023a) and NSW Net Zero Plan Stage 1: 2020-2030 (NSW Government, 2020)
- Contributing to the targeted energy storage needs of the CWO REZ and the NEM as identified in the NSW Electricity Strategy (NSW Government, 2019), by providing energy storage, frequency control, system stability or other Frequency Control Ancillary Services
- Support the realisation of the Central West and Orana Regional Plan 2041 (DPE, 2022a), which includes goals to diversify the local economy, provide direct and indirect economic benefits to local communities in the region through employment opportunities and increased investment in local communities
- Provide both voltage and reactive power support for the Beryl area, which was identified as having voltage constraints (Transgrid, 2022).

2.2 Policy and strategic alignment

The strategic documents relevant to the Project are described in **Table 2-1**.

Table 2-1. Relevant plans, policies or strategies

Plan, policy or strategy	Description	Relevance to the Project
National context		
The Paris Agreement and Climate Change Act 2022 (Cth)	The Paris Agreement is a legally binding international treaty on climate change adopted by 196 parties in 2015. As a signatory to the agreement, the Australian Government has committed to 43% emissions reduction target by 2030 as an enhanced Nationally Determined Contribution under the Paris Agreement. Australia has also legislated the 2030 emissions reduction target and a target of net zero by 2050 under <i>the Climate Change Act 2022</i>.	The Project will contribute to meeting Australia's commitments under the Paris Agreement by facilitating increased renewable penetration of the grid and reducing the NEM's annual greenhouse gas emissions. The Project will also support the Australian net zero by 2050 target.
Integrated System Plan 2022 (ISP)	The 2022 ISP provides an integrated roadmap for the development of the NEM over the next 20 years. The key objective of the ISP 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 Project will contribute to the ISP energy storage targets, and help to provide consumers with reliable, secure and affordable electricity. The Project contributes towards meeting the need for storage options to manage variable renewable energy generation.

Plan, policy or strategy	Description	Relevance to the Project
	The ISP notes that the most pressing need in the next decade (beyond what is already committed) is for dispatchable batteries, pumped hydro or alternative storage. Approximately 46 GW/640 GWh of dispatchable storage capacity is needed by 2050.	
Draft 2024 ISP	The Draft 2024 ISP is anticipating a need for a significant increase in firming capacity to maintain grid stability and predicts almost a fourfold increase in firming capacity by 2050. In line with the current 2022 ISP, the importance of utility scale batteries continues to be highlighted as such technology would support the integration of renewables into the grid. The economic viability of expanding battery storage within the NEM is also emphasised in relation to the substantial net market benefits associated with spending on transmission projects and including associated storage technologies.	The Project would align with the Draft 2024 ISP and the identified need to grow firming capacity through technology such as utility-scale batteries. The Project would contribute to grid stability alongside the increase of renewable energy sources in the grid.
CSIRO Renewable Energy Storage Roadmap 2023	CSIRO modelling shows that all decarbonisation pathways to achieve net zero would require a large increase in energy storage capacity, including with batteries. Short duration storage at commercial utility scale (1-4 hours, 100+ MWh) is expected to play a major role in decarbonising the grid and industries.	The Project aligns with the recommendations of the Renewable Energy Storage Roadmap as it would develop short-duration electricity storage with a proposed 100MW/200MWh battery.
2023 Electricity Statement of Opportunities (ESOO)	The 2023 ESOS provides a 10-year reliability outlook for the NEM to inform planning and decision making, including a reliability gap forecast for the coming five years. When considering only energy supply infrastructure, the reliability gaps are forecast in all mainland NEM regions, including NSW. However, the expected additional investments in renewable generation, dispatchable capacity, transmission are forecast to reduce reliability risks, if developed.	The Project will contribute to firming capacity as a short duration battery. Within the NEM short duration storage can help mitigate some electricity supply reliability risks.
NSW context		
Climate Change (Net Zero Future) Act 2023	The <i>NSW Climate Change (Net Zero Future) Act 2023</i> legislates NSW's targets to reduce GHG emissions by 50% by 2030 and 70% by 2035 to achieve net zero GHG emissions by 2050. This Act identifies NSW's approach to addressing climate change as a whole of government approach with the objective for NSW to be more resilient to a changing climate.	The Project would facilitate emissions reduction in the grid which would be needed to meet the targets under this Act.
NSW Electricity Strategy 2019	The NSW Electricity Strategy is the NSW Government's plan for a reliable, affordable, and sustainable electricity future that supports a growing economy. The strategy supports approximately \$8 billion of private investment	The Project is consistent with this strategy as it provides energy storage which is expected to assist with stabilising and managing the increased penetration of renewables

Plan, policy or strategy	Description	Relevance to the Project
	in the NSW electricity system over a 10-year period, including \$5.6 billion in regional NSW.	in the grid which would lead to downward pressure on electricity prices and make it more affordable for consumers and businesses.
Net Zero Plan Stage 1: 2020-2030	The Net Zero Plan is the foundation for NSW state 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 contributes to Priority 1 of the Plan: 'Drive uptake of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living.'
NSW Electricity Infrastructure Investment Roadmap 2020	The Electricity Infrastructure Investment Roadmap sets out a plan to deliver the state's first five Renewable Energy Zones (REZs) in the Central-West Orana, New England, South-West, Hunter-Central Coast, and Illawarra regions.	The Project is within the CWO REZ and is ideally placed to contribute to the success of the roadmap.
NSW Network Infrastructure Strategy 2023	The Network Infrastructure Strategy is intended to be a 20-year strategy for the coordinate development of network infrastructure to deliver at least five REZs and including a total 14 GW of capacity to be delivered as soon as practicable by 2033.	The Project is within the CWO REZ which is identified in the Strategy to require 4.5 GW of network capacity to progress as quickly as possible, and 2.3 GW to be secured now and delivered in 2030s. The Project would provide energy storage and ancillary service benefits for the REZ.
Regional and local context		
Central West and Orana Regional Plan 2041 (Regional Plan)	The Regional Plan provides the 20-year strategic framework for the region and guides land use planning priorities and decision making, with the main themes identified as: ▪ Region-shaping investments ▪ A sustainable and resilient place ▪ People, centres, housing and communities ▪ Prosperity, productivity and innovation ▪ Local Government Priorities.	The Project directly contributes to Objective 2 of the Regional Plan to support the State's transition to net zero by 2050 and deliver the CWO REZ. The Project would also align with Objective 17, to coordinate smart and resilient utility infrastructure, focus development around existing infrastructure and promote co-location of new infrastructure.
Mid-Western Regional Council Local Strategic Planning Statement 2020	The Local Strategic Planning Statement sets out the 20-year vision for land use and strategic planning in the Mid-Western Regional Council LGA. Planning Priority 7 of the Local Strategic Planning Statement is to "support the attraction of a diverse range of business and industries". To support this planning priority the Local Strategic Planning Statement contains a land use action to "consider renewable energy development in appropriate areas that avoids impacts on the scenic rural landscape and preserves valuable agricultural land."	The Project will contribute to Planning Priority 7 of the Local Strategic Planning Statement and has been sited to minimise impacts on productive agricultural land and visual amenity.
Mid-Western Region Towards 2040 Community Plan 2022	The Community Plan sets the vision for the Mid-Western Regional community and aligns with NSW state priorities and the Central West and Orana Regional Plan. Some of the key outcomes and strategies of the Community Plan includes:	The Project directly contributes to some of the economic and growth related strategic goals and will support the growth of an energy sector and skilled workforce in the region.

Plan, policy or strategy	Description	Relevance to the Project
	- Support the attraction and retention of a diverse range of businesses and industries - Encourage the development of a skilled and flexible workforce to satisfy local industry and business requirements - Support projects that create new jobs in the region and help to build a diverse and multi-skilled workforce	

2.3 Key features of the Project area and surrounds

Details relating to the key features of the Project area and surrounding area are provided in **Table 2-2**. Photos of the Project area and surrounds is provided below in **Picture 2-1** to **Picture 2-3**.

Table 2-2. Key features of the Project

Key feature	Description
Local context	
LGA	MWRC LGA
Landscape features	The Project area is within a broad valley, with an undulating landform and a rural character. Land surrounding the Project is primarily cleared land, used for grazing or dry land cropping with scattered rural residences and agricultural buildings and infrastructure. Specifically: - To the west, Wialdra Creek is located 100 m from the Project area, 600 m from the Project. Dense vegetation is present along Wialdra Creek - To the north and east, there are large open paddocks with scattered rural residences and intermittent corridors of trees along the Castlereagh Highway and paddock/property boundaries - To the east, a commercial panel beating business is located 500 m from the Project area - Directly south of the Project area is the Beryl Substation and the existing Beryl Solar Farm with infrastructure such as solar panels dominating the local landscape.
Nearby communities	The nearest population centre to the Project is in Gulgong, approximately 6.3 km south-east of the Project area. Other nearby population centres around Gulgong include Mudgee, Dunedoo, Wellington and Dubbo.
Aboriginal communities	Aboriginal communities around the Project include the Traditional Owners and Custodians of the Wiradjuri, Wongaibon, Wailwan (also known as Weilwan and Wayilwan), Gamilaroi (also known as Gamilaraay and Kamilaroi), Ngiyampaa, Dharug and Gundungurra countries.
National parks and reserves	The closest national parks and reserves to the Project are Yarrobil National Park and the Goodiman State Conservation Area approximately 8.2 km and 16.5 km north-west from the Project area.

Key feature	Description
Project context	
Project area, land ownership and existing infrastructure	The Project area is about 38 ha and includes: 5 Holleys Lane, Gulgong owned by an Associated Landowner of the Project. The rural residence includes two residential dwellings and sheds in the eastern section of the property. There is one mapped (Strahler 1st order) ephemeral watercourse that traverses the property and is dammed at the centre. There is also one unmapped drainage line associated with a culvert on Beryl Road also extends into the property. Both watercourses are diffuse and shallow depressions within the Project area (refer to Picture 2-1, Figure 2-1 and discussed further in Section 4.2 and Section 7.1) The rest of the farm property consists of large grass paddocks with some remnant vegetation - A portion of Beryl Road (sealed road) managed by the MWRC - Western portion of Beryl Substation (Lot 1, DP 523876), owned by the Electricity Transmission Ministerial Holding Corporation (ETMHC), and managed by Transgrid - Four existing 66kv transmission lines and easement corridors owned by Essential Energy spanning across the property in a general north-south direction, connecting to the Beryl Substation.
Land use	Existing land use within the Project area is low intensity agriculture currently limited to light grazing. Operation of the Project would not impact grazing activities for the remainder of the Project area that does not contain Project infrastructure. Along Beryl Road, works would involve the connection to Beryl Substation via underboring and establishment of a new site access. The Project would not result in a change of use for Beryl Road, which currently provides local access to rural properties. Works with the Beryl Substation would be consistent with its current energy supply land use purpose.
Land zoning	The Project area is zoned RU1 Primary Production under the Mid-Western Regional Local Environmental Plan 2012 (Mid-Western Regional LEP). The surrounding land parcels to the north, east and west of the Project area are zoned as R5 – Large Lot Residential under the Mid-Western Regional LEP (refer to Figure 2-1).
Crown Land and other licences	There are no Crown Lands within the Project area however several Crown parcels are located near the Project area (refer to Figure 2-1). The Project area and surrounds are subject to a mineral exploration licence EL8160 held by Bowdens Silver Pty Ltd which covers a large area in the local region.
Existing infrastructure outside the Project area	The following infrastructure is in the vicinity but outside the Project area: - The Beryl Substation is located south of the Project area, which connects the 132 kV Mudgee Tee to Beryl, 132 kV Wellington to Beryl and two other 66 kV transmission lines - The operational 110 MW Beryl Solar Farm (not owned by the Applicant) is directly south of the Project area, adjacent to the Beryl Substation - The Project area is accessed by Beryl Road from the Castlereagh Highway which runs in a south-east to north-west direction approximately 1.6 km east of the Project area - The non-operational/dismantled Gulgong Mary Vale railway line is 760 m south of the Project area at its closest point with the rail corridor running in an east-west direction - The Ulan to Binnaway railway line (part of the Wallerawang Gwabegar branch) runs in a general north-south direction about 6 km east of the Project area, providing freight services, mainly wheat traffic to Newcastle. Railway lines in proximity to the Project are shown in Figure 2-1.

Key feature	Description
Proposed subdivisions	Based on a review of MWRC website, there are no subdivisions proposed in the surrounding area.
Key environmental risks and hazards	Consideration of key environmental risks relevant to the Project are provided in the following sections: ▪ Flooding – Section 7.8 ▪ Bushfire prone land – Section 7.9.1 ▪ Contaminated land – Section 7.4.2.10.
Non-associated Landowners	There are 50 Non-associated Landowners within five km of the Project area.



Picture 2-1. Site photo looking south-west. Project area in the foreground with transmission lines, mapped ephemeral drainage line is located in the mid-ground and existing Beryl Substation and Beryl Solar Farm in the background



Picture 2-2. Site photo showing Beryl Road and Project area, looking west



Picture 2-3. Aerial image of Project area at 5 Holleys Lane, Gulgong, facing north-west

Source: Raine & Home – Gulgong

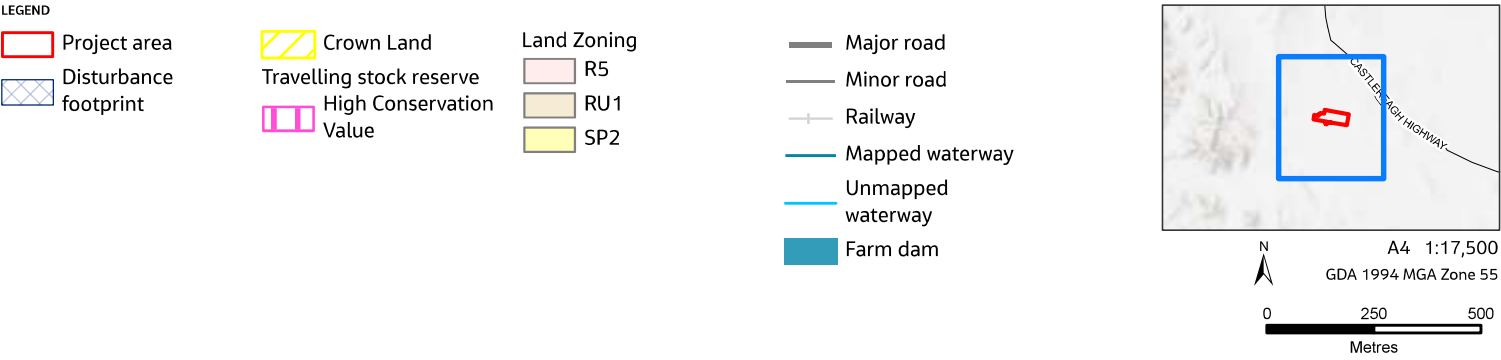
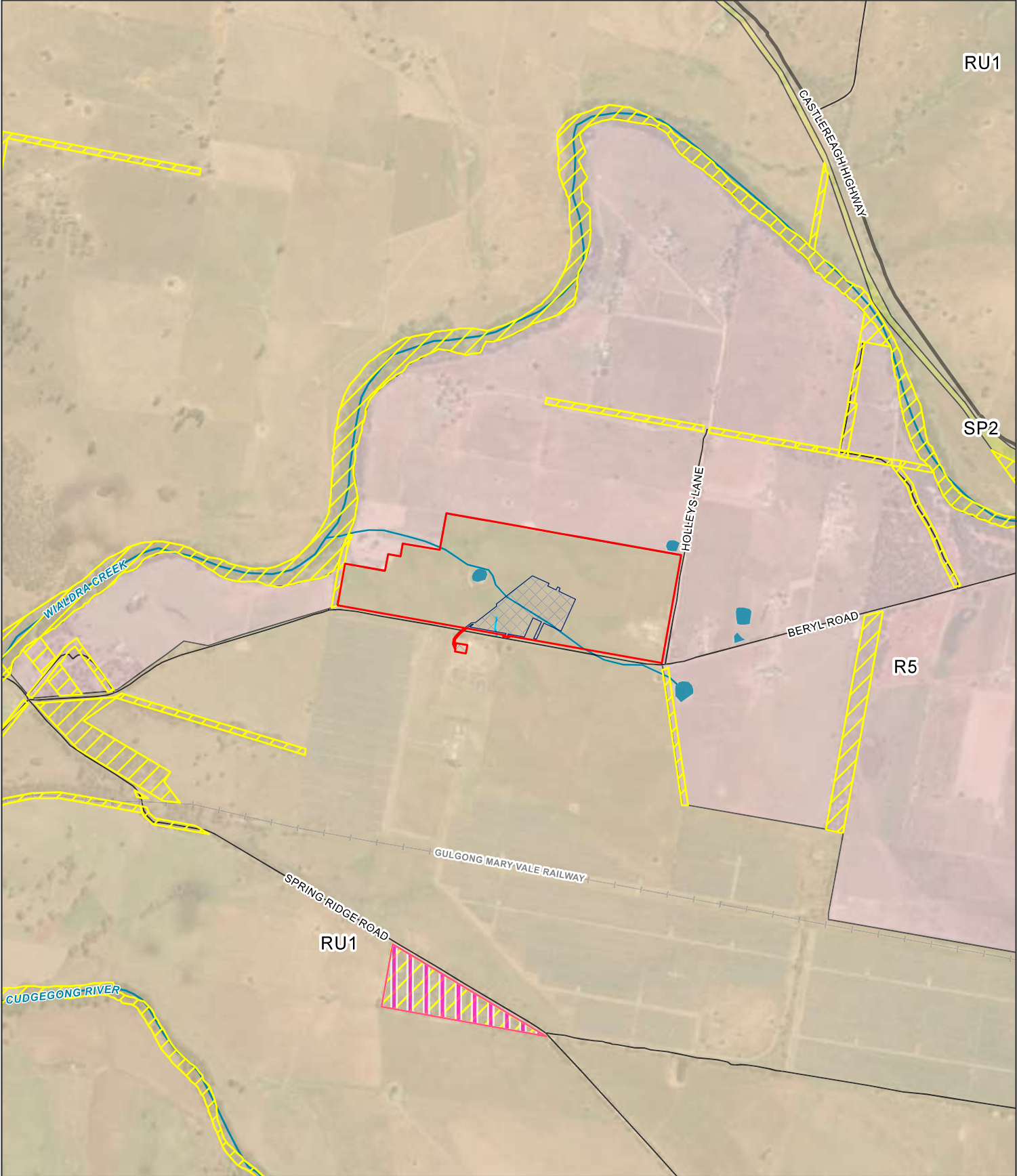


Figure 2-1 Land zoning and Crown land

Data Sources: NSW Department of Planning and Environment (2024); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2024), Australian Bureau of Statistics (2021)

2.4 Site suitability

The Project area is considered a suitable site for the purposes of the Project for the following key reasons:

- Location within the CWO REZ
- Energy generation including storage is a permissible land use within the land use zone and facilitates SSD application and planning approval for a BESS
- Availability of existing access to the Project area via an established road network
- Immediate proximity to the existing Beryl Substation and transmission lines to minimise impacts of easements and land fragmentation
- The Project would be a continuation of the existing electricity generation infrastructure within the area, demonstrated by the existing Beryl Substation and transmission lines, and would not conflict with the existing or proposed land use, or ongoing operations
- Sufficient size of land within the Project area to avoid and/or minimise impacts to biodiversity, Aboriginal cultural heritage and visual amenity impacts
- Sufficient buffers to minimise impacts to surrounding privately or publicly owned land and properties.

2.5 Negotiated agreements

RAC has obtained written landowner agreement to the development application being made from all landowners within the Project area.

Additionally, RAC has entered into, or is in the process of negotiating the following agreements:

- Option to Lease agreement with the landowner of 5 Holleys Lane, Gulgong (referred to as an 'Associated Landowner' within the EIS)
- Agreement with Transgrid relating to upgrade works at Beryl Substation which is owned by ETMHC, and managed by Transgrid on Lot 1 DP 523876. The upgrade works, including the new 132 kV bay, that will be built as part of the Project will be an asset owned and operated by Transgrid, connecting the project to the NEM. The agreement is being formalised as part of the Connection Agreement Process.
- Negotiations on voluntary planning agreements (VPA) with MWRC. The voluntary planning agreements will be in place prior to construction
- Annual contributions to a community benefit fund focussed on the Gulgong region, that would be spent on community projects.

There are 50 Non-associated Landowners within five km of the Project area. RAC has not entered any agreements with these Non-associated Landowners.

2.6 Potential for cumulative impacts

The CWO REZ was the first REZ to be declared in Australia and since its formal declaration in November 2021, the surrounding region has seen substantial growth in renewable energy developments.

Within the vicinity of the Project area there are multiple renewable energy projects (refer to **Table 7-58**). In addition to renewable energy, a number of mining projects in and around Ulan and Wilpinjong are operational and subject to proposed or approved expansions.

Cumulative impacts have the potential to occur when impacts from a project interact or overlap with impacts from other projects and can potentially result in a larger overall effect (positive or negative) on the environment, businesses or local communities.

Consideration of cumulative impacts associated with surrounding developments has been assessed in accordance with Cumulative Impact Assessment Guidelines for State Significant Projects (CIA Guidelines) (DPE, 2022d) and discussed in **Section 7.13**.

2.7 Project options and alternatives considered

The Project has been under development since early 2022, during which time RAC has considered preliminary options and siting to identify the optimal Project area and layout. The alternatives considered are as follows:

- **Option 1: Do nothing**
 - The 'do nothing' approach would involve not constructing and operating the Project at the Project area. The identified objectives and benefits of the Project would not be realised. While this approach may alleviate potential cumulative impacts, it would not support the Commonwealth and NSW Government and local or regional strategies and policies to reduce emissions, improve grid stability resilience, and increase investment in regional communities and new technologies. In the absence of significant impacts of the preferred option, and on the basis that the residual impacts are able to be mitigated, the do nothing option is not preferred.
- **Option 2: Alternative renewable energy development**
 - Consideration was given to other renewable energy generation such as solar or wind options that could be developed in the Project's locality and within the CWO REZ which could contribute to higher emissions reduction and displacement of fossil fuel-based generation in the NEM. However, this option was not pursued further on the basis that Beryl Solar Farm (not owned by the Applicant) is currently operational adjacent to the Project area, and several other solar farm and wind farm development are currently proposed near the Project area. It is considered that other sites are more suitable for alternative energy generation developments as indicated by the number of projects seeking access via the REZ and that the limited size of the Project area and close proximity to the transmission network with recognised voltage constraints make energy storage a better option for the Project area.
- **Option 3: Alternative location for the BESS Project**
 - This option would involve constructing and operating the Project at an alternative location. This option was not pursued further given the selected Project area is located at an optimal distance for transmission connection to the Beryl Substation (i.e. shortest viable distance). Alternative locations for a BESS further away from the Beryl Substation would require longer transmission lines and easements that can contribute to property fragmentation for large rural landholdings and potential habitat fragmentation across vegetated areas. As a result, this option was not considered viable.
- **Option 4: BESS at the Project area, different location**
 - An indicative layout for the Project was presented to MWRC and neighbouring landholders in July 2023 where Project infrastructure was located along the northern boundary of the current Project area with the intent of maximising distance from Beryl Road and reduce amenity impacts. Feedback from consultation activities identified a preference from neighbouring landholders for the Project to be located in proximity to the Beryl Substation and Beryl Road in an effort to consolidate visual impacts in the landscape associated with electrical infrastructure. As a result, this option was not pursued further. Instead, and in response to the above feedback, the Project was revised to be adjacent to Beryl Road and vegetation screening was included in the design (as per Option 5)
- **Option 5: BESS at the Project area, nominated location (preferred option)**
 - The Project as shown on **Figure 1-2** was selected to avoid and minimise potential environmental or social impacts where feasible, in particular impacts to visual amenity, remnant vegetation, nearby dwellings, existing easements and areas of moderate archaeological potential. Since the preparation of the Beryl BESS Scoping Report (Jacobs, 2023), the design has been further revised by reducing the disturbance footprint and refining the location for vegetation screening.

Based on the reasons presented above, the preferred option for the Project is Option 5.

3. Project description

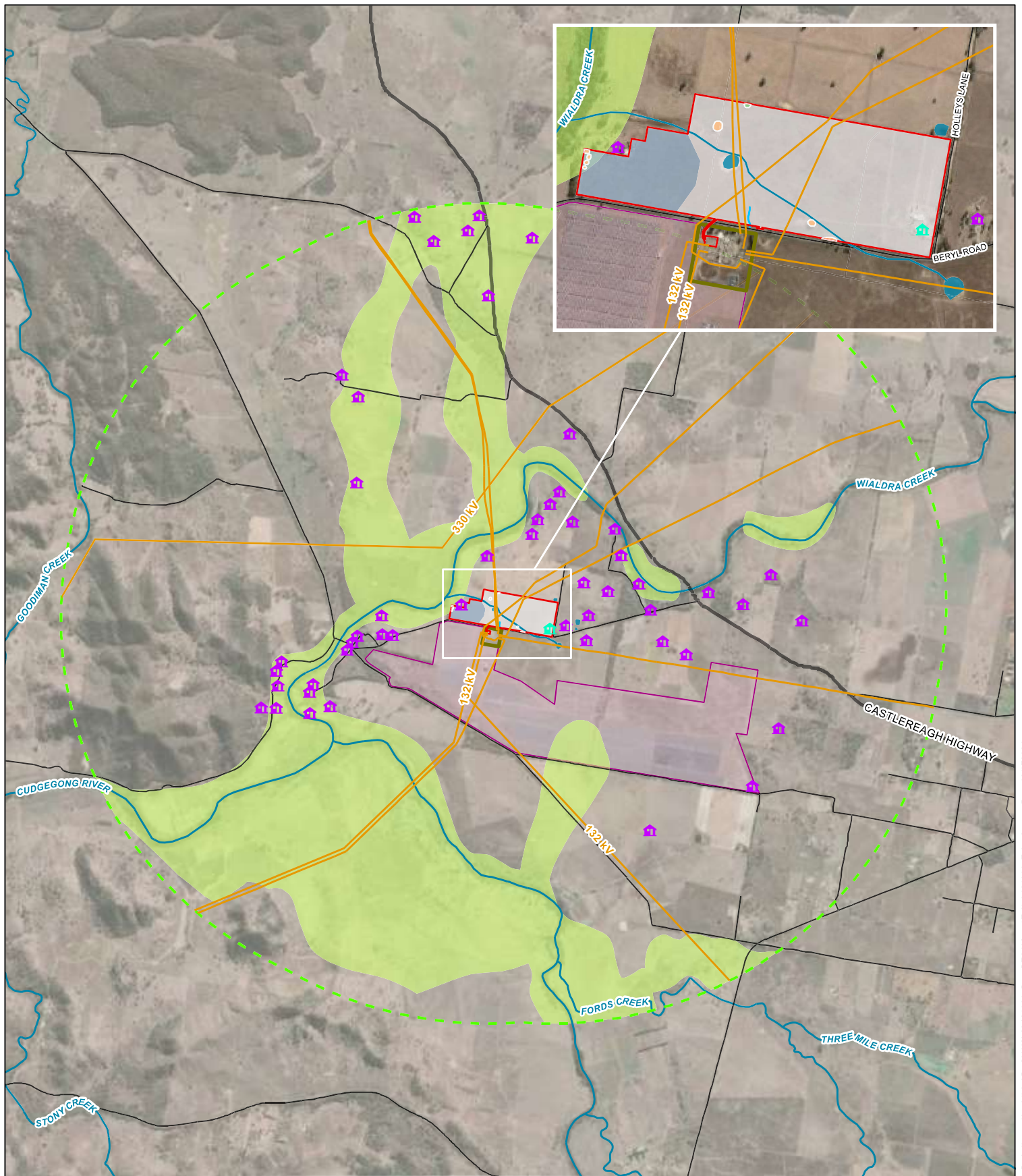
3.1 Environmental constraints

The following environmental and planning constraints are located within the Project area and have been considered when considering the Project layout to avoid and mitigate direct impacts (refer to **Figure 3-1**):

- Location of nearby residences
- Areas of remnant vegetation
- Farm dam and watercourses (mapped and unmapped)
- An area of moderate archaeological potential to contain Aboriginal objects in the west of the Project area
- BSAL in the west of the Project area
- Existing easements and transmission lines.

The Project layout responds to these constraints by avoiding identified environmentally sensitive areas in all cases and includes only temporary and compatible construction uses within the identified existing easements.

The Project will incorporate drainage design to convey overland flows around the Project to the farm dam downstream and prevent redirection of flows.



LEGEND

- | | | | |
|--|--|--|---|
| Project area | 5km buffer | 🏠 Associated Landowner | — Transmission line |
| Biophysical Strategic | Plant community types | 🏠 Non-associated Landowner | — Major road |
| Agricultural land | PCT 201 Remnant | | — Minor road |
| Beryl Substation | PCT 281 Remnant | | — Mapped waterway |
| Beryl Solar Farm | Archaeological potential | | — Unmapped waterway |
| | Low | | — Road |
| | Moderate | | Farm dam |

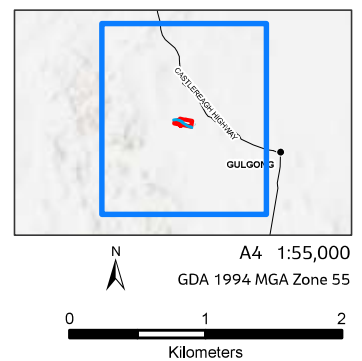


Figure 3-1: Constraints within and surrounding the Project

Data Sources: NSW Department of Planning and Environment (2024); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2024), Australian Bureau of Statistics (2021), TransGrid (2024)

3.2 Project overview

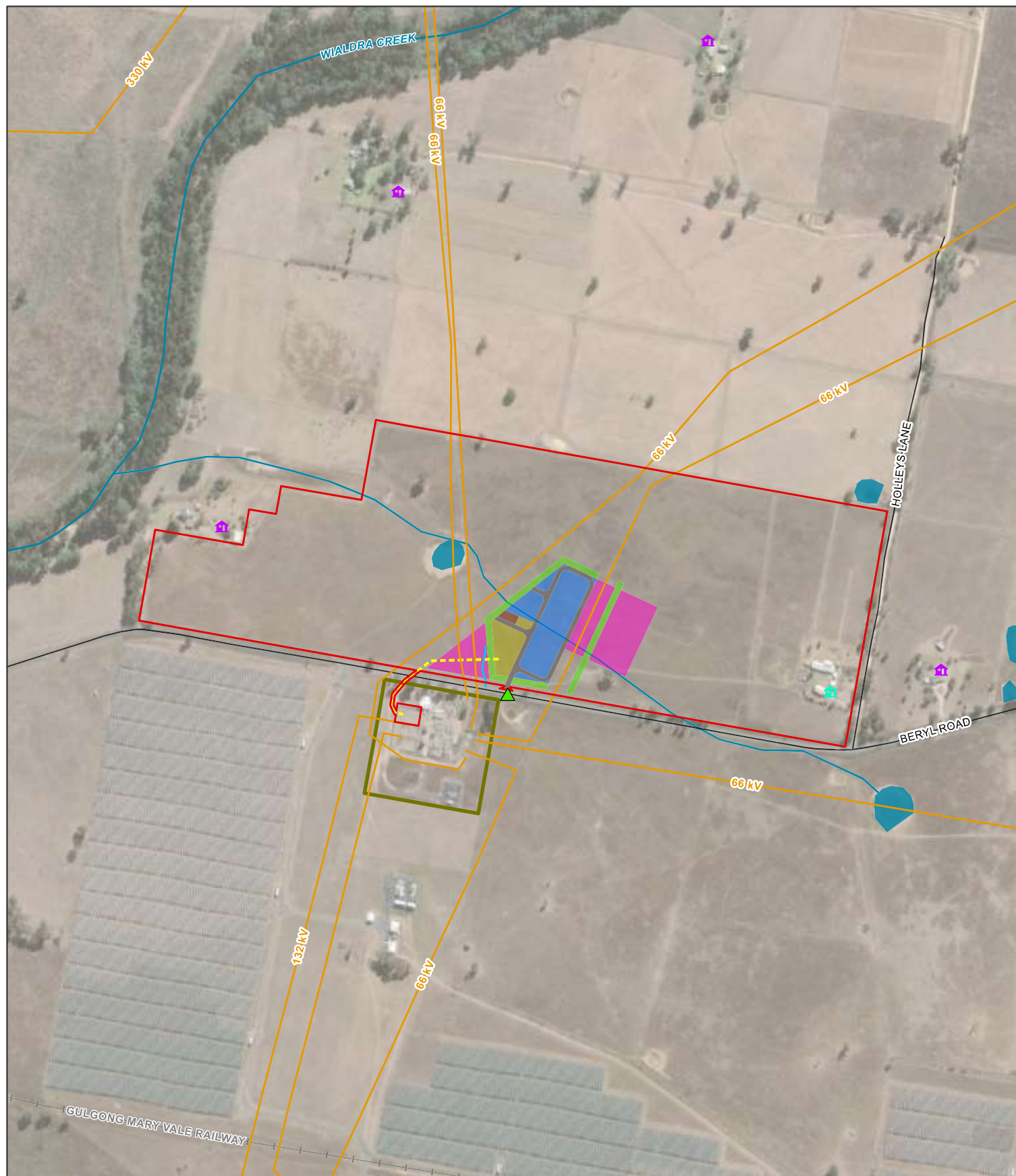
The Project would involve the development, construction, operation and decommissioning of a grid-scale BESS with a discharge capacity of 100 MW and a storage capacity of 200 MWh. A summary of the key elements of the Project are provided in **Table 3-1**. An overview and indicative layout of the Project is provided in **Figure 3-2** and **Figure 3-3** respectively.

Table 3-1. Key aspects of the Project

Key aspects	Description
Site context	
Disturbance footprint	Within the Project area (38 hectares), the Project would involve vegetation clearing, cut and fill and bulk earthworks to establish level areas across the Project area. The disturbance footprint required for construction is 4.2 ha as shown on Figure 3-3. Within the existing easements in the Project area, partial disturbance may be required to establish laydown areas, temporary parking and temporary construction facilities. No permanent infrastructure or vegetation screening would be established within the exiting on-site easements. Following construction, laydown areas would be returned to pre-construction conditions. Any necessary asset protection zones would be managed on an ongoing basis for bushfire protection purposes. The operational footprint of the project would be 2.5 ha, where permanent project infrastructure would be located.
Site access	Site access to the Project area would be via Castlereagh Highway then Beryl Road. An internal access track off Beryl Road is proposed to facilitate the transport of equipment and materials to the Project area during construction
Specifications	
Discharge capacity	Up to 100 MW
Storage capacity	Up to 200 MWh or two hours at maximum discharge capacity
BESS technology	Lithium-iron phosphate
Typical operating cycle	Up to one cycle per day is expected. The actual frequency of charge / discharge cycles would depend on market conditions in the NEM.
BESS compound (refer to Section 3.3.1)	The BESS compound would include: ▪ Battery enclosures (nominally 3.4 m height x 1.5 m long x 2.4 m wide) containing lithium-iron phosphate type batteries, internal cooling and safety management systems ▪ Cabling (Direct Current (DC) electrical, communications and earthing), underground cable pits and conduits ▪ Power Conversion Systems (PCS) including inverters, 33 kV transformers and switchgear ▪ Underground power and communications cables to switch rooms and control room ▪ Stormwater retention bund. The exact number of battery enclosures and inverter stations and their dimensions and arrangement as well as overall electrical connection and facility layout would be determined by the battery supplier once selected.
Switch room and transformer area (refer to Section 3.3.2)	The switch room and transformer area would include: ▪ Two switch rooms including the auxiliaries (such as heating ventilation and air conditioning and fire suppression) ▪ A 132/33 kV 125 megavolt-amperes step-up transformer ▪ Two 33/0.415 kV auxiliary transformer

Key aspects	Description
	▪ Harmonic filter (if required) ▪ 33 kV underground cables from 33 kV switch room to the step up transformer and from switch room to the PCS ring main unit. ▪ Emergency diesel generator including the housing and interconnection with the low voltage network (if required) ▪ Two dedicated fire water tanks with total 500 megalitres (ML) storage and pumps. The connection infrastructure would include a 132 kV underground cable connecting the switch room and transformer to Beryl Substation.
Beryl Substation upgrade works (refer to Section 3.3.3)	An extension of the existing Beryl Substation, including a new 132 kV bay with disconnector and switchgear and extension of 132 kV busbars.
Construction power and utilities (refer to Section 3.3.4)	Power and communications would be established during construction including a transformer to provide auxiliary power and a portable emergency diesel generator in the case of any sustained grid outage event.
Construction laydown area	The construction laydown area would include: ▪ Temporary construction compound ▪ Temporary workers carpark ▪ Stockpiles and laydown areas for equipment and materials.
Permanent ancillary infrastructure (refer to Section 3.4)	Permanent ancillary infrastructure would include: ▪ Operation and maintenance facility ▪ Security fencing, lighting, lightning protection, closed-circuit television cameras (CCTV) and safety and security signage ▪ Asset Protection Zone (APZ) with a minimum 10 m width.
Materials and finishes	BESS enclosures would be light in colour to reduce heat absorption, and of a painted steel finish. Buildings would be painted a neutral colour to match the local landscape to reduce their prominence in any views to the Project.
Vegetation screening	Screening vegetation would be provided around the perimeter of the operational infrastructure. This additional vegetation would introduce a mix of shrubs and trees in a linear pattern that would be compatible with the character of the view.
Construction	
General activities	Construction would be carried out in four key stages: ▪ Enabling works, including installation of environmental controls, temporary facilities, construction of site access and vegetation clearing ▪ Construction of the Project including cut and fill, structural works and delivery, installation and electrical fit-out components ▪ Testing and commissioning ▪ Demobilisation.
Construction hours	Construction work would generally be limited to standard construction with some exceptions for low impact works. There are some situations where works would need to be carried out outside of standard work hours, including safety or emergency reasons (discussed further in Section 3.5.2).
Workforce	Up to 40 people per day.
Program	Approximately 12 months with construction scheduled to begin in early 2025 (subject to approval), refer to Section 3.5.4 .

Key aspects	Description
Plant and equipment	A variety of plant and equipment are required to construct the Project including cranes, heavy vehicles, light vehicles, welding equipment and concrete pumps. The full list of equipment is provided in Section 3.5.5 .
Vehicle movements	The following vehicle movements are anticipated during construction: ▪ Light vehicles: - Average of 15 light vehicle trips per day (15 in and 15 out) - Peak of 40 light vehicle trips per day (40 in and 40 out) ▪ Heavy vehicles: - Average of 5 heavy vehicle trips per day (5 in and 5 out) - Peak of 10 heavy vehicle trips per day (10 in and 10 out) ▪ Two oversize overmass vehicles during construction.
Water demand	During construction, 8.6 ML (total) of non-potable water is required predominantly for dust suppression purposes and 1.4 ML (total) of potable water would be required. Water for construction purposes would be sourced from a private commercial supplier and transported to the Project area in water trucks. Minimal amounts of water would be required for the operation of the Project.
Operation	
Design life	Up to 30 years and this may be extended subject to replacement of components.
Operational hours	The BESS would be remotely controlled, and is available 24 hours per day, 7 days per week. Operation will depend on demand/supply.
Workforce	Up to two people per day shift for routine inspections and maintenance.
Vehicle movements	Staff light vehicles up to two per day (two in and two out). Ad hoc deliveries of replacement parts would be unlikely to exceed one delivery per day on average.
Noise emission level	The range of sound power levels were used for assessment purposes are: ▪ Full load (charge and discharge): - Battery enclosures: 78 dB(A) - Inverters (with silencers): 86 dB(A) - 132 kV Transformers: 95 dB(A). ▪ Half load (charge and discharge): - Battery enclosures: 75 dB(A) - Inverters (with silencers): 74 dB(A) - 132 kV Transformers: 95 dB(A).
Decommissioning	
Timing	Decommissioning would be subject to a decision that the BESS was past its useful life and not able to be life extended.
Works	Decommissioning would remove above-ground infrastructure and return the Project area to its original state, in consultation with the Associated Landowner. Decommissioning would not exceed the intensity associated with construction.



LEGEND

- Project area
- 1km Project area buffer
- Beryl Substation

The Project

- Proposed 132kV electricity transmission line
- BESS compound
- Entry road
- Laydown area
- O&M area
- Screening
- Switchroom & transformer

- 🏠 Associated Landowner
- 🏠 Non-associated Landowner
- ▲ Site access

- Transmission line
- Minor road
- + Railway
- Mapped waterway
- Unmapped waterway
- Farm dam



A4 1:8,000
GDA 1994 MGA Zone 55

0 150 300
Metres

Figure 3-2: Overview of Project

Data Sources: NSW Department of Planning and Environment (2023); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2023), Australian Bureau of Statistics (2021), TransGrid (2023)

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Beryl Battery Energy Storage System
Environmental Impact Statement

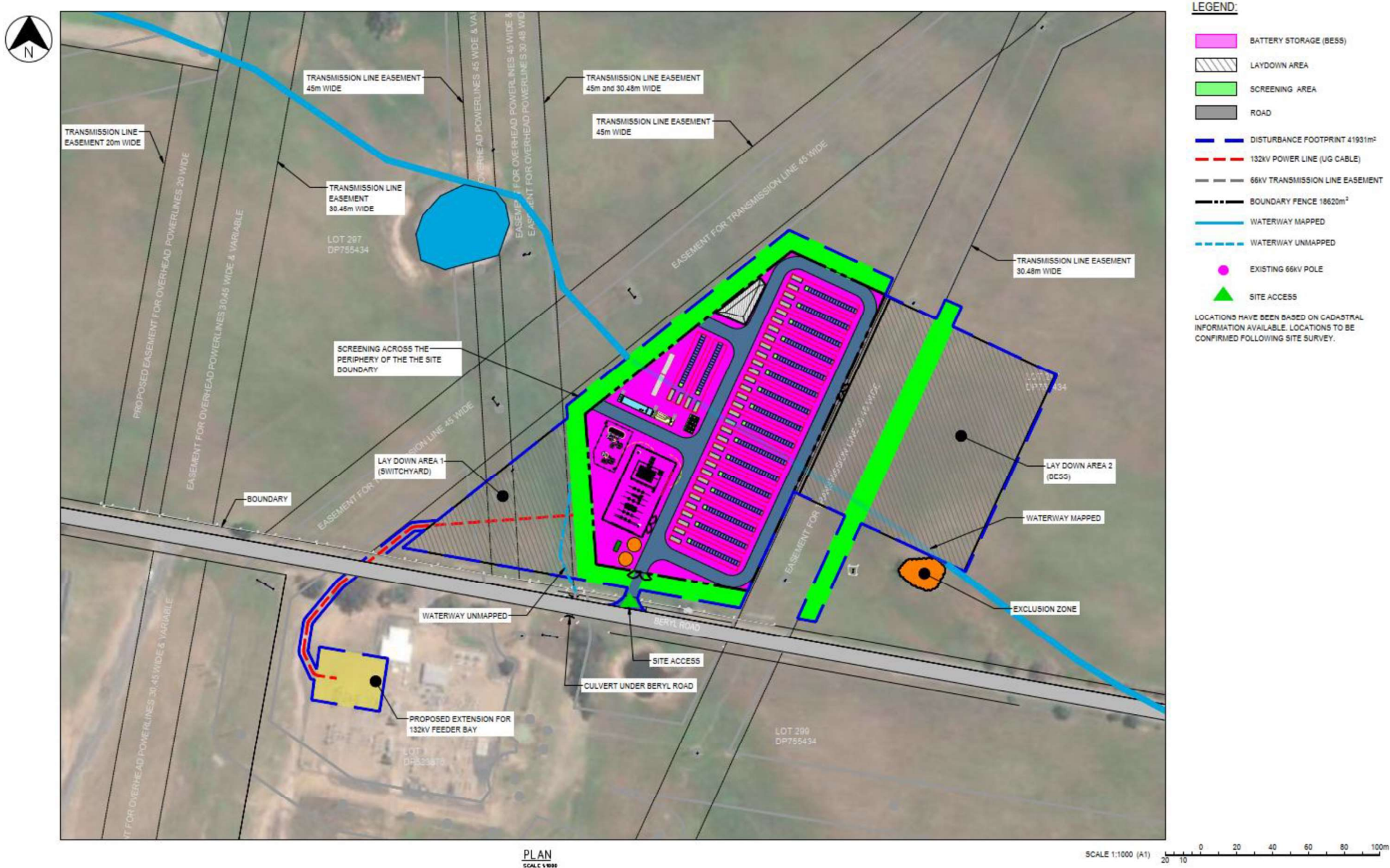


Figure 3-3. Indicative layout for the Project

3.3 Physical layout and design

The indicative layout and design of the Project is shown in **Figure 3-3**. The final layout and design for the Project would be determined during detailed design and is subject to change based on the selection of technology and construction contractor. For the purpose of the EIS, the layout has assumed a conservative disturbance footprint to assess environmental impacts while also allowing for flexibility in design.

Further details on each of the Project components are detailed in the following sections.

3.3.1 BESS compound

The BESS compound is designed to house battery enclosures, each containing multiple battery cells alongside essential auxiliary systems including internal cooling, fire safety, and battery control and protection systems. Approximately 324 battery enclosures would be required for the Project, subject to the final choice of technology supplier. These enclosures are expected to measure 3.4 m height, 1.5 m in length and 2.4 m in width. The battery enclosures are planned to be arranged in rows, creating a formation similar to what is shown in **Figure 3-4**.

Each battery enclosure would be connected to a PCS equipped with inverters and transformers. This setup would facilitate the conversion of power flow between the battery storage and the electrical grid.



Figure 3-4. Example of BESS compound

3.3.2 Switch room and transformer area

The BESS compound would connect to the 33 kV switchgear located within a switch room. This room would include auxiliary equipment such as ventilation and arc duct systems, fire suppression mechanisms and monitoring and control devices.

A control room would house network infrastructure, control and protection panels, engineering workstations, Human-Machine Interfaces (HMIs), metering stations, among other essential components.

A High Voltage (HV) step-up transformer would be positioned in the transformer yard, which would also house auxiliary support equipment such as neutral earthing resistors, surge arrestors, instrument transformers, and cable support structures. The specific ratings and types of these components would be determined during the detailed design phase.

Connections from the BESS to the switch room and subsequently to the step-up transformer would be facilitated via underground cables, operating at voltages not exceeding 1,000 volts. The HV step-up transformer would connect to the 33 kV switch room via underground cables and to the 132 kV Beryl Substation via a 132 kV underground cable.

3.3.3 Beryl Substation upgrade works

It is anticipated that the upgrade of the existing Beryl Substation would be carried out by Transgrid to facilitate the connection of Beryl BESS to the grid. The upgrade would require the addition of a new 132 kV

bay equipped with a disconnecter, current and voltage transformers, an extension of the 132 kV busbars, and connections to a 132 kV cable.

Underground cables from the Project's HV step-up transformer would terminate at the incoming end of the new bay.

3.3.4 Utilities and services

Power and telecommunications would be established during the construction phase. Auxiliary power would be sourced from a 33/0.415 kV transformer. Provision would be made for connection of a portable emergency diesel generator, in the unlikely event of a sustained grid outage. The emergency generator would be sized to accommodate the Heating, Ventilation, and Air Conditioning (HVAC) cooling load, ensuring critical systems remain operational during outages.

Protection and control systems would be powered through the auxiliary bus and an Uninterruptible Power Supply, guaranteeing system integrity and continuity.

During construction, portable toilets with self-contained sewage systems will be utilised.

3.4 Permanent ancillary infrastructure

The permanent ancillary infrastructure associated with the Project are described in **Table 3-2**.

Table 3-2. Permanent ancillary infrastructure

Aspect	Details
Operation and maintenance facility	- Up to two permanent operational staff would be required to oversee the operation of the Project and carry out routine inspections and maintenance. - An operation and maintenance facility would be established during construction and maintained throughout operation. The facility would comprise the following: - Project administration building (control room) - Maintenance and spares warehouse - Water tanks and a septic system - Offices and amenities for maintenance staff - Storage and laydown areas for equipment and materials - Designated car spots for vehicles (about four car spots).
Security fencing, lighting, signage, CCTV	- Secure fencing would be installed to ensure the entire perimeter of the permanent infrastructure - Lighting would be provided via pole mounted installations across the BESS compound, BESS switchyard and transformer for security purposes, and for emergency maintenance operations at night if required. All lighting would be designed and operated in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting - Clear boundaries would be established using "goal posts" to ensure safe clearances (height) when traversing the easement - Signage to indicate reduced headroom clearance, hazardous areas, areas where chemicals are handled, stored or processed - Appropriate warning signs would be positioned on the fence at regular intervals and at the entry gate - All buildings containing equipment which is operated under hazardous voltage shall be labelled accordingly at each access door.
Asset protection zones	An Asset Protection Zone (APZ) with a minimum 10m width to be established and maintained around Project-infrastructure (i.e. battery enclosures). Roads and paved/cleared areas are suitable within the APZ while temporary laydown areas, site access and associated fencing do not require specific APZ.
Vegetation screening	Screening vegetation would be provided around the perimeter of the permanent infrastructure, outside of the APZ. This additional vegetation would introduce a

Aspect	Details
	mix of shrubs and trees in a linear pattern that would be compatible with the character of the view, which includes existing corridors of vegetation along Holleys Lane and some field boundaries. Vegetation screening will be managed in perpetuity via a vegetation and landscaping management plan to ensure that the vegetation does not increase the risk of bushfire.
Site access off Beryl Road	The Project includes a site access off Beryl Road to allow access for vehicles during construction. The proposed access road would be gravelled with a 7 m wide formation and tie-in to the existing Beryl Road formation. The road would be retained during operation of the Project to allow for maintenance and operational activities.

3.5 Construction

3.5.1 Construction activities

The final construction methodology would be subject to further detailed design and the selection of the construction contractor. The construction activities that are likely to occur, and in general order, are presented in **Table 3-3**.

Table 3-3. Description of construction activities

Construction activity	Description of works
Enabling works	- Installation and maintenance of environmental controls including drainage and sediment controls - Mobilisation and establishment of temporary construction facilities and temporary laydown areas - Construction of site access off Beryl Road - Vegetation clearing to accommodate project infrastructure and asset protections zones.
Construction	- Cut and fill to level areas and establish desired design levels - Structural works including numerous concrete pads, strip footings or piers to support battery enclosures, power conversion systems and transformer structures - Construction of the switch room and transformer foundations including delivery and installation of transformers, outdoor switchgear, and other ancillary infrastructure - Delivery, installation and electrical fit-out of battery enclosures, power conversion systems and transformers, including cable laying and trench backfilling to connect the BESS compounds to the switch room and transformer - Interconnection of battery enclosures to the PCS and to the electrical room - Installation of lighting/lightening posts - Cable trenching and installation of a 132 kV underground cable from the transformer to the Beryl Substation, including underground drilling for road crossing - Installation of security fencing - New bay at Beryl Substation - Installation of a 132 kV cable and supporting structure as required to connect the new 132 kV bus bars at Beryl Substation.
Testing and commissioning activities	- Testing and pre-commissioning of individual equipment - Hot commissioning - Testing.

Construction activity	Description of works
Demobilisation	- Removal of construction equipment and rehabilitation of construction laydown areas - Planting of screening vegetation and installation of stock exclusion fences.

A Construction Environmental Management Plan (CEMP) will be prepared for the Project. The CEMP will detail how the performance outcomes, commitments, and environmental management measures for the Project will be implemented and achieved during construction. The CEMP will also provide the roles and responsibilities of key construction personnel and describe how environmental risks associated with the Project will be managed.

3.5.2 Construction work hours

Construction activities would be undertaken during standard day time construction hours in accordance with the Interim Construction Noise Guideline (ICNG) (DECC, 2009):

- Monday to Friday – 7 am to 6 pm
- Saturday – 8 am to 1 pm
- Sunday and Public Holidays – no work.

The ICNG (DECC, 2009) recognises there are some situations where construction may need to be carried out outside of the recommended standard construction hours. For the Project, these activities may include:

- The delivery of materials as required by the authorities for safety reasons
- Commissioning activities where the operation of the Project must align with demands on the grid
- Emergency situations to prevent the loss of lives and properties and/or to prevent environmental harm
- Work determined to comply with the relevant noise management levels
- Situations where agreement is reached with affected receivers.

3.5.3 Construction workforce

During construction it is expected that approximately 40 full time equivalent (FTE) jobs would be required during the peak construction period. The construction workforce would be sourced from the local area as far as practicable. The Project would explore localised upskilling and training in the region for the deployment of batteries.

3.5.4 Construction program

The construction of the Project would begin in early 2025, pending planning approval and grid connection agreement. The construction of the Project is expected to take approximately 12 months to complete with operation of the BESS anticipated for 2026. An indicative program is provided in **Table 3-4**.

Table 3-4. Indicative construction program

Construction stage	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Enabling works												
Cut and fill												
Construction at Beryl Substation												
Construction of switchyard												
Construction of BESS												
Testing and commissioning												
Demobilisation												

3.5.5 Plant and equipment

The list of plant and equipment in **Table 3-5** are likely to be required to facilitate construction of the Project.

Table 3-5. Typical plant and equipment

Construction stage	Plant and equipment	
Enabling works	- Trucks (medium rigid, heavy rigid, dog trailers and tipper combinations) - Scissor lift - Light vehicles - Excavators (tracked) 35t - Mobile crane - Franna crane.	
Construction	- Franna cranes - Excavators (tracked) 35t - Graders - Vibratory rollers - Concrete trucks - Dump trucks - Water cart - Concrete pumps - Concrete vibrators - Generators	- Light vehicles - Front loaders - Backhoes - Asphalt truck and sprayer - Rigid trucks - Mobile cranes - Compressors - Welding equipment - Air track drill.
Testing and commissioning	- Light vehicles - Generators.	
Demobilisation	- Rigid trucks - Franna cranes - Excavators (tracked) 35t - Vibratory rollers - Water cart - Backhoes.	

3.5.6 Materials, water demand and water supply

The following materials are required for the construction of the Project (quantities to be confirmed during detailed design):

- Structural steel
- Concrete
- Cables
- Prefabricated buildings
- Water tanks
- Ash, sand, gravel, clay, rock and bitumen.

Up to 8.6 ML of non-potable water is expected to be required for compaction and dust suppression activities. About 1.4 ML of potable water is anticipated during construction. Water would be sourced via commercial agreements.

3.5.7 Vehicle movements

Traffic generated by the construction workforce is assumed to consist of a mix of light vehicles and heavy vehicles. The following average and peak traffic generation that is anticipated is provided in **Table 3-6**. A total of two OSOM vehicle movements would occur during the construction of the Project. A 'movement' is defined as a single, one-way, vehicle pass-through.

Table 3-6. Anticipated vehicle movements

Construction activity	Average		Peak hours^ in AM and PM	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Enabling	2	2	1	1
Construction	40 (during peak construction), 15 at other times	10 (during peak construction), 5 at other times	15	5
Testing and commissioning	25 during peak commissioning	10	15	5
Demobilisation	5	4	2	2
OSOM	2 total			

^ Morning peak = 6:00 AM to 7:00 AM, Evening Peak = 6:00 PM to 7:00 PM.

3.6 Operation

The Project is anticipated to be operational in 2026. The operational phase would be approximately 30 years, after which the BESS would be replaced, upgraded or decommissioned.

The Project is proposed to operate unmanned 24 hours a day seven days a week, with up to two operational staff required one to two weeks each month to carry out regular maintenance activities, including vegetation management, pest control and general maintenance and potentially out of hours for any emergency response and maintenance work. Traffic movements would be minimal with light vehicles occasionally needing to access the Project area for maintenance activities. Heavy vehicles may also occasionally access the site to replace larger components as necessary.

An Operational Environmental Management Plan (OEMP) will be prepared to mitigate and manage environmental impacts during operation of the Project. The OEMP will include a program for monitoring and reviewing the performance of environmental controls, and where agreed corrective actions are implemented if necessary.

3.7 Decommissioning

The Project has a target life of 30 years with components anticipated to be replaced or upgraded as required and life may be extended if feasible at the time. In the event of decommissioning, the Project area would be returned to its original state with all above-ground BESS infrastructure removed in consultation with the landowner.

A Decommissioning and Rehabilitation Plan will be prepared in consultation with the Associated Landowner prior to the cessation of operations. The standard construction hours for the construction of the Project would also apply to the decommissioning phase.

4. Statutory context

4.1 Planning framework

The EP&A Act and the EP&A Regulation provide the framework for planning and approval and environmental assessment in NSW. The EP&A Act and Regulation are supported by a number of environmental planning instruments, which include State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).

The applicable environmental planning instruments and the regulations made under the EP&A Act determine the relevant planning approval pathway and the associated environmental assessment requirements for proposed development activities.

A summary of the statutory requirements for the Project are presented in **Table 4-1**.

Table 4-1. Summary of Statutory Requirements

Category	Requirement
Power to grant consent	The Project is declared SSD and is subject to assessment under Part 4, Division 4.7 of the EP&A Act. Under Section 4.36(2) of the EP&A Act, a SEPP may declare any development to be SSD. Under Section 2.6(1) of the Planning Systems SEPP, a development is classified as SSD if: (a) <i>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 EP&A Act, and</i> (b) <i>the development is specified in Schedule 1 or 2.</i> Schedule 1(20) of the Planning Systems SEPP defines the following as SSD: <i>Electricity generating works and heat or co-generation</i> <i>Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, waste, hydro, wave, solar or wind power) that:</i> (a) <i>has a capital investment value of more than \$30 million, or</i> (b) <i>has an estimated development cost of more than \$10 million and is located in an environmentally sensitive area of State significance.</i> Under Section 2.2 (3) of the Planning Systems SEPP, <i>words and expressions used in this Chapter have (subject to this section) the same meaning as they have in the standard local environmental planning instrument prescribed by the Standard Instrument (Local Environmental Plans) Order 2006.</i> Under the Standard Instrument—Principal Local Environmental Plan (2006 EPI 155a): <i>electricity generating works means a building or place used for the purpose of—</i> (a) <i>making or generating electricity, or</i> (b) <i>electricity storage.</i> The Project as such meets the definition of ‘electricity generating works’ and as it has a capital investment value of more than \$30 million is declared SSD. Section 4.38 of the EP&A Act provides the consent authority to determine a development application in respect of SSD by either granting consent to the application with such modifications of the proposed development or on such conditions as the consent authority may determine, or refusing consent to the application.
Permissibility	The Project is proposed on land zoned RU1 Primary Production under the Mid-Western Regional LEP. Development for the purpose of energy generation (which includes storage) is permissible with consent under the land use table of the LEP.

Category	Requirement
	The Project is also permissible through the application of Section 2.36(1) of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP) which provides for electricity generating works to be carried out on any land in a prescribed rural, industrial or special use zone with development consent. The RU1 zone is a prescribed zone defined in Section 2.35 of the Transport and Infrastructure SEPP.
Other approvals	Other approvals related to the Project: ▪ The Project requires a consent under section 138 of the <i>Roads Act 1993</i> (refer to Table 4-3). ▪ The Project does not require approval under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) as no significant impacts to matters of national environmental significance (MNES) are likely as further considered in Table 4-4. ▪ A controlled activity approval may have been required if the Project was not an SSD (refer to Table 4-2)
Pre-conditions to exercising the power to grant approval	A development application for SSD is to be accompanied by an EIS prepared by or on behalf of the Applicant in the form prescribed by the regulations. Section 190 of the EP&A Regulation specifies the form required of the EIS that is required to accompany an application for SSD. Section 191 of the EP&A Regulations identifies that the EIS must comply with the environmental assessment requirements. Section 192 of the EP&A Regulations specifies mandatory content of an EIS. Consideration of alignment with form prescribed by the regulations is provided in Appendix B. Under Section 4.6(1) of the State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP), the consent authority must be satisfied that the land is suitable in its current state – or will be suitable, after remediation – for the purpose for which the development is proposed to be carried out. The Project area is not considered to be contaminated. Consideration of the contamination status of the Project area is provided in Section 7.4.2.10. Under Section 7.9 of the <i>Biodiversity Conservation Act 2016</i> (BC Act) an application for SSD is to be accompanied by a Biodiversity Development Assessment Report (BDAR) unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values. A BDAR is provided in Appendix E.
Mandatory considerations	The relevant objectives of the Section 1.3 of the EP&A Act are identified as: (a) <i>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</i> (b) <i>to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,</i> (c) <i>to promote the orderly and economic use and development of land,</i> (e) <i>to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,</i> (j) <i>to provide increased opportunity for community participation in environmental planning and assessment.</i> Consideration of relevance and consistency with the objects of the EP&A Act is provided in Section 8.4.

Category	Requirement
	Section 4.15 of the EP&A Act applies to the determination of the development application. The application of Section 4.15 and how it has been addressed in the EIS is provided in Section 8.5. Relevant environmental planning instruments are identified as: ■ Planning Systems SEPP ■ Transport and Infrastructure SEPP ■ Resilience and Hazards SEPP ■ Mid-Western Regional LEP. Consideration of applicable environmental planning instruments is provided in Table 4-4. Under Section 61 of the EP&A Regulation, for SSD located within 200 km of Siding Springs Observatory, the consent authority is required to consider the Dark Sky Planning Guideline, Protecting the observing conditions at Siding Springs Observatory (NSW DPE 2023). The Project area is within 100 km of siding springs and consideration of the above guideline is provided in Section 7.5 and Appendix H.

4.2 Other approvals

Section 4.41 of the EP&A Act identifies approvals that do not apply in the case of this Project and where authorisations are not required for SSD that has been approved. Nevertheless, they have been considered below in **Table 4-2**.

Table 4-2. Relevant approvals not required under Section 4.41 of the EP&A Act

Approval	Consideration	Where considered in EIS
A permit under section 201, 205 or 219 of the Fisheries Management Act 1994 (FM Act)	The Project would include conveying flows from the two ephemeral waterways (mapped and unmapped) around the Project to the farm dam downstream (which is their current discharge). Under Section 198A of the FM Act, <i>dredging work means—</i> (a) <i>any work that involves excavating water land, or</i> (b) <i>any work that involves moving material on water land or removing material from water land that is prescribed by the regulations as being dredging work to which this Division applies.</i> <i>Reclamation work means any work that involves—</i> (a) <i>using any material (such as sand, soil, silt, gravel, concrete, oyster shells, tyres, timber or rocks) to fill in or reclaim water land, or</i> (b) <i>depositing any such material on water land for the purpose of constructing anything over water land (such as a bridge), or</i> (c) <i>draining water from water land for the purpose of its reclamation.</i> <i>Water land means land submerged by water—</i> (a) <i>whether permanently or intermittently, or</i> (b) <i>whether forming an artificial or natural body of water,</i> The Project area is not considered water land. As such a permit under Section 201 of the FM Act is not required.	Section 7.8

Approval	Consideration	Where considered in EIS
	Both waterways are diffuse, shallow depressions that do not contain riparian vegetation or formed channels. The Project would not impact on marine vegetation or cause blockage in fish passage. As such a permit under Section 205 or 219 of the FM Act is not required.	
An approval under Part 4, or an excavation permit under section 139 of the <i>Heritage Act 1977</i> (Heritage Act)	The Heritage Act provides for the conservation of buildings, works, relics and places that are of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the State. Matters protected under the Act include items listed on the State Heritage Register, the heritage schedules of local council LEPs, and/or the conservation registers (or Section 170 Registers) of NSW State government agencies, as well as items subject to an Interim Heritage Order. Section 139 of the Heritage Act prohibits a person from disturbing or excavating any land on which the person has discovered or exposed a relic, except in accordance with an excavation permit or a notification granting exception for the permit. There are no listed heritage items identified near the Project. No impacts to the heritage items or value are expected as a result of the Project.	Section 7.3
An Aboriginal heritage impact permit under section 90 of the <i>National Parks and Wildlife Act 1974</i> (NPW Act)	The NPW Act seeks to protect natural and cultural heritage by prescribing offences and defences relating to, but not limited to, Aboriginal heritage and the preservation of native title within NSW. Under Part 6 Section 86 of NPW Act, it is an offence to harm or desecrate an Aboriginal object or Aboriginal place. Section 87(1) of the NPW Act provides that it is a defence to these provisions if the harm or desecration act is authorised by an AHIP. Under Section 4.41 of the EP&A Act, an AHIP under Section 90 of the NPW Act is not required for SSD that is authorised by a development consent. Nevertheless, the Project is required to comply with all legislative requirements under Part 6 of the NPW Act. No known Aboriginal heritage sites or listed items are identified within the Project area.	Section 7.2
Bush fire safety authority under section 100B of the <i>Rural Fires Act 1997</i>	The Rural Fires Act facilitates the prevention, mitigation and suppression of bush and other fires in LGAs and parts of NSW considered to be rural fire districts. Under the Rural Fires Act, the owner or occupier of land is obligated to take precautions to minimise the risk of bushfires starting or spreading within their land. Section 100B requires a bushfire safety authority for a subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes, or development of bush fire prone land for a special fire protection purpose. The Project does not meet the definition of a special fire protection purpose and as such would not otherwise require a bushfire safety authority. The Project is not located within any mapped bush fire prone land.	Section 7.9.2
A water use approval (section 89)	The WM Act was introduced to provide a comprehensive singular piece of legislation to effectively manage and regulate access and use of the State's water resources.	Section 7.8

Approval	Consideration	Where considered in EIS
A water management work approval (section 90) An activity approval (other than an aquifer interference approval) under section 91 of the <i>Water Management Act 2000</i> (WM Act)	The Project would not require a water use approval under section 89 of the WM Act. The Project would not involve any water management work under Section 90 of the WM Act. Under Section 91(2) of the WM Act, a controlled activity approval confers a right on the approval holder to carry out a specified controlled activity at a specified location in, on, or under waterfront land. A controlled activity approval is required for any work or action done on waterfront land (defined as the bed of rivers, lakes, or estuaries, as well as land on each side within 40 m of a riverbank). As described above, a mapped watercourse traverses the Project area and connects to an existing farm dam. The drainage line is an ephemeral flow path which meets the definition of waterfront land. The Project would involve activity on waterfront land. Under Section 4.41 of the EP&A Act an activity approval under section 91 of the WM Act is not required for SSD that has received development consent under Division 4.7 of the EP&A Act. Therefore, a controlled activity approval is not required for the Project. No aquifer interference activity would occur and as such Section 91(3) would not apply to the Project.	

Section 4.42 of the EP&A Act identifies approvals that must be applied consistently to a Project if it is necessary for carrying out SSD that has been approved. In these instances, an authorisation of the following approvals cannot be refused. Environmental approvals required under Section 4.42 of the EP&A act are outlined in **Table 4-3**.

Table 4-3. Relevant approvals required under Section 4.42 of the EP&A Act

Approval	Consideration
An aquaculture permit under section 144 of the FM Act	The Project would not involve aquaculture development and no aquaculture permit is required.
An approval under section 22 of the Coal Mine Subsidence Compensation Act 2017	The Project is not located within a mine subsidence district, and an approval would not be required.
A mining lease under the <i>Mining Act 1992</i>	An existing exploration licence (EL8160) covers the Project area. Since the Project would only involve surface infrastructure with a limited footprint, potential impacts on existing or future mining activities are not anticipated. A mining lease is not required.
A production lease under the <i>Petroleum (Onshore) Act 1991</i>	The Project would not involve petroleum production and no production lease is required.
An environment protection licence under Chapter 3 of the <i>Protection of the Environment</i>	The principal legislation regulating pollution and waste management in NSW is the POEO Act which specifies the requirements for licences and regulates activities that have the potential to pollute or harm the environment. All scheduled activities as listed in Schedule 1 of the POEO Act require an environment protection licence (EPL).

Approval	Consideration
Operations Act 1997 (POEO Act)	Energy storage is not a scheduled activity and an EPL would not be required for the Project.
A consent under section 138 of the Roads Act 1993	The Roads Act aims to establish the rights and procedures for using, opening and closing public roads. It also provides the classifications of roads and the declaration of Transport for NSW and other public authorities as roads authorities for classified and unclassified roads. The Project would require road work on Beryl Road between the Project area and the Beryl Substation and relevant work approvals will be sought from MWRC prior to any work commencing.
A licence under the Pipelines Act 1967	No pipelines or associated licences would be required for the Project.

4.3 Other relevant legislation and policy

Based on the scope of the Project, the legislation that are relevant are identified in **Table 4-4**.

Table 4-4. Relevant legislation and environmental planning instruments

Legislation	Requirement
Commonwealth legislation	
EPBC Act	Under the EPBC Act, an Applicant proposing to undertake an action that may or will have a significant impact on MNES, or the environment generally for 'Commonwealth agencies', is to be referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for determination as to whether or not it is a controlled action. The BDAR (provided in Appendix E) considered potential impacts on species and communities listed under the EPBC Act. The impact assessment is summarised in Section 7.1. The Project is not expected to result in significant impacts to MNES and does not require referral or approval under the EPBC Act.
Native Title Act 1993	The Native Title Act recognises and protects the Indigenous rights and interest to land and waters. The Act provides a legal framework for determining native title claims and for the negotiation and registration of Indigenous Land Use Agreements. The Project area falls within the boundary of an active native title application, namely "Warrabinga-Wiradjuri #7" (Tribunal No NC2018/002, Fed Court No NSD857/2017). The application was registered on 22 November 2018. Consultation with the native title applicant has been undertaken and is summarised in Section 5.5.
NSW legislation	
Protection of Environment Operations Act 1997 (POEO Act)	As described in Table 4-3 , the Project does not constitute a scheduled activity under Schedule 1 and will not require an EPL. The POEO Act has a number of regulations relating to matters of pollution, waste, air quality and noise. If relevant, these specific sections would be considered as part of the EIS and technical assessments.
Roads Act 1993	As described in Table 4-3 , the Project would require road work on Beryl Road between the Project area and the Beryl Substation. Relevant road work approvals will be sought prior to any work commencing (refer to Section 7.7.6).
Biodiversity Conservation Act 2016 (BC Act)	The BC Act aims to conserve threatened species, populations and ecological communities through ensuring appropriate assessment, management and regulation of actions that may damage critical or other habitat for a listed threatened species, or may otherwise significantly affect a threatened species, population or ecological community. The assessment of biodiversity impacts is provided in Section 7.1.

Legislation	Requirement
Biosecurity Act 2015	Under the Biosecurity Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Section 22 requires that any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Listed weeds are identified within the Project area and the Biosecurity Act would apply, with assessment of potential impacts and management measures provided in Section 7.1.
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act provides for the management and conservation of land declared as national parks and conservation areas, as well as regulating the management of Aboriginal objects and places. No part of the Project falls within land reserved under the NPW Act or NSW National Parks and Wildlife Service owned or managed lands, with the nearest national park being approximately 8.2 km west. An assessment of potential impacts to identified Aboriginal objects and places is provided in Section 7.2.
Heritage Act 1977	Under Section 146 of the Heritage Act, if a relic is discovered or located, the Heritage Council must be notified of the location of the relic. The Project would not impact on any listed heritage items. An assessment of potential impacts on unlisted heritage items or values is provided in Section 7.3.
Crown Land Management Act 2016 (CLM Act)	Under the CLM Act, consent from NSW Crown Lands is required for works over Crown land. While there are no Crown land reserves within the Project area, there are three Crown land reserves within 20 m of the Project area, with the closest reserve located adjacent to the Project area western boundary. Wialdra Creek is also identified as a Crown waterway. It is not anticipated that any Project activity, including construction traffic, would access any Crown lands. Potential impacts on Crown reserves is further detailed in Section 7.4.
Environmental planning instrument	
Planning Systems SEPP	The Planning Systems SEPP identifies development that is significant to the state of NSW. As described in Table 4-1, the Project is classified as SSD under Section 2.6 in conjunction with Section 20 of Schedule 1 of the Planning Systems SEPP. Under Section 2.7 of the Planning Systems SEPP, the Independent Planning Commission is declared, under Section 4.5(a) of the EP&A Act, to be the consent authority under circumstances which include Council or at least 50 other parties object to the application or where the application is made by a person who has disclosed a reportable political donation. Under Section 2.10, development control plans (whether made before or after the commencement of this Policy) do not apply to SSD.
Transport and Infrastructure SEPP	The aim of Chapter 2 (Infrastructure) of the Transport and Infrastructure SEPP is to facilitate the effective delivery of infrastructure across the State. In the event that electricity generating works was not permissible with consent under the Mid-Western Regional LEP, the Project would be rendered permissible with consent under Part 2.3 Division 4 of the Transport and Infrastructure SEPP. Beryl Road is not a classified road and as such the mandatory considerations for development on land that has a frontage to a classified road under Section 2.119 of the Transport and Infrastructure SEPP is not applicable. The estimated traffic generation does not trigger consideration of the Project as a traffic generating development under Section 2.122 of the Transport and Infrastructure SEPP.
Resilience and Hazards SEPP	The aim of Chapter 3 (Hazardous and offensive development) of the Resilience and Hazards SEPP is to ensure that measures are used to reduce the impact of a

Legislation	Requirement
	development that is potentially hazardous or offensive. A preliminary hazard analysis (PHA) has been prepared for the Project and is provided in Section 7.9.1 .
Mid-Western Regional LEP	Under Clause 2.3(2), the consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone. The objectives of the RU1 Primary Production zone are as follows: ▪ 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 by preserving the area's open rural landscapes and environmental and cultural heritage values ▪ To promote the unique rural character of Mid-Western Regional and facilitate a variety of tourist land uses. The Project is characterised as 'electricity generating works', which is permitted with consent under the Mid-Western Regional LEP in land zoned RU1 Primary Production. Under Clause 6.3 Earthworks of the Mid-Western Regional LEP : <i>(3) Before granting development consent for earthworks, the consent authority must consider the following matters—</i> <i>(a) the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality of the development,</i> <i>(b) the effect of the development on the likely future use or redevelopment of the land,</i> <i>(c) the quality of the fill or the soil to be excavated, or both,</i> <i>(d) the effect of the development on the existing and likely amenity of adjoining properties,</i> <i>(e) the source of any fill material and the destination of any excavated material,</i> <i>(f) the likelihood of disturbing relics,</i> <i>(g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area,</i> <i>(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</i> These are assessed in Section 7.2, Section 7.4 and Section 7.8. The Project area is also mapped as Groundwater Vulnerable in the LEP groundwater vulnerability map. Under Section 6.4 of the LEP: <i>(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider the following—</i> <i>(a) the likelihood of groundwater contamination from the development (including from any on-site storage or disposal of solid or liquid waste and chemicals),</i> <i>(b) any adverse impacts the development may have on groundwater dependent ecosystems,</i>

Legislation	Requirement
	(c) <i>the cumulative impact the development may have on groundwater (including impacts on nearby groundwater extraction for a potable water supply or stock water supply),</i> (d) <i>any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.</i> (4) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that—</i> (a) <i>the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or</i> (b) <i>if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</i> (c) <i>if that impact cannot be minimised—the development will be managed to mitigate that impact.</i> Consideration of groundwater impacts is provided in Section 7.8.

5. Engagement

5.1 Objectives and approach

RAC is committed to working with local community members and stakeholders to inform and communicate the planning and delivery of the Project. A comprehensive Community and Stakeholder Engagement Plan (CSEP) was developed for the Project in line with the International Association of Public Participation (IAP2) Public Participation Spectrum, Community Participation Plan (DPE, 2019) and Undertaking Engagement Guidelines for State Significant Projects (DPE, 2022f).

The CSEP outlines the communication and engagement objectives to be achieved, identifies key stakeholders and engagement activities to be carried out throughout the approval process.

The key objectives for the CSEP include:

- Form relationships with neighbouring landowners to explain the planning process, provide an initial overview, and obtain their feedback
- Provide consistent messaging to neighbouring landowners about the proposed project, to ensure a 'no surprises' approach
- Document and action communication received from neighbouring landowners and other stakeholders or community members
- Provide a responsive point of contact for any enquiries, complaints, and suggestions.

5.2 Engagement tools

Table 5-1 provides the different engagement tools implemented during the EIS phase to collect input from the local community and stakeholders.

Table 5-1. Engagement tools

Tool	Purpose	Target audience
Community information 1800 and email address	Provides a free and accessible point of contact for enquiries	▪ All community members and stakeholders
Phone calls and emails	To engage with local community and stakeholders in the locality, to ensure a 'no surprises' approach and to provide key information about the proposed project, its benefits and timings.	▪ Adjacent and nearby landowners ▪ Transport for NSW ▪ MWRC ▪ DPHI ▪ Community Reference Group for Central-West Orana REZ ▪ Mudgee District Environmental Group ▪ Gulgong Chamber of Commerce ▪ Mudgee Business ▪ Local Members of Parliament (MPs) ▪ Landowners.
Website	Update text, image and frequently asked questions (FAQ) as more information on the proposed project becomes available, and provide online survey and feedback mechanisms.	▪ All community members and stakeholders.
Newsletter	Project updates provided to the community via email or letterbox drop and printed for display	▪ Local community.

Tool	Purpose	Target audience
Maps / diagrams	Provides a visual explanation of the work and associated impacts. Can be included in flyer	All community members and stakeholders.
In-person meeting	Inform and consult adjacent landowners, key stakeholders about construction and obtain any permissions for works on local roads and open spaces. Held by teleconference or face to face, as required	- Landowners and businesses - Transport for NSW - MWRC - DPHI - Gulgong Chamber of Commerce - MWRC Councillors.
Community Information Session (and/or webinar)	Inform and consult community members about the proposals and key messages, and gain their feedback	- Landowners - Wider community.
Social media	Project updates and key messages via RAC or other approved alternative channels	Local community.
Media release/advertising	Reinforce key information and benefits among community, and avoid negative community-led coverage	Local community.
Email	To thank community members and stakeholders for their involvement, inform them on next steps for the proposed project, and provide updated project flyer.	- Local community - Key stakeholders.

5.2.1 Stakeholder identification

Key stakeholders relevant to the Project were identified based on the following:

- Identification of landowners in proximity to the Project area and in the surrounding community
- Discussion with regulators, local Council and statutory bodies
- A detailed review of local community groups, Aboriginal groups and organisations, local land councils and relevant government agencies and departments
- Engagement activities, including in-person and online meetings, community drop-in session and newsletters
- Inclusion of all stakeholders referenced in the SEARs.

The identified key stakeholders are provided in **Table 5-2**.

Table 5-2. Key stakeholders

Stakeholder type	Stakeholder
Elected Members	- Local – Dugald Saunders, Member for the Dubbo Electorate - Local – Honorary Sam Faraway, Legislative Council MP and Deputy National Party Leader.
Local Government	MWRC.
Government agencies	- Transport for NSW - EnergyCo - Department of Regional NSW – Mining, Exploration & Geoscience (MEG) – Geological Survey of NSW (GSNSW) - Fire and Rescue NSW (FRNSW) - DPHI - DPI Fisheries

Stakeholder type	Stakeholder
	- DPI Agriculture - Heritage NSW - Environment Protection Authority (EPA).
Emergency services and utilities	- NSW Rural Fire Service - Transgrid - Essential Energy - Ulan Water.
Gulgong Community	- Neighbouring landowners - Wider community - Local businesses, including real-estate agents - Tourist and visitors - Community groups or business associations including Gulgong Chamber of Commerce.
Aboriginal stakeholders	- Registered Aboriginal Parties (RAPs) (North East Wiradjuri Co Ltd, Thomas Dahlstrom, Wingarra Wilay Aboriginal Corporation, Wellington Valley Wiradjuri Aboriginal Corporation, Muronggialinga, Girragirra Murun Aboriginal Corporation, Paul Brydon, Mudgee Local Aboriginal Land Council (LALC) - Warrabinga Native Title Claimants Aboriginal Corporation - CWO First Nations Working Group - National Native Title Tribunal (NNTT) - Native Title Services Corporation (NTSCorp) - Central Tablelands Local Land Services - Office of the Registrar. Aboriginal Land Rights Act 1983 NSW (ORALRA) - A&K Cultural Heritage.
Other	- Bowdens Silver Pty Ltd - Banpu Solar.

5.3 Community consultation

Engagement with the community commenced in May 2023 as part of the Scoping phase of the Project. Feedback collected during initial consultation activities has been used to inform the design of the Project to minimise impacts where possible, in particular around visual amenity.

The following sections provide an overview of engagement activities carried out with the community during the EIS phase, feedback received, and how it has been addressed.

5.3.1 Community engagement activities

Engagement activities carried out with the community during the EIS phase between September 2023 and June 2024 are detailed in **Table 5-3**.

Outcomes of consultation and how feedback has been addressed is provided in **Section 5.3.2**.

Table 5-3. Community consultation – Engagement mechanisms

Mechanism	Target audience	Date	Description and feedback
Community information 1800 and email address	▪ Adjacent landowners ▪ Nearby landowners ▪ Wider community.	July 2023 – May 2024	A dedicated Project email and 1800 phone line were established to provide community with responsive channels to raise questions, respond to correspondence and complain in line with RAC enquiry and complaints handling procedures and NSW DPHI Community Engagement Guidelines (2001). To date: ▪ 26 email enquiries and seven phone calls received responding to correspondence or calls to arrange meetings ▪ Two emails were received opposing the Project within the broader context of renewable energy projects in region ▪ 58 emails issued responding to enquiries or to confirm meetings and provide information about the Project.
Letters	▪ Adjacent landowners ▪ Nearby landowners.	July 2023 – January 2024	Correspondence to introduce the project, offer in person briefings and seek preferred contact details. To date: ▪ 42 letters issued ▪ 8 responses received via phone or email.
Factsheets and FAQs	▪ Adjacent landowners ▪ Nearby landowners ▪ Wider community.	July 2023 – June 2024	A factsheet and online FAQ developed for the Project to share responses to common community questions raised and proactively provide information on technical assessments as they were developed. Further factsheets will be developed to summarise the finding of the technical reports undertaken as part of the EIS. To date: ▪ Four updates to online FAQs ▪ Distribution of printed FAQs to adjacent landowners and key stakeholders to support (29) in-person meetings and a community information session.
Newsletters	▪ Adjacent landowners ▪ Nearby landowners ▪ Wider community.	July 2023 – June 2024	To encourage community feedback to inform and refine planning of Project design, planning and preliminary assessment findings, as well final technical reports undertaken as part of the EIS. Ongoing updates will be developed to keep the community informed as the Project area design is finalised and proposed construction management plans developed. To date: ▪ Three newsletters distributed to 1051 residential homes and businesses within 3 km from the Project area ▪ 11 registered key stakeholders received digital newsletters to keep them advised of progress, including local MPs, agencies and departments, as well as community organisations.

Mechanism	Target audience	Date	Description and feedback
Meetings in-person	▪ Adjacent landowners ▪ Nearby landowners.	July 2023 – June 2024	Providing in-person tailored briefings about the proposed Project, updates on planning progress and consult on preliminary Landscape and Visual Impact assessments and proposed mitigations. To date: ▪ 29 in-person meetings held with adjacent landowners and nearby neighbours, as well as key stakeholders.
Community Information Session/s	▪ Wider community.	Feb 2024	Community information stand at Gulgong Show on 17 February 2024, to provide general and technical information about the proposed BESS. 76 community members attended and were canvassed to provide feedback on preliminary landscaping and visual impact mitigation design and Project area design. Overall positive feedback on the project, with only one person against renewable energy development in the region but registered as a local business supplier.
Advertisements	▪ Wider community.	Feb – May 2024	Three advertisements highlighting opportunities to provide formal and informal feedback, events, online information and online survey. To date: ▪ Feb 2024 Gulgong Show Society program to promote community information stand and website information available ▪ June-July 2024 Gulgong Gossip and Mudgee Guardian (print) advertisements providing a project update to wider community ▪ June 2024 online and print advertisement in Mudgee Guardian specifically advising of EIS public exhibition and period for submissions.

5.3.2 Community feedback

Key issues raised by the community include visual impact, noise impacts, effect on property values, potential fire and chemical hazards, dust during construction, operational lifespan, potential for future expansion of the facility and loss of agricultural land.

Table 5-4 provides a summary of community feedback received during EIS phase consultation.

Table 5-4. Summary of community feedback

Theme	Summary	Project response
Visual impact	Concerns from adjacent landowners and MWRC about preserving visual amenity and rural character of locality.	▪ The Project design was altered to achieve maximum set-back distances from neighbouring landowners, moving closer to Beryl Road, to minimise potential amenity impacts such as visual or noise ▪ Reduction of construction footprint from 8 ha to 4.2 ha and boundaries adjusted to reduce visual exposure to nearest properties ▪ Additional areas of avoidance within the Project area to avoid potential biodiversity and heritage impacts ▪ Photomontages were provided to adjacent receivers to enable consultation with property owners on proposed vegetation mitigation plan, which would include the installation of container stock.
Noise impact	Concerns from adjacent landowners about potential noise from plant equipment and cumulative noise impact with Beryl Substation	▪ Project design adjusted to achieve maximum setback from residential receivers ▪ Inclusion of noise attenuation on equipment, such as silencers on inverters.
Potential hazards (including bushfires)	Concern from adjacent landowners and wider community about potential for battery fire and chemical hazards	▪ Provided briefings and information online about preferred lithium iron-phosphate batteries to be used which have higher temperature flash points and battery automated fire and safety management systems ▪ Consulted neighbouring property owners and local Rural Fire Service about recent bushfires, identified mitigations, such including water catchment and storage tanks on site, to be incorporated into bushfire and hazard management plans.
Property values	Concern visible infrastructure location would affect nearby property values	▪ Photomontages were provided to adjacent receivers to enable consultation with property owners on proposed vegetation mitigation plan
Operational lifespan	Concern about operational lifespan and decommissioning plans	▪ Provided information for adjacent landowners and wider community outlining the operational life expectancy of 30 years and ongoing work with suppliers to maximise end-of-life options for the batteries, including repurposing or recycling of battery components.

Theme	Summary	Project response
Potential for future expansion	Concern the facility could be expanded in the future by this Applicant or another future owner	Provided information for adjacent landowners and wider community on Applicants record operating in other communities and planning approval processes which would be required for any significant modification.
Loss of agricultural land	Concern about loss of land currently used for livestock agistment	Operation of the Project would not impact grazing activities for the remainder of the Project area that does not contain Project infrastructure.

5.4 Stakeholder and agency feedback

A summary of the stakeholder and agency engagement activities and feedback received is provided in **Table 5-5**.

Table 5-5. Stakeholder and agency feedback

Stakeholder	Date	Activities	Purpose	Feedback	Project response
DPHI	09 May 2024.	Email.	Update on the progress of the EIS.	EIS to be submitted directly to the Major Projects Planning Portal website.	
MWRC	27 November 2023 19 December 2023 1 February 2024 14 April 2024 17 April 2024 19 April 2024 05 June 2024 12 June 2024.	- Meeting - Email - Letter - Phone call.	- Project progress updates - Consultation on Social and Economic Impact Assessment and Accommodation Strategy - Director of Development discussion on water and waste management and the Community Benefit Fund - Meeting to discuss EIS draft assessment reports findings - Local Emergency Management Committee coordination with interagency stakeholders to provide project information - Briefing on the outcomes of the EIS and seeking landowner consent for Beryl Road asset.	Cumulative impacts with other proposed development in the CWO REZ, specifically: - Road access and safety - Visual amenity impacts - Noise impacts - Community benefits - Construction workforce and accommodation - Waste management capacity limits in LGA - Advised would need to see Draft EIS before providing written consent as landowner on Beryl Road proposed interface.	- Confirmed the most relevant proposed development in the region that could lead to cumulative impacts with the Project during construction - Accepted suggestions for avoiding school bus route operating times and avoiding parking on public lands to minimise road safety risks during construction - Accepted suggestions on vegetation screening planting where feasible within the Project area to reduce potential visual amenity impacts - Exploring accommodation options in the area - Brought forward visual and landscape assessment modelling (including photomontages) to enable early consultation with Council and community - Exploring community benefits options additional to Voluntary Planning Agreement and seeking community views via advertisements.

Stakeholder	Date	Activities	Purpose	Feedback	Project response
NSW RFS Cudgegong District	7 February 2024 6 June 2024 12 June 2024 14 June 2024.	Email notification.	To provide details on the bushfire and PHA assessment.	No response was received.	
Bowdens Silver	5 March 2024 4 April 2024.	Email notification.	Consultation regarding EL 8160.	Response received on 24/04 noting that the Project can co-exist with EL8160.	
Gulgong Rural Fire Service	6 February 2024 26 March 2024 6 June 2024.	- Phone - Email.	- Project overview and arrange consultation on bushfire management assessment - Provision of draft bushfire and PHA assessment.	Advised of recent grassfires at nearby properties and solar farm as a risk to be managed.	- Project design includes water run-off retention and storage tanks to store water for use in bushfire management - Exclusion zones in and around the Project area to minimise risks - Ongoing consultation on Bushfire management planning and mitigation actions.
Essential Energy	11 March 2024.	Email notification.	To inform the stakeholder of the Project and interface with existing easements.	No comments on Project interface with easements was received.	
Transgrid	4 April 2024.	Letter.	- To inform the stakeholder of the project - Project information and letter seeking landowner consent on design interface with Transgrid assets.	Transgrid requested copy of the draft EIS to review prior to providing written consent to advertise the EIS.	Draft EIS to be forwarded for review.
EnergyCo	11 March 2024 4 April 2024.	- Email notification - Letter.	- To inform the stakeholder of the project - Project information and request for meeting.	No response was received.	

Stakeholder	Date	Activities	Purpose	Feedback	Project response
Transport for NSW	11 March 2024 12 June 2024.	Email notification.	Seeking information and consultation re proposed oversized/overmass (OSOM) vehicle route between the Port and access to project site as part of preparation of assessment for EIS.	Transport for NSW provided list of expectations for the traffic and transport impact assessment.	The traffic and transport impact assessment has been prepared in accordance with the relevant guidelines and will be available for comment during the exhibition of the EIS.
MEG – GSNSW	11 March 2024.	Email notification.	To inform the stakeholder of the project.	MEG-GSNSW acknowledged the early engagement and did not identified any resource sterilisation issues. Requests to actively monitor the MinView map viewer for mining title changes relevant to the Project.	
Ulan Water	15 March 2024 4 April 2024.	Letter.	Seeking confirmation Ulan Water are able to provide potable and non-potable water demands during construction of the Project.	No response received.	
Mudgee District Environmental Group	12 April 2024 17 April 2024 14 June 2024.	- Phone - Meeting.	- Overview of project and seeking meeting to understand environmental priorities - Meeting to discuss project design and scale, visual and landscape (biodiversity) assessment and sustainability (including decommissioning).	- Suggested biodiversity corridors to sustainably support birdlife and other fauna - Concerned screening with “mature trees” would not be successful as they do not adapt or grow as fast as tube stock - Concerned about cumulative impact on	Advised vegetation, landscaping and fencing is being designed to support co-existence with current land use for livestock agistment but involves approved native ‘pioneering’ species favourable to local fauna, with rigorous maintenance and management plan to ensure successful growth

Stakeholder	Date	Activities	Purpose	Feedback	Project response
				community and accommodation of workers.	Draft Biodiversity assessment, Native Vegetation and Landscape Plans and information on Decommissioning Plans have been forwarded.
Gulgong Chamber of Commerce	21 November 2024 19 December 25 January 2024 25 January 2024 5 February 2024.	- Email - Email - Email - Phone - Email.	- Project information overview and request for meeting - Project update newsletter - Request for interview for Social and Economic Impact Assessment - Confirmation of briefing at next meeting and logistics - Advice received on rescheduling meeting.	No response received.	
Australian Energy Infrastructure Commissioner – DCCEEW	10 January 2024 18 January 2024 29 January 2024 30 January 2024 10 April 2024.	- Email - Online meeting - Email - Email - Email.	- Advice of adjacent neighbour complaint seeking compensation - Project briefing and discussion of assessment progress - Formal notification of complaint - Update provided on actions taken to resolve concerns.	- Early stages of consultation and assessments made it difficult to satisfy compensation request - Complaint involved unrelated project.	- Consultation with complainant expedited on visual and noise impact assessments - Offer of neighbourhood agreement to allay concerns.
Elected representatives: - MP Dugald Saunders - MLC Sam Faraway	19 December 2023 17 February 2024.	- Emails - Meeting.	- Project update newsletter and offer of briefing - Overview of project progress.	No response received.	
Banpu Solar (Beryl Solar Farm)	15 March 2024 4 April 2024.	Email.	Overview of Project.	No response received.	

5.5 Aboriginal cultural heritage

The Aboriginal community consultation for the Project was carried out in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW, 2010). The Aboriginal community consultation program generally consisted of the following components:

- Stage 1 – Notification and registration
- Stage 2 – Project information
- Stage 3 – Survey methodology and fieldwork
- Stage 4 – Draft Aboriginal Cultural Heritage Assessment Report (ACHAR) review.

A summary of the Aboriginal community consultation for the Project is described below. Further detail relating to the consultation is provided in **Appendix F**.

The consultation involved:

- Stage 1 – Notification and registration of Aboriginal Parties
 - Notifications were developed and the registration of Aboriginal parties was completed in accordance with Part 5, Division 2 Section 60 of the NPW Regulation
 - Nine groups or individuals registered to be consulted as RAPs:
 - North East Wiradjuri Co Ltd
 - Thomas Dahlstrom
 - Wingarra Wilay Aboriginal Corporation
 - Wellington Valley Wiradjuri Aboriginal Corporation
 - Muronggialinga
 - Girragirra Murun Aboriginal Corporation
 - Paul Brydon
 - Warrabinga Native Title Claimants Aboriginal Corporation
 - Mudgee LALC.
- Stage 2 and 3 – Presenting and gathering information about cultural significance
 - Correspondence relating to survey methodology and review of the draft ACHAR
 - One response was received from Wellington Valley Wiradjuri Aboriginal Corporation that they supported the methodology, however requested that test excavation be included in the assessment, and that Mr Paul Brydon be included as a RAP.

Mudgee LALC did not formally register as a RAP for the Project but were included for transparency.

Consultation with the Aboriginal community was undertaken in accordance with the NPW Act and NPW Regulation, with reference to the Guide to Investigating Assessing and Reporting on Aboriginal Cultural Heritage in NSW (Office of Environment and Heritage, 2011). The consultation timeline is outlined in **Table 5-6**. Further detail relating to the consultation is provided in **Appendix F**.

Table 5-6. Aboriginal community consultation and timing

Consultation	Timing
Provision of letter (via email) requesting identification of Aboriginal parties with cultural knowledge/interest in the Project	2 June 2023
Public advertisement providing notification of assessment and opportunity to register interest for consultation.	2 June 2023
Provision of letter (via email) to identified Aboriginal parties requesting registrations of interest	16 June 2023
Methodology letter sent via email to the Representative Aboriginal Parties	3 July 2023
Fieldwork with representative from Mudgee LALC	3 October 2023
Draft ACHAR provided to RAPs for review and comment	3 November 2023

5.6 Public exhibition of the EIS

During the public exhibition period, the community and other stakeholders will be advised via newspaper print and online advertisements of the opportunity to review the EIS and make written submissions to DPHI regarding the Project. The EIS will be available for review by the community and stakeholders on the DPIE Major Projects website (www.planningportal.nsw.gov.au/major-projects).

Engagement carried out after exhibition of the EIS will most likely focus on responding to any key and substantive issues raised in submissions. A submissions report would then be prepared by RAC for submission to DPHI which would respond to community and stakeholders' comments on the EIS and be publicly available via the DPIE Major Projects website (<https://www.planningportal.nsw.gov.au/major-projects>).

5.7 Ongoing and future engagement

5.7.1 Overview

Ongoing engagement with the community and stakeholders would be continued during the EIS exhibition and assessment phase. This engagement would include:

- Advertise EIS exhibition period in local newspapers and promote on website
- Email or call local community members to inform them on next steps for the proposed project and provide project update newsletter
- Email stakeholders that have been met with to update them on timing and provide any responses to their questions or concerns that were raised during the proposed project.
- Other additional stakeholder meetings and liaison, as required.

RAC also have a dedicated email and contact number to ensure community members can provide feedback and raise any issues they have.

5.7.2 Complaints procedure

A dedicated email and 1800 number have been established for enquiries or complaints. All enquiries or complaints will be resolved at first contact where possible.

In instances where a complaint or feedback cannot be resolved within five business days of initial receipt and contact details have been provided, an acknowledgement of receipt will be sent to the complainant. In instances where a customer is non-contactable, a reasonable attempt to contact will be made. If it is likely to take longer than 20 business days to resolve the complaint, the complainant will be kept informed of

progress on a regular basis until the matter is resolved. During the delivery of the Project, a dedicated RAC community relations team would handle and investigate complaints. Follow-up monitoring would be carried out to ensure any issues/complaints were resolved satisfactorily. The complaints management procedure d above would be in place for the duration of construction.

All contact relating to the Project, including suggestions and complaints will be registered and documented. This would include incoming and outgoing correspondence, phone and verbal contact, written submissions and any corresponding actions taken.

6. Preliminary environmental risk analysis

A preliminary environmental risk analysis was undertaken for the Project to identify key risks for the environmental matters being assessed in this EIS and where detailed assessment was required. The outcomes of the preliminary environmental risk analysis are provided in **Table 6-1**.

Table 6-1. Preliminary environmental risk analysis

Aspect	Preliminary environmental risks	Detailed assessment required?
Biodiversity	The Project has refined the disturbance footprint to avoid remnant trees and reduce impacts to the native grassland. The Project would result in direct impacts on biodiversity values as a result of proposed clearing of approximately 4.07 ha of native vegetation, which is comprised of one PCT. This PCT does not correspond with any listed threatened ecological communities (TECs) under the BC or EPBC Act. A BDAR was prepared for the Project and provided in Appendix E with the assessment findings and management measures summarised in Section 7.1.	Yes, refer to Section 7.1 and Appendix E
Aboriginal heritage	The Project area is located on the land of the Wiradjuri tribal and linguistic group, at the eastern extent of the Wiradjuri territory. One registered Native Title Claim covers the Project area: Warrabinga-Wiradjuri #7 (NC2018/002, NSD857/2017). As the Project area does not include any Crown land, no land within the Project area is applicable to 'future acts' under the <i>Native Title Act 1993</i>. No known AHIMS sites are located within the Project area. No Aboriginal objects, sites, areas of potential archaeological deposits or specific cultural values were recorded during field survey with a RAP. An ACHAR was prepared for the Project in consultation with the RAPs and provided in Appendix F. The assessment findings and management measures are summarised in Section 7.2.	Yes, refer to Section 7.2 and Appendix F
Historical heritage	The nearest listed historical heritage to the Project area is The Lagoon Homestead located about 2.3 km north-east. No other potential heritage items or areas were identified within the Project area. A Historic Heritage Assessment Report was prepared for the Project and provided in Appendix F with the assessment findings and management measures summarised in Section 7.3.	Yes, refer to Section 7.3 and Appendix F
Land	Agriculture is the primary land use in the Mid-Western Regional LGA, with the Project area being used for low intensity agriculture currently limited to light grazing. Areas within the Project area not utilised for the Project would continue to be used for grazing. The Project is not located on BSAL, State Significant Agricultural Land (SSAL) or Crown Land. There is no known registered contamination at the Project area. Project area and surrounding land are subject to a mineral exploration licence EL8160 held by Bowdens Silver Pty Ltd. Based on the outcomes of a soil investigation survey (Appendix G) there is potential for soil erosion within the Project area. An assessment of impacts on land resources, including a Land Use Conflict Risk Assessment (LUCRA) has been carried out for the	No, refer to Section 7.4

Aspect	Preliminary environmental risks	Detailed assessment required?
	Project, with the findings and management measures summarised in Section 7.4 .	
Visual amenity	The Project design has sought to consolidate visual impacts associated with electrical infrastructure in consultation with adjacent residents and included vegetation screening to minimise potential visual impacts during operation. The Project area would be located in a rural agricultural landscape within a homogenous landscape character zone, which contains features with generally low sensitivity and has capacity to absorb visual changes. A Landscape Character and Visual Impact Assessment (LCVIA) and landscaping plan was prepared for the Project and provided in Appendix H, with the assessment findings and management measures summarised in Section 7.5.	Yes, refer to Section 7.5 and Appendix H
Noise and vibration	The acoustic environment of the area surrounding the Project is defined by farm properties and low intensity industrial developments. To the east, north and west of the Project are a number of isolated farmhouses and rural properties which would experience noise impacts during construction, operation and decommissioning of the Project. A Noise and Vibration Impact Assessment (NVIA) was prepared for the Project and provided in Appendix I, with the assessment findings and management measures summarised in Section 7.6.	Yes, refer to Section 7.6 and Appendix I
Traffic and transport	The Project would have primary access via Castlereagh Highway and Beryl Road. During the construction (and lesser extent decommissioning) phase there would be an increase in traffic movements to and from the Project area, including heavy vehicles transporting materials and equipment, light vehicles transporting personnel and OSOM vehicles. Traffic movements associated with the operation of the Project would be minimal and would typically involve operational and maintenance staff accessing the area. There are no train services, formal pedestrian or cycling facilities in the vicinity of the Project area. An informal stop may be located on the corner of Beryl Road and Castlereagh Highway. A Traffic and Transport Impact Assessment (TTIA) was prepared for the Project provided in Appendix J, with the assessment findings and management measures summarised in Section 7.7.	Yes, refer to Section 7.7 and Appendix J
Water	The Project area is located in the Macquarie-Bogan River Catchment, and locally within a small one square kilometres (km²) lateral catchment within the lower Wialdra Creek Catchment. There is one mapped waterway and one unmapped waterway that flows through the Project area in a westerly direction towards Wialdra Creek about 600 m west, and both waterways are ephemeral flow paths with shallow depressions. There is one farm dam within the Project area near the centre that forms part of the mapped waterway. There are no groundwater boreholes within the Project area and the closest is located 552 m north-west. Flood modelling demonstrated that the Project area and surrounds are partially inundated in the 1% Annual Exceedance Probability	Yes, refer to Section 7.8 and Appendix K

Aspect	Preliminary environmental risks	Detailed assessment required?
	(AEP) event from surface water flow paths, however the Project area is flood free from the regional flooding zone of Wialdra Creek. The total water demand during construction is estimated to be 8.5ML/year (0.089ML/day) of non-potable water and 1.46ML/year of potable water for site personnel. During operation, water demand would be minimal. A hydrology and hydraulic assessment and site water balance has been prepared for the Project and provided in Appendix K and Appendix L respectively. The assessment findings and management measures are summarised in Section 7.8.	
Hazards	Potential hazards associated with battery energy storage systems include thermal runaway, external fire, exposure to electromagnetic fields contamination of surface or groundwater, and electrical accidents. A PHA, Bushfire Assessment and electromagnetic fields (EMF) assessment has been prepared for the Project and is provided in Appendix M, Appendix N and Appendix O respectively. The assessment findings and management measures are summarised in Section 7.9.1 Section 7.9.2 and Section 7.9.3.	Yes, refer to Section 7.9 , Appendix M , Appendix N and Appendix O
Social	Potential health impacts, changes to visual amenity impacts, bush fire risk and cumulative impacts associated with the CWO REZ such as loss of tourism, change in land use, influx of construction workers and community fractions have been raised by stakeholders in the local community as key issues during targeted consultation. A Social and Economic Impact Assessment (SEIA) has been prepared for the Project and is provided in Appendix P, with the assessment findings and management measures summarised in Section 7.10.	Yes, refer to Section 7.10 and Appendix P
Economic	The Project has the potential to result in positive economic impacts due to the provision of Associated Landowner and community payments through a VPA, contributions to a community benefit fund focussed on the Gulgong region, employment generation and increased business demand. However, the increased demand for workforce accommodation and other services in the region may have a cumulative impact when combined with other concurrent infrastructure developments. The SEIA, which includes an assessment of economic impacts is provided in Appendix P, with the assessment findings and management measures summarised in Section 7.11. In response to concerns around cumulative construction workforce impacts, a Construction Workforce Accommodation Strategy has been prepared and provided in Appendix Q	Yes, refer to Section 7.11 , Appendix P and Appendix Q
Waste	Waste generated by the Project would predominantly be during Project construction and decommissioning. The quantities of recovered materials and residual materials requiring disposal associated with the Project are anticipated to be very low. A preliminary Waste Management Plan has been prepared for the Project and is provided in Appendix R, with the assessment findings and management measures summarised in Section 7.12.	No, refer to Section 7.12 and Appendix R

Aspect	Preliminary environmental risks	Detailed assessment required?
Cumulative	The Project is located within a REZ and there are more than 30 energy generation or storage projects proposed within the region, as well as the CWO REZ Transmission Project and coal mine expansions. The potential cumulative impacts of relevant future developments combined with the Project, including biodiversity, visual amenity, noise, traffic and transport, social and economic impacts, are assessed in Section 7.13.	Yes, refer to Section 7.13

7. Assessment of impacts

7.1 Biodiversity

A BDAR (**Appendix E**) was prepared by OzArk in response to the SEARs and summarised in this section. The BDAR assesses the potential impact of the Project on biodiversity under the BC Act and the EPBC Act, describes any biodiversity offset requirements under the Biodiversity Assessment Method (BAM), and recommends measures to minimise potential impacts.

7.1.1 Assessment methodology

The methodology for the assessment involved:

- Desktop searches and review of ecological databases to identify threatened species, populations or ecological communities
- Field survey on 1 May 2023, 9 November 2023 and 27 November 2023 of the subject land to conduct BAM plots, identify vegetation communities and habitat features, and identify target predicted threatened species and ecological communities
- Preparation of a BDAR that describes the potential impacts of the Project on biodiversity values and provides recommendations to avoid, minimise and mitigation these impacts. The BDAR also provides a biodiversity credit summary that identifies the offset requirements for the Project.

Further details of the assessment methodology including desktop review sources and survey methodology are provided in the BDAR (**Appendix E**).

7.1.2 BDAR terminology

The following terms are relevant to this assessment:

- Subject land corresponds to land proposed for Project (also the disturbance footprint).
- Study area refers to land within a 1,500 m buffer from the outside edge of the subject land.

7.1.3 Existing environment

7.1.3.1 Landscape features

Table 7-1 summarises the relevant biodiversity landscape features identified within the subject land.

Table 7-1 Biodiversity landscape features

Landscape feature	Details
Interim Biogeographic Rationalisation for Australia (IBRA) bioregions and subregions	▪ NSW South Western Slopes bioregion ▪ Inland Slopes IBRA subregion
NSW (Mitchell) landscapes	Talbragar – Upper Macquarie Terrace Sands and Gravels landscape
Geology	The bioregion lies wholly in the eastern part of the Lachlan Fold Belt. Granites are common and mostly located in large scale upfolded bodies of rock. Granite landscapes occur either as central basins surrounded by steep hills or as high blocky plateau features. The valleys between ranges are either in granite or generally softer rocks.

Landscape feature	Details
	Limited areas of Tertiary basalt with underlying river gravels and sands occur, and as the country becomes lower to the west and north, wide valleys filled with Quaternary alluvium and occasional lakes become the dominant landscape form. At the western edge of the bioregion the alluvial fans of the Riverine Plain have largely buried bedrock forms.
Soil landscapes	The overall pattern of soils in these landscapes is one where shallow, stony soils are found on the tops of ridges and hills. On valley floors subsoils have drabber colours indicative of poor drainage and they may accumulate soluble salts. Dryland salinity is widespread. Alluvial sands and loams are more common than clays in most parts of the landscape but alluvial clays become more important nearer to the Riverine Plain.
Areas of geological significance	Surface and embedded rock are largely absent from the subject land. No outcropping rock, caves, or karst formations are present.
Connectivity of habitat	The subject land contains no woody vegetation and consequently offers no connectivity for woodland-dependent species. The subject land may contribute to overall landscape connectivity for species that make use of grassland habitats, as it forms part of a larger network of derived pastures. However, the subject land is unlikely to constitute a significant connectivity feature for many fauna species, as it contains only a species-poor pasture with few habitat features (e.g. rocks or fallen timber) of note.
Climate and weather	Weather data from Gulgong Post Office (station 062013), indicating warm summers, cool winters, and a mean annual rainfall of 654.2 millimetres (mm), though 2023 experienced below-average rainfall of 462.3 mm (BOM, 2023).
Rivers, streams, wetlands and key fish habitat	Within the subject land there is: - One Strahler 1st order, minor, ephemeral mapped watercourse - One unmapped drainage line. Within the study area there is: - Six Strahler 1st order watercourses, - Two Strahler 2nd order watercourses - Three Strahler 3rd order watercourses - One 4th or greater order watercourse (Wialdra Creek). No areas of Key Fish Habitat (KFH) or Protected Riparian Land (PRL) occur within the subject land. The nearest occurrence of both KFH and PRL is associated with Wialdra Creek. No mapped wetlands occur in the subject land.
Groundwater dependent ecosystems (GDE)	There are no GDEs within the subject land. The nearest mapped GDEs are associated with Wialdra Creek, which possesses a mixture of high- and moderate-probability GDEs. A band of low-probability GDEs is located to the southwest of the subject land.
Areas of outstanding biodiversity value	The subject land does not contain any currently listed Areas of outstanding biodiversity value.
Native vegetation extent	The study area contains approximately 607.36 ha (51.61%) of native vegetation.

7.1.3.2 Land category

According to section 6.8(3) of the BC Act, land defined as Category 1 – Exempt Land (within the meaning of Part 5A of the *Local Land Services Act 2013*) is to be excluded from assessment under the BAM. Category 1 exemption applies to rural land (zoned RU1, RU2, or RU3) that was cleared of native vegetation as of 1 January 1990 or lawfully cleared of vegetation between 1 January 1990 and 25 August 2017.

While the subject land is situated on zoned rural land (RU1), current guidelines indicate that where the land contains “grasslands that are not low conservation value grasslands”, the land should be taken to be Category 2 – Regulated Land.

The subject land is not a low conservation value grassland (less than 50% native cover) and is considered Category 2 – Regulated Land.

7.1.3.3 Native vegetation

Within the subject land there is 4.07 ha of native vegetation that corresponds with one plant community type (PCT), as shown in **Figure 7-1**:

- **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.

The local occurrence of this PCT within the subject land comprises one vegetation zone of derived grassland wholly lacking canopy vegetation (281_Derived). Conspicuous incursions of wet-area weeds, notably Purpletop (*Verbena bonariensis*) were recorded, particularly in areas associated with drainage lines.

Where the proposed 132 kV cable connection enters substation land, it passes a row of planted trees. The precise identity of these trees was not ascertained during the survey; however, they are planted non-local eucalypts. It is expected that the cable route would avoid impacts to the root area of any of these trees.

7.1.3.4 Threatened ecological communities

The local occurrence of PCT 281 within the subject land does not correspond with any TECs.

7.1.3.5 Flora species

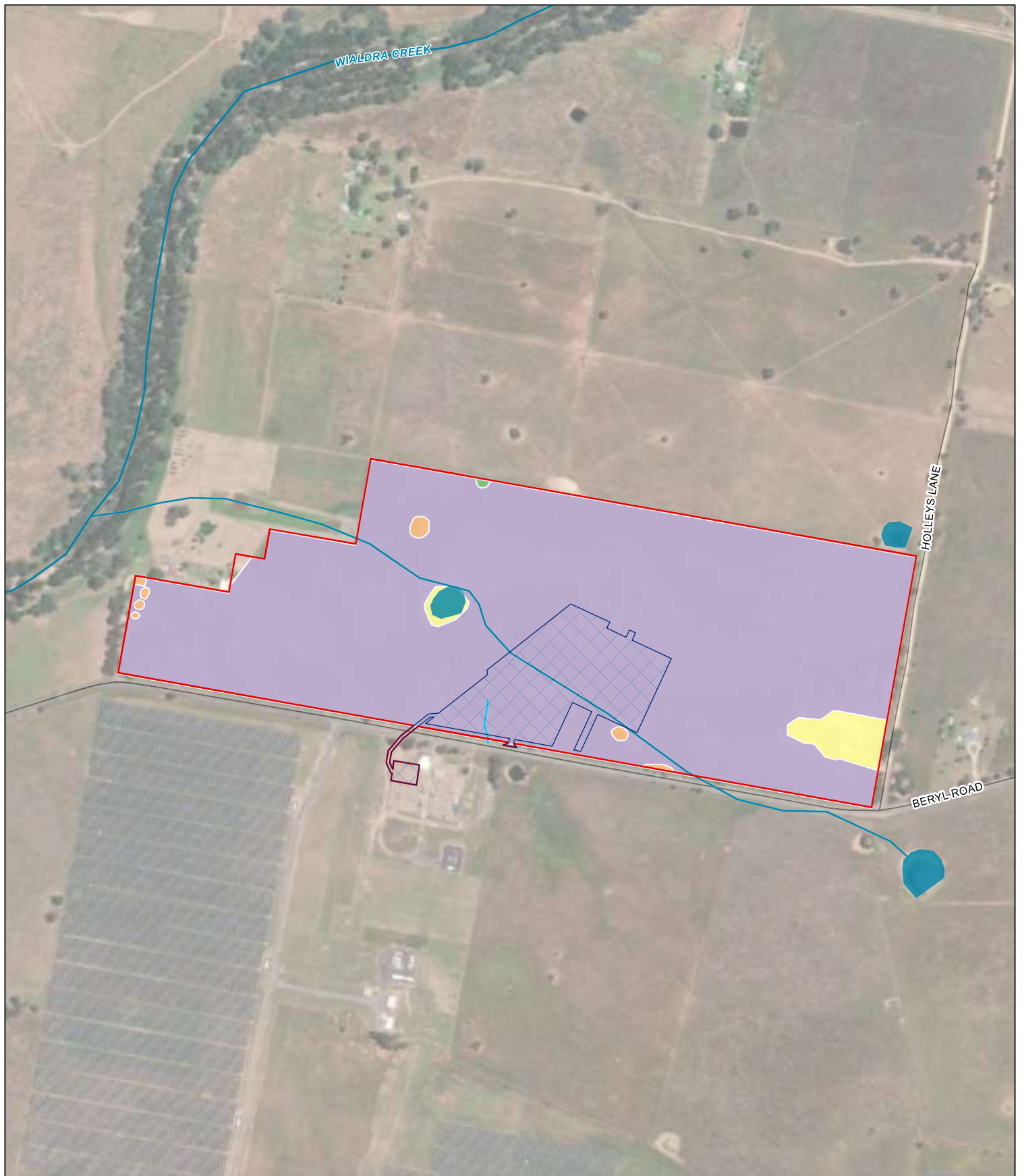
No threatened flora species were detected in the field surveys.

The field surveys identified a total of 57 flora species within the assessment area. Of these, 21 (36.84%) were native and 36 (63.16%) introduced.

Six of the recorded exotic species are listed as high threat exotic species under the BAM:

- Great Brome (*Bromus diandrus*)
- Umbrella Sedge (*Cyperus eragrostis*)
- African Lovegrass (*Eragrostis curvula*)
- Paspalum (*Paspalum dilatatum*)
- Saffron Thistle (*Carthamus lanatus*)
- St. Johns Wort (*Hypericum perforatum*).

St. Johns Wort is also listed as a Priority Weed for the Central Tablelands Local Land Services region. The listed weed would be subject to regulation of biosecurity risks under the *Biosecurity Act 2015* (refer to **Table 4-4**).



Project area
Subject land

Plant community types
PCT 201 Remnant
281 Derived
281 Remnant
Non-native

Minor road
Mapped waterway
Unmapped waterway
Farm dam

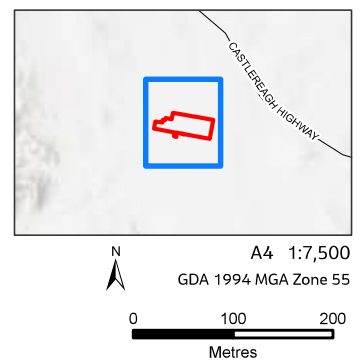


Figure 7-1 PCTs and vegetation zones within the subject land

Data Sources: NSW Department of Planning and Environment (2024); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2024), Australian Bureau of Statistics (2021), OzArk (2024)

7.1.3.6 Fauna species and habitat

No threatened fauna species were detected in the field survey.

The field surveys identified 15 fauna species within, or adjacent to, the subject land. Of these, 13 were native (86.67%) and five introduced (13.33%).

With the exception of a single farm dam, which falls outside the subject land, and two ephemeral drainage lines, no habitat features of note were recorded within or immediately adjacent to the subject land. The subject land was found to be devoid of caves and lacking significant deposits of surface or embedded rock. No outcropping rock occurs within or near the site. No hollow-bearing trees were recorded and fallen timber was absent.

Targeted surveys were carried out for species credit species in November 2023, however the Southern Myotis (*Myotis macropus*) was added to the BAM-C case late in the preparation of the BDAR and during an inappropriate season for survey. Given the presence of this species can not be excluded, it has been assumed present.

7.1.3.7 Matters of National Environmental Significance

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places – defined as matters of national environmental significance.

An EPBC Act protected matters search has identified four wetlands of international importance, five TECs, 44 threatened species, 10 migratory species and 17 marine species that could possibly occur in the 10 km search area. Of these, six threatened and two migratory species were assessed as potentially occurring on the subject land, based on habitat available. An assessment of impact significance has been undertaken for each of these threatened and migratory species following EPBC guidelines, as detailed in the BDAR (**Appendix E**).

A summary of these matters and whether the Project is likely to impact them is provided in **Table 7-2**. It is concluded that no MNES will be significantly impacted by the Project.

Table 7-2. Potential impacts to MNES

Consideration	Potential impact?
Any impact on a listed threatened species or communities?	Yes (non-significant, Appendix E)
Any impacts on listed migratory species?	Yes (non-significant, Appendix E)
Any impacts on a Ramsar wetland of international importance?	No
Any impacts on a Commonwealth marine environment?	No
Any impacts on a World Heritage property?	No
Any impacts on a National Heritage place?	No
Any impacts on the Great Barrier Reef Marine Park?	No
Does the Project involve a nuclear action (including uranium mining)?	No
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	No
Additionally, any impact (direct or indirect) on Commonwealth land?	No

7.1.3.8 Watercourse, aquatic habitat and GDEs

Within the subject land, one mapped minor, ephemeral Strahler 1st order watercourse connects to Wialdra Creek. Additionally, an unmapped drainage line associated with a culvert on Beryl Road also extends into the subject land. No areas of KFH, PRL or GDE within the subject land.

Wialdra Creek is 600 m west from the subject land. Wialdra Creek is mapped as potential habitat for the Southern Purple-spotted Gudgeon (*Mogurnda adspersa*). Wialdra Creek is mapped as KFH, GDE and PRL. A band of low-probability GDEs is also located to the southwest of the subject land.

7.1.4 Avoidance and minimisation

The following avoidance measures have been integrated into the design for the Project:

- The disturbance footprint was situated wholly within the derived native grassland, avoiding impacts to remnant trees
- The disturbance footprint has been refined to reduce impacts to derived grassland PCT 281
- The disturbance footprint similarly avoids direct impacts to the dam, which offers some limited wetland habitat.

7.1.5 Potential construction impacts

7.1.5.1 Removal of native vegetation

The Project would remove up to 4.07 ha of PCT 281_Derived.

Wherever possible, direct impacts have been avoided and/or minimised through the design of the Project. Impacts will be further managed and mitigated through the implementation of environmental management measures detailed in **Section 7.1.8**.

7.1.5.2 Impacts to watercourses, aquatic habitat and GDEs

Direct impacts to one mapped and one unmapped watercourse are likely to result from the Project, as these watercourses traverse or extend into the subject land. This may alter drainage patterns that feed the farm dam and, to a lesser extent, Wialdra Creek. Drainage for the Project would be designed to convey runoff around the subject land to minimise impacts to the unmapped watercourse. Management measures to avoid and minimise impacts to watercourses are discussed further in **Section 7.8.6**.

The scale of any impacts to Wialdra Creek, and associated KFH, GDE or PRL, are likely to be minor and unlikely to have significant adverse impacts on any aquatic entity.

7.1.5.3 Prescribed impacts

Potential prescribed impacts associated with the Project are summarised in **Table 7-3**. Potential prescribed impacts that were deemed to be negligible in impact have been omitted. Environmental management measures to mitigate impacts associated with prescribed impacts are detailed in **Section 7.1.8**.

Table 7-3. Relevant prescribed impacts

Prescribed impacts	Site assessment
Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation.	The subject land is largely native but includes a significant proportion of non-native species. These non-native species may be opportunistically used for foraging by fauna species that utilise grasslands. No TECs would be impacted by the Project.
Impacts of development on the connectivity of different areas of habitat of threatened species	No significant impacts to connectivity are likely to result from the Project.

Prescribed impacts	Site assessment
that facilitates the movement of those species across their range.	
Impacts of the development on movement of threatened species that maintains their life cycle.	No significant impacts to the movement of threatened species may result from this Project.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and TECs.	No adverse impacts to waterbodies are likely to result from the operation phase of this Project. However, minor sedimentation impacts to a nearby farm dam may result from construction activities.
Impact of vehicle strikes on threatened species of animals or on animals that are part of a TEC.	An increase in overall traffic movement is anticipated due to the construction works associated with the Project. Maintaining suitably low speed limits on site would help to mitigate impacts that arise from this increase.

7.1.5.4 Indirect impacts

Potential indirect construction impacts associated with the Project include:

- Inadvertent impacts on adjacent habitat or vegetation
- Reduced viability of adjacent habitat due to edge effects
- Reduce viability of adjacent habitat due to noise, dust or light spill
- Transport of weeds and pathogens from the site to adjacent vegetation
- Increased risk of starvation or exposure, and loss of shade or shelter
- Loss of breeding habitat
- Trampling of threatened flora species.

These potential impacts would be avoided and/or minimised through the design of the Project, demarcation of no-go areas and implementation of management measures proposed in **Section 7.1.8**.

7.1.5.5 Serious and irreversible impacts

No serious and irreversible impacts (SAIL) entities relevant to the Project were detected or assumed present following targeted surveys, therefore no SAIL entities would be impacted by the Project.

7.1.5.6 Matters of National Environmental Significance

An assessment of impact significance has been undertaken for each of these threatened and migratory species following EPBC Act guidelines, as detailed in the BDAR (**Appendix E**). It is concluded that no MNES would be significantly impacted by the Project.

7.1.6 Potential operational impacts

Potential indirect operational impacts associated with the Project include:

- Loss of breeding habitat
- Trampling of threatened flora species
- Rubbish dumping.

Environmental management measures outlined in **Section 7.1.8** would mitigate indirect operational impacts.

7.1.7 Potential decommissioning impacts

The potential impacts to biodiversity associated with the decommissioning of the Project would be similar to those during construction. These would be at a smaller scale and shorter duration. Management measures proposed to manage these impacts are detailed in **Section 7.1.8**.

7.1.8 Environmental management measures

Proposed measures to manage and/or mitigate biodiversity impacts from the Project are detailed in **Table 7-4**.

Table 7-4. Biodiversity environmental management measures

Impact	Reference	Environmental management measure	Timing
Clearing and prevention of over-clearing	BIO1	Prior to construction fencing will be installed to demarcate 'no go zones' where vegetation is to be retained and clearly identify the extent of permitted vegetation clearing.	Prior to construction, decommissioning
	BIO2	All personnel are to be inducted to be aware of the following: - Disturbance outside the Project area is unauthorised and could have legislative consequences - Potential threatened flora and fauna present. Evidence of all personnel receiving an induction would be kept on file.	Construction, decommissioning
	BIO3	A pre-clearing process, including pre-clearance survey, and unexpected threatened species finds procedure will be developed and implemented for the Project. In the event that threatened flora is discovered on site, works should cease in that location and a qualified ecologist will be consulted. Any fauna found during the disturbance are to be allowed (or assisted by a suitably qualified ecologist) to relocate into adjoining habitat. Any vegetation containing threatened fauna may not be removed until the fauna has dispersed.	Prior to construction, construction
	BIO4	Vegetation will be removed in such a way to avoid unnecessary damage to surrounding vegetation.	Construction
	BIO5	The CEMP must ensure that stockpiling of materials and equipment and parking of vehicles does not occur outside subject land, and that native vegetation outside the footprint is not otherwise disturbed.	Prior to construction, construction, decommissioning
Introduction and spread of significant weeds and pathogens	BIO6	Construction machinery (bulldozers, excavators, trucks, loaders and graders) must be clean and free from soil or weeds before entry to the work site.	Construction, decommissioning
	BIO7	Weed-free fill only to be used for on-site earthwork, if required.	Construction, decommissioning
	BIO8	Any herbicide use is to be in accordance with the requirements on the label. Any person carrying out herbicide application would be appropriately trained and competent in its use.	Construction, operation, decommissioning,

Impact	Reference	Environmental management measure	Timing
Habitat disturbance	BIO9	Any bush rock encountered on site is to be relocated to the edge of the disturbance area to enhance habitat. Where possible, dead wood and hollow logs should be relocated to the edge of the disturbance area to enhance habitat.	Construction
Impacts to aquatic ecosystems	BIO10	Construction work is not to occur when the watercourse is flowing to avoid downstream impacts to the farm dam or Wialdra Creek.	Construction, decommissioning

7.1.9 Biodiversity credit requirements

Given the poor condition of the associated vegetation, potential impacts do not generate a requirement to offset any ecosystem credits.

All species credit species generated by the BAM-C were either surveyed for or could be excluded due to habitat constraints, with the exception of the Southern Myotis (*Myotis macropus*). In total, 21 species credits for the Southern Myotis must be retired prior to commencement of construction.

The Applicant is considering options to address the offset obligation which may include sourcing credits from the biodiversity stewardship public register and retiring these through negotiation with the credit holder or paying directly into the Biodiversity Conservation Fund.

7.2 Aboriginal heritage

An ACHAR is contained within the Aboriginal Cultural Heritage and Historic Heritage Assessment Report (**Appendix F**) prepared by OzArk for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.2.1 Assessment methodology

The methodology for the assessment involved:

- Identification and consultation with Aboriginal stakeholders who may hold cultural knowledge of the area (refer to **Section 5.5**)
- Desktop investigation of the existing environmental and cultural heritage context relevant to the Project, including Aboriginal Heritage Information Management System (AHIMS) database search on 20 April 2023
- Developing a predictive model based on background research to identify areas with high archaeological potential to contain Aboriginal objects
- Delineation of survey units for targeted site inspection based on landform elements identified by the predictive model
- A preliminary site inspection was carried out on 1 May 2023 to identify any areas of archaeological potential to inform the Project design as part of the Scoping phase
- An archaeological survey was carried out from 3 October 2023 on foot by a team of one archaeologist and a representative from Mudgee LALC
- Significance assessment of any Aboriginal sites, considering social value, historic value, scientific value and aesthetic value
- Impact assessment to determine type and degree of impacts to any Aboriginal cultural heritage items as a result of the Project
- Recommendations to mitigate or effectively manage potential Project impacts.

7.2.2 Existing environment

7.2.2.1 Landscape features

The topography of the Project area is generally flat to gently undulating with an elevation of approximately 600 m near Wialdra Creek. The sloping landforms which dominate the Project area would not have been hospitable to Aboriginal people, furthermore, there are few areas within the Project area which would have encouraged substantial Aboriginal occupation of the landscape.

The absence of outcropping rock greatly decreases the possibility of stone procurement for tool manufacture to have occurred at the Project area. Soils present on the gentle slopes inside the Project area are likely to have been affected by water erosion and are poor draining. The erosional qualities of the soils present will have influenced the likelihood for in situ archaeological deposits being present. Furthermore, the widespread and comprehensive use of the Project area for cultivation would have further promoted soil erosion and loss.

The Project area would have once supported an open woodland which would have provided some resources for Aboriginal subsistence in the past. However, resources likely to have supported a large population of people would have been present closer to the banks of more permanent water sources including the Cudgegong River. The broad-scale vegetation clearance which has taken place across the Project area for agricultural purposes reduces the likelihood that any culturally modified trees remain present.

Ground surface disturbances such as vegetation clearance, cultivation, and grazing exist throughout the Project area. These activities may have displaced Aboriginal objects and are likely to have reduced the potential for subsurface archaeological material. However, disturbance at a given location does not necessarily mean that there will be no cultural material present, as often a disturbed context will reveal objects which may have previously been subsurface.

7.2.2.2 Archaeological context

At the time of European settlement, the Project area was situated within the territory of people belonging to the Wiradjuri tribal and linguistic group (Tindale, 1974). The Wiradjuri tribal area is situated within the Murray Darling Basin and extends across three general physiographic regions: the highlands or central tablelands in the east, the riverine plains in the west, and the transitional western slopes zone in-between (Navin Officer, 2005: 48). The Project area is located on the eastern extent of Wiradjuri territory.

Oral tradition records the presence of over 20 clans within the broader Bathurst–Mudgee region, organised according to matrilineal descent (Navin Officer, 2005: 48). Clans were made up of a number of fairly independent groups, of up to 20 members, in friendly contact with each other, moving separately for much of the year over a shared territory (Pearson, 1981; Haglund, 1985).

Within the Wiradjuri region, the presence of Aboriginal people in the Darling Basin has been dated to 40,000 years ago. A spread east into the mountains is thought to have occurred between 14,000 to 12,000 years ago.

7.2.2.3 Desktop review

7.2.2.3.1 Database searches

A search of the AHIMS database identified 37 previously recorded Aboriginal sites within a 10 km by 10 km search area centred on the Project area. No AHIMS sites are located within the Project area. The types and frequencies of sites from the search is provided in **Table 7-5** and shown in **Figure 7-2**.

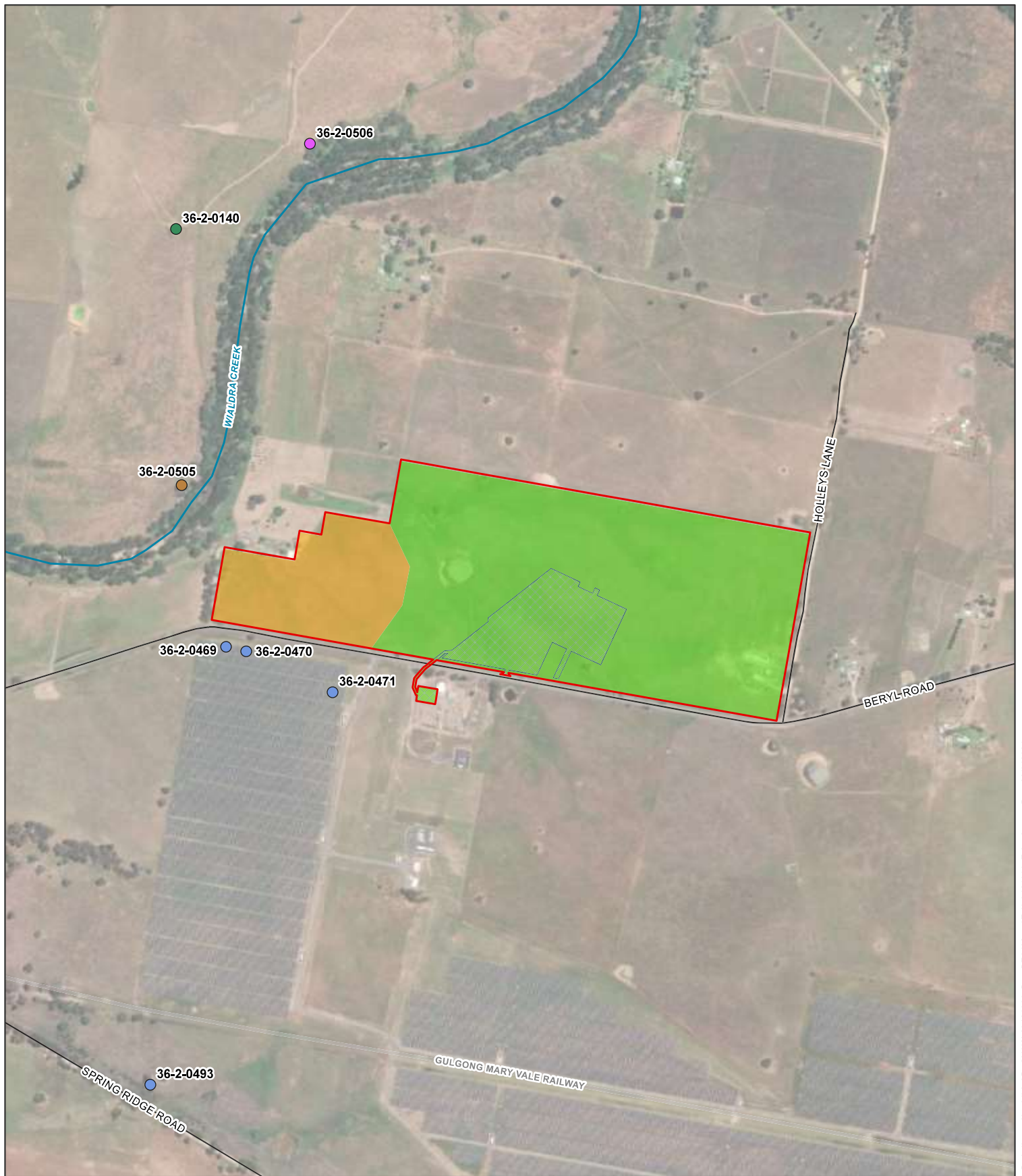
Table 7-5. Site types and frequencies of AHIMS sites near the Project area

Site type	Number	Frequency (%)
Artefact site (quantity unspecified)	28	77.5
Potential archaeological deposit (PAD)	2	5
Isolated find	2	5
Artefact & PAD	1	2.5
Artefact & culturally modified tree (carved or scarred) & PAD	1	2.5
Isolated find & PAD	1	2.5
Culturally modified tree (carved or scarred) & PAD	1	2.5
Artefact & quarry	1	2.5
Total	37	100

Source: OzArk (2023a)

One registered Native Title Claim covers the Project area: Warrabinga-Wiradjuri #7 (NC2018/002, NSD857/2017). As the Project area does not include any Crown land, no land within the Project area is applicable to 'future acts' under the *Native Title Act 1993*.

No Aboriginal places are listed on the National, Commonwealth or LEP heritage lists are located within the Project area.

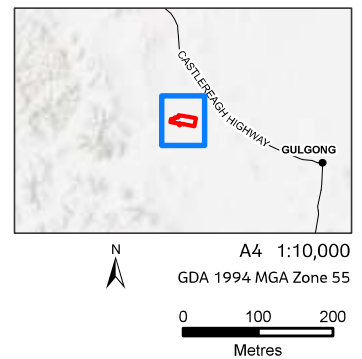


LEGEND

- Project area
- Disturbance footprint

- Aboriginal heritage item
- Artefact site (quantity unspecified)
 - Isolated find
 - Potential archaeological deposit (PAD)
 - Potential archaeological deposit (PAD) and culturally modified tree
- Archaeological potential
- Low
 - Moderate

- Minor road
- Railway
- Waterway



Data Sources: NSW Department of Planning and Environment (2023); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2023), Australian Bureau of Statistics (2021), OzArk (2023)

Figure 7-2. Location of previously recorded AHIMS sites and archaeological potential

7.2.2.3.2 Literature review

There have been several archaeological surveys in the vicinity of the Project area which have resulting in the following conclusions being made for archaeological investigations:

- Stone artefact sites (isolated finds and artefact scatters) are the most frequent sites recorded in the area. These sites tend to be within 200 m of water, even ephemeral drainage lines, and are more likely near named waterways
- Quartz is the predominant material for stone artefacts in the area, although volcanic materials, silcrete, quartzite, mudstone, chert, and chalcedony could also be present
- Modified trees are relatively uncommon in the region, likely due to the high levels of historic clearing for agricultural purposes
- Flat landforms have an increased likelihood of containing in situ artefact sites, sometimes with potential PAD.

7.2.2.4 Predictive model

Based on knowledge of the environmental context of the Project area and a desktop review of the known local and regional archaeological records, the predictions listed in **Table 7-6** have been made concerning what types of sites may be present within the Project area.

Table 7-6. Likelihood of landforms within the Project area to contain Aboriginal objects

Site type	Likelihood of being present in the Project area
Isolated finds	As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Project area.
Open artefact scatters	As most of the Project area is within sloping landforms distant to permanent water, this site type is not predicted to be common. However, in flat landforms this site type is possible although the moderate degree of disturbance in the Project area will probably mean that the scatter has become displaced. It is likely that any sites associated with such landforms are likely to have a low artefact density and a low complexity of tool types as the sites are either one-off events or only infrequently used.
Culturally modified trees	Due to the near-total clearance of trees from within the Project area, this site type is predicted to be very rare. It is also noted that this site type is uncommon at a regional level.
Quarry sites	This site type could be recorded within the Project area should suitable rock outcroppings be available.
Hearths/ovens	This site type is considered possible in areas where A-Horizon soils are relatively undisturbed. However, given the high levels of disturbance across the Project area the likelihood of identifying this site type in situ is significantly reduced.
Burials	Although it is possible that this site type could be found within the Project area, it is considered a rare site type especially given the disturbance that has occurred within the Project area.

7.2.2.5 Archaeological field survey results

No Aboriginal objects were recorded during the survey of the Project area, and it was assessed that the Project area does not contain landforms with subsurface archaeological potential. As such, test excavation is considered unwarranted.

No specific cultural values were identified by the RAPs regarding the Project area from their review of the assessment methodology or during field survey.

7.2.2.6 Significance assessment

During the survey, no Aboriginal sites were recorded and therefore there are no places of archaeological significance within the Project area. No specific locations of intangible cultural significance have been identified within the Project area by the Aboriginal community.

7.2.3 Potential construction impacts

No impacts to Aboriginal heritage during construction of the Project is anticipated.

7.2.4 Potential operational impacts

No impacts to Aboriginal heritage during operation of the Project is anticipated.

7.2.5 Potential decommissioning impacts

No impacts to Aboriginal heritage during decommissioning of the Project is anticipated.

7.2.6 Environmental management measures

Proposed measures to manage and/or mitigate Aboriginal heritage impacts from the Project are detailed in **Table 7-7**.

Table 7-7. Aboriginal heritage environmental management measures

Impact	Reference	Environmental management measure	Timing
Impacts on unknown Aboriginal sites	AH01	In the unlikely event that unexpected Aboriginal heritage items are encountered during works, the Unanticipated Finds Protocol (Appendix F) will be implemented.	Construction
Human remains	AH02	If suspected human remains are located during any stage of the Project, work will stop immediately, and the NSW Police and Coroner's Office will be notified. NSW Heritage will be notified if the remains are found to be Aboriginal	Construction
Impacts to unknown Aboriginal sites	AH03	All staff and contractors involved in the proposed work should undergo a cultural heritage induction to ensure they can recognise Aboriginal artefacts and are aware of the legislative protection requirements for all Aboriginal sites and objects under the NPW Act and are familiar with the Unanticipated Finds Protocol (AH01) and the skeletal remains notification (AH02).	Construction

7.3 Historic heritage

A historic heritage assessment is contained within the Aboriginal Cultural Heritage And Historic Heritage Assessment Report (**Appendix F**) prepared by OzArk for the Project in response to the SEARs and in accordance with the NSW Heritage Manual. A summary of the assessment is provided in this section.

7.3.1 Assessment methodology

The methodology for the assessment involved:

- Desktop assessment literature review of relevant previous heritage reports and other source material
- Review of heritage registers and listing databases, including:
 - NSW State Heritage Register
 - Mid-Western Regional LEP
 - National and Commonwealth Heritage Listings
- A field survey was carried out on 03 October 2023 on foot to identify any potential heritage items or areas of archaeological potential.

7.3.2 Existing environment

7.3.2.1 Historical context

Early European exploration of the region occurred in the 1820s. One of the first land holders and cattle runs in the area was owned by the sons and grandsons of William Cox, who had built the road across the Blue Mountains (ADB, 2020). Their cattle run was called 'Guntawang' and was established in 1822, 8 km south-west of the present town of Gulgong. The Guntawang Homestead is approximately 4.4 km south of the Project area.

The Gulgong goldfield was gazetted in 1866 but initial finds were negligible. A large find on the future town site (at Red Hill) in 1870 sparked a major goldrush. There was spectacular growth in Gulgong during the 1870s, with the mines around Gulgong producing twice as much gold as the Meroo field produced over half a century in 1872 (DUAP, 1996: 92). When the town was gazetted in 1872 there were reputedly 20,000 people in the area.

Gulgong became a municipality in 1876 although the gold had already begun to dwindle. By 1881 the population was 1,212 and the boom years were over. From that point, wheat and wool production, boosted by the arrival of the railway in 1909, sustained the town.

7.3.2.2 Historical heritage register search

There are no heritage items listed on the Mid-Western Regional LEP, NSW State Heritage Register or Australian Heritage Database within or near the Project area. The closest heritage item to the Project area is 'The Lagoon Homestead' (I391 under the Mid-Western Regional LEP) located about 2.3 km north-east of the Project area.

The Project area does not contain any identifiable structures with historic heritage potential. Historical aerial imagery of the Project area indicates that the structures associated with the current residence adjacent to the Project area in the south-west have been constructed since 1963 and are unlikely to have historic heritage values.

7.3.2.3 Field survey results

No historic heritage sites or historic archaeological deposits were recorded in the Project area during field survey. As such, there are no anticipated impacts to historic heritage as a result of the Project.

7.3.3 Potential construction impacts

No construction impacts to historical heritage are anticipated as a result of the Project.

7.3.4 Potential operational impacts

No operational impacts to historical heritage sites are anticipated as a result of the Project.

7.3.5 Potential decommissioning impacts

No decommissioning impacts to historical heritage sites are anticipated as a result of the Project.

7.3.6 Environmental management measures

Based on the results of the assessment, environmental management measures to manage historical heritage are not required.

7.4 Land

This section provides a summary of the existing land use and assesses any potential land use conflicts with the Project. This section is also informed by the findings of a Soil Sampling Investigation (refer to **Appendix G**) prepared by Macquarie Geotechnical in response to the SEARs. A summary of the assessment is provided in this section.

7.4.1 Assessment methodology

The methodology for the assessment involved:

- Desktop review of available information and data sources to characterise the existing environment
- Review of soil sampling investigation based on fieldwork carried out on 20th December 2023
- An assessment of land use conflicts and identification of potential Project conflicts to arise in accordance with the Land Use Conflict Risk Assessment Guide (LUCRA Guideline) (Department of Primary Industries (DPI), 2011)
- Identifying key land uses and impacts during construction, operation and decommissioning
- Identification of management measures required to minimise impacts and conflicts.

7.4.1.1 Land use conflict risk assessment

A LUCRA has been developed for the Project using DPI's LUCRA Guideline (refer to **Section 7.4.6**). DPI defines the LUCRA as a system to identify and assess the potential for land use conflict to occur between neighbouring land uses (DPI, 2011).

A risk ranking matrix show below in **Table 7-8** is used to rank the identified potential land use conflicts. The risk ranking matrix assesses the environmental, public health and amenity impacts according to the probability of occurrence and consequence of the impact. The combination of the 'probability' ranking and the 'consequence' ranking give a value to identify the severity of the risk. The probability and consequence tables are shown in **Table 7-9** and **Table 7-10**.

Table 7-8. Risk ranking matrix (Table 2 of the LUCRA Guideline)

	Probability					
Consequence		A	B	C	D	E
	1	25	24	22	19	15
	2	23	21	18	14	10
	3	20	17	13	9	6
	4	16	12	8	5	3
	5	11	7	4	2	1

Table 7-9. Probability of occurrence (Table 3 of the LUCRA Guideline)

Level	Descriptor	Description
A	Almost certain	Common or repeating occurrence
B	Likely	Known to occur or 'it has happened'
C	Possible	Could occur or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

Table 7-10. Consequence of the impact (Table 4 of the LUCRA Guideline)

Level	Descriptor
1	Severe Severe and/or permanent damage to the environment Irreversible Severe impact on the community Neighbours are in prolonged dispute and legal action involved
2	Major Serous and/or long term impact to the environment Long terms management implications Serious impact on the community Neighbours are in serious dispute
3	Moderate Moderate and/or medium-term impact to the environment and community Some ongoing management implications Neighbour disputes occur
4	Minor Minor and/or short term impact to the environment and community Can be effectively managed as a part of normal operations Infrequent disputes between neighbours
5	Negligible Very minor impact to the environment and community Can be effectively managed as part of normal operations Neighbour disputes unlikely

7.4.2 Existing environment

7.4.2.1 Topography and geology

The local topography is undulating with gently inclined slopes and with elevation between 410 m and 415 m above height datum, sloping towards Wialdra Creek to the west.

Regionally, the Project area is in the Lachlan Fold Belt system that extends from eastern Tasmania through Victoria and NSW into the central western Queensland. The Lachlan Fold Belt is comprised of multiple deformed turbiditic sediments, with Silurian-Devonian volcanics, numerous periods of granitic intrusion and large plutonic suites.

Based on the Dubbo 1:250,000 geological map, the Project area is underlain by Quaternary (Qa) comprising alluvial silt, clay and sand with variable humic content and sporadic pebble- to cobble-sized unconsolidated conglomeratic lenses.

7.4.2.2 Soil landscapes and classification

Soil landscape mapping based on eSpade (State of NSW & DPIE, 2024) shows that the Project area is entirely mapped as Home Rule (SI5504hr), consisting mainly siliceous sands and earthy sands near the surface, with very low fertility, low water-holding capacity, acidic surface soils, moderate to high erosion hazard under cultivation (Murphy & Lawrie, 1998). In addition, the surface soils are fragile and susceptible to soil structure degradation and require erosion control such as maintaining surface cover to minimise runoff.

Based on the soil sampling results, the topsoil depth range from 0 to 0.1 m and consists of silty clay/clay. Residual soil is detected at 0.1-1.5 m depth range consists of sandy clay, clayey sand, silty sand and sand. Sandy clay is the main type of soil found in the samples, observed at various depths across five different boreholes, indicating consistent soil type across the site.

Based on the Australian Soil Classification system (DPIE, 2021), the soils across the Project area are entirely mapped as sodosols. Sodosols generally have low agricultural potential with high sodicity leading to high erodibility, poor structure and low permeability.

7.4.2.3 Soil erodibility

Soils in the disturbance footprint range from Emerson Class 2 to Emerson Class 3 (Macquarie Geotech, 2024). Whilst not the most dispersive category (Emerson Class 1), these soils are still considered to be dispersive and taken up into suspension very readily upon contact with water during even very low flow velocity events. As such, the presence of dispersive soils within the disturbance footprint increases the erosion hazard.

7.4.2.4 Acid sulfate soils

The acid sulfate soils (ASS) risk map from the CSIRO Atlas of Australian ASS indicated a low probability of ASS across the Project area. Soils within the Project area ranged in pH from 5.9 to 8.8, and indicated low levels of sulfate. As such, the soils are considered to have a low potential for ASS.

7.4.2.5 Salinity

Soils in the Project area ranged from 64 parts per million (ppm) to 1200 ppm and electrical conductivity from 25 to 460 microsiemens per centimetre ($\mu\text{S}/\text{cm}$). Based on these results, the soils are considered to be low salinity.

7.4.2.6 Land use

As described in **Section 2.3**, the majority of the Project area is utilised for low intensity agriculture currently limited to light grazing. The Associated Landowner resides in the two dwellings located in the south east corner of the Project area. The remainder of the Project area is comprised of a portion of Beryl Road and Beryl Substation.

Adjacent land uses include cropping, grazing native vegetation, utilities (Beryl Substation), transport, communication (Beryl Road) (NSW DCCEEW, 2023) and the Beryl Solar Farm south of the Project area which became operational in 2019 and connects to the Beryl Substation.

Key land uses in the wider region of Gulgong and surrounds include agriculture, forestry, nature conservation, infrastructure and rural/semi-rural development. With a long history of agricultural use, the broader region continues to support primary production in a mix of modified and natural landscapes.

7.4.2.7 Agriculture capacity

NSW Land and Soil Capability (LSC) mapping provides a broadscale regional view of the dominant LSC in the Project area. The majority of the Project area, including where the Project will be located is mapped as Class 5 – Severe limitations (refer to **Figure 7-3**).

BSAL refers to land with high quality soil and water resources capable of sustaining high levels of productivity. There is a small area (0.37 ha) of BSAL mapped at the western boundary of the Project area, and no mapped draft SSAL in the Project area (refer to **Figure 7-3**).

7.4.2.8 Crown lands

As described in **Section 2.3**, there are no Crown Lands within the Project area however several Crown parcels are located near the Project area (refer to **Figure 2-1**).

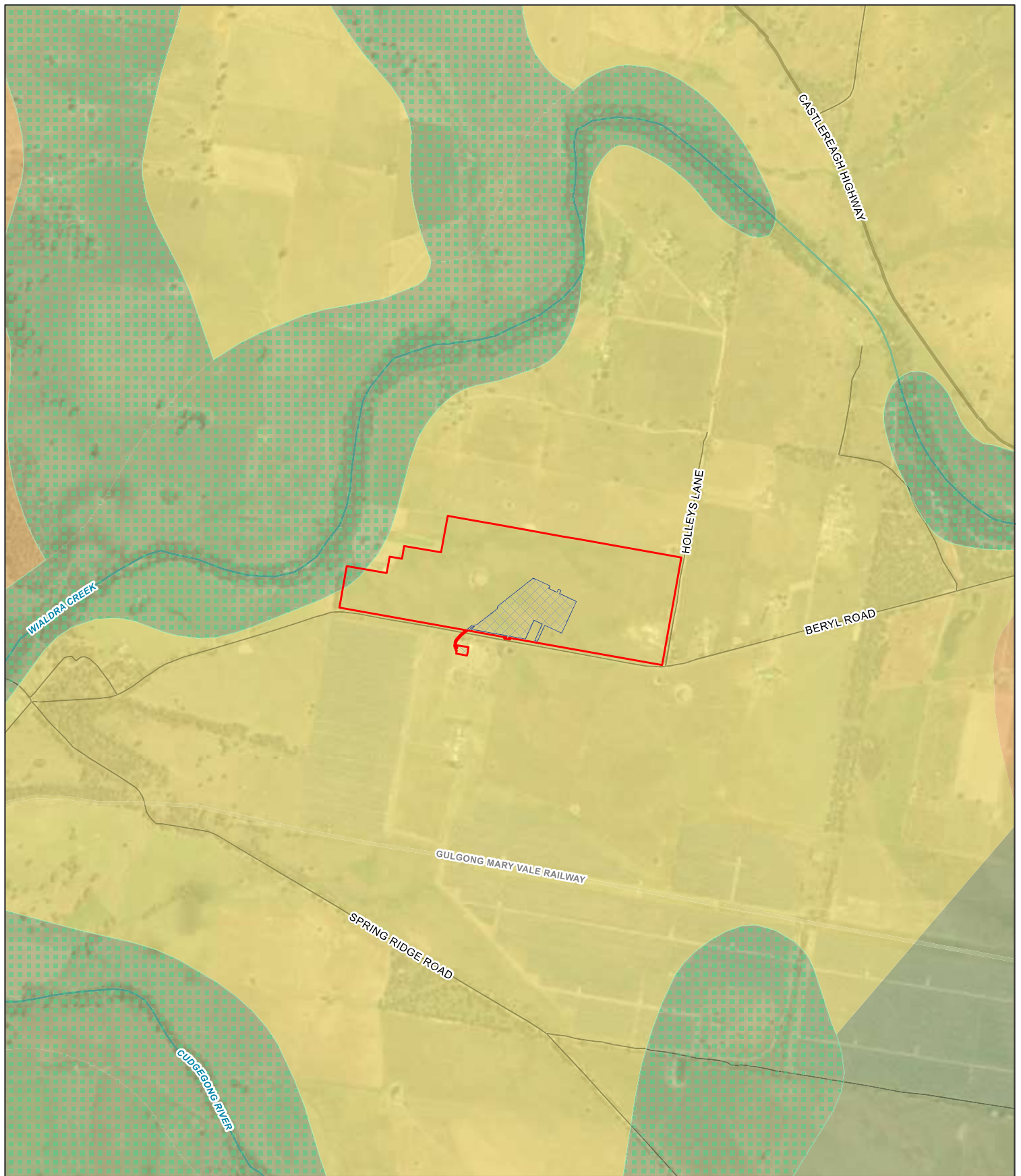
7.4.2.9 Mining, quarries, mineral or petroleum rights

A search of the MinView database (GSNSW, 2024) indicates the Project area and surrounding land are subject to a mineral exploration licence EL8160 held by Bowdens Silver Pty Ltd. Consultation with Bowdens Silver is discussed in **Section 5.4**.

7.4.2.10 Contamination

There are no registered contaminated land records near the Project area. A search of the POEO Act public register on 1 May 2023 identified there are no relevant licenced activities in proximity to the Project area, with the closest licenced site being the Boral Quarries Beryl, located about 2.1 km southwest of the Project.

Based on the NSW DPI naturally occurring asbestos (NOA) hazard mapping, there are no known NOA at the Project area.

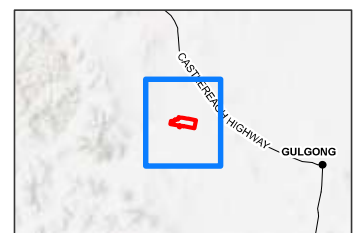


LEGEND

- Project area
- Disturbance footprint

- Biophysical strategic agricultural land
- Land and soil capability mapping of NSW
 - 3 - Moderate limitations
 - 5 - Severe limitations
 - 6 - Very severe limitations

- Major road
- Minor road
- Railway
- Waterway



N
A4 1:17,500
GDA 1994 MGA Zone 55
0 250 500
Metres

Data Sources: NSW Department of Planning and Environment (2023); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2023); Australian Bureau of Statistics (2021)

Figure 7-3 LSC and BSAL mapping within and surrounding the Project area

7.4.3 Potential construction impacts

7.4.3.1 Soil erosion hazard

The presence of dispersive soils within the Project area indicates a potential for erosion to occur via wind and/or water, particularly during high intensity rainfall or flooding events. The generally flat nature of the Project area would help to limit erosion potential as overland flows that could contribute to scour and erosion will generally be of low velocity.

Soil erosion hazards will be managed through appropriately designed site drainage and the implementation of appropriate management measures during construction (refer to **Section 7.4.7**).

7.4.3.2 Dust

The Project has the potential to generate dust which may result in adverse air quality impacts. Measures to mitigate dust, including dust suppression and monitoring, are proposed in **Section 7.4.7** to mitigate any air quality impacts.

7.4.3.3 Acid sulfate soils and salinity

Based on desktop assessment and soil sampling, there is low potential for ASS and salinity within the Project area. As such, potential impacts during construction are not anticipated.

7.4.3.4 Land use conflicts

During construction, the Project would fence off about 4.07 ha of land that was previously utilised for grazing within the Associated Landowners property. The remainder of the property (over 32 ha) would continue to be utilised for grazing activities.

Construction activities also have the potential to disrupt usual farm activities and grazing patterns due to higher level of noise and traffic movements. Potential noise and traffic impacts would be managed with management measures proposed in **Section 7.6.6** and **Section 7.7.6** respectively.

The Project is not expected to impact the operation of Beryl Solar Farm or Beryl Substation.

7.4.3.5 Impacts to agricultural land

As described above, the Project would remove approximately 4.07 ha of agricultural land during construction.

The Project has been designed to avoid areas of BSAL land and proposed infrastructure is located approximately 400 m to the east of the mapped area.

7.4.3.6 Impacts to Crown land and other licences

The Project would not impact on Crown reserves.

Since the Project would only involve surface infrastructure with a limited footprint, potential impacts on existing or future mining activities are not anticipated. Further, the Project is located in a constrained environment that is not considered conducive with exploration activities, i.e. close proximity to easements, private residences, electrical transmission and Beryl Substation.

7.4.4 Potential operational impacts

Areas within the operational footprint would be stabilised and comprise large areas of hardstand that would minimise the potential for soil erosion.

The Project would fence off about 2.5 ha of land and return areas previously utilised for construction, i.e. laydown areas, to pre-construction conditions suitable for grazing. As such, land use impacts are expected to be minimal.

Activities within the operational footprint would be limited with most operational activities occurring remotely.

7.4.5 Potential decommissioning impacts

The decommissioning phase would involve the removal of above-ground infrastructure and rehabilitation of the affected land. It is assumed that the Project area would be reinstated for rural land uses, consistent with the existing land use.

7.4.6 Land use conflict risk assessment

Based on the evaluation criteria outlined in **Section 7.4.1.1**, the following key conflict issues presented in **Table 7-11** have been identified for the Project.

Under the unmitigated scenario (i.e. without the implementation of the proposed management strategies), the risk ranking matrix identified potential for four high-risk conflicts (i.e. those with a risk ranking score of greater than 10). Through the implementation of the proposed management measures and strategies, the number of high-risk conflicts is reduced to two.

Table 7-11. LUCRA evaluation

Identified potential conflict	Risk ranking		Mitigating factors or strategies	Residual risk rating	
	P	C		P	C
Agriculture and nearby receivers					
Agricultural expansion on existing farm property for Associated Landowner	C5	4	▪ The Project would result in the loss of a small proportion of passive agricultural land on the existing farm property, approximately 4.07 ha ▪ All areas outside the BESS could be grazed or continued to be used for non-intensive agricultural purposes by the Associated Landowner, about 32 ha in size.	C5	4
Noise	B3	17	▪ Noise generated during construction and decommissioning stages would be minimised through the implementation of management measures ▪ Where regular maintenance practices are incorporated into operation, noise is not expected to generate a land use conflict.	B4	12
Dust	B4	12	▪ Dust generated during the construction and decommissioning stages to be managed using water carts when required ▪ Dust is not expected to generate a significant land use conflict during operation.	B5	7
Surface water runoff	D4	5	▪ Implementation of a soil and water management plan and an erosion and sediment control plan would minimise risk of the potential impact.	D5	2
Fire/ bushfire	D4	5	▪ Implementation of a Bushfire Management Plan and a minimum 10 m APZ would reduce the probability of BESS operation starting a fire or a bushfire damaging the BESS infrastructure.	E4	3

Identified potential conflict	Risk ranking		Mitigating factors or strategies	Residual risk rating	
	P	C		P	C
Visual amenity	B3	17	Proposed vegetation screening would reduce the risk of visual impacts for private and public receivers.	B4	12
Traffic generation and disruption	B4	12	- Traffic generation and disruptions during construction and decommissioning stages are considered likely however the impact would be temporary and able to be managed (refer to Section 7.7.6). - Traffic is not expected to generate a land use conflict during operation.	C4	8
Weed and pest control	D4	5	Implementation of pest and weed management plan during construction and operation phases (refer to Section 7.1.8).	E5	1
Energy generation/resource exploration					
Beryl Solar Farm and Beryl Substation to the south	E5	1	The Project is not expected to generate a land use conflict with the operational Beryl Substation and Beryl Solar Farm	E5	1
Mineral exploration licence	E5	1	The Project is not expected to generate a land use conflict with the mineral exploration licence EL8160.	E5	1

Note P=Probability; C=Consequence

7.4.7 Environmental management measures

Proposed measures to manage and/or mitigate land use impacts from the Project are detailed in **Table 7-12**.

Table 7-12. Land environmental management measures

Impact	Reference	Environmental management measure	Timing
Erosion hazard	L1	Design of drainage and erosion control measures will need to take due consideration of the dispersive nature of soils within the Project area	Detailed design
	L2	An Erosion and Sediment Control Plan (ESCP) will be prepared and will detail the specific erosion and sediment control measures to be implemented within the Project, in accordance with the principles and requirements of Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004). As a minimum the ESCP would include: - Plans for temporary drainage, scour protection and control measures to reduce erosion and water quality impacts from increased sediment loads from the construction site. The ESCP would identify location of proposed sediment basins if applicable - Dust suppression and monitoring to ensure no downstream sedimentation or air quality impacts.	Prior to construction, construction, decommissioning
	L3	To manage soil hazards: Minimise the total area of bare earth exposed at any time	Construction, decommissioning

Impact	Reference	Environmental management measure	Timing
		▪ Employ interim rehabilitation strategies to minimise dust generation and soil erosion on parts of the Project that cannot yet be permanently rehabilitated ▪ Where required, rehabilitate all areas of the Project that are not proposed for future disturbance as soon as is practicable following construction and decommissioning. ▪ Minimising the number of stockpiles, area used for stockpiles, and time that they are left exposed ▪ Locating stockpiles away from drainage lines, including at least 40 m away from any waterway and away from areas where they may be susceptible to wind erosion ▪ Stabilising stockpiles, establishing appropriate sediment controls and suppressing dust as required.	

7.5 Visual amenity

An LCVIA (**Appendix H**) was prepared by Iris Visual Planning and Design Australia for the Project in response to the SEARs. A native vegetation and landscape plan was also prepared by CUSP Pty Ltd. A summary of the assessment is provided in this section.

7.5.1 Assessment methodology

The methodology for the assessment involved:

- Landscape character assessment:
 - Identify landscape character zone(s) (LCZ) of the Project area and surrounding study area
 - Describe the existing conditions of each landscape character zone
 - Identify the sensitivity of the landscape character zone and magnitude of change created by the Project
 - Combine these factors to assign a level of landscape character impact.
- Visual impact assessment:
 - Describe the existing view, including from private dwellings
 - Identify the visual sensitivity by combining the viewpoint sensitivity and scenic quality rating to determine the viewpoint sensitivity
 - Identify the magnitude of change created by the Project
 - Combine the viewpoint sensitivity and magnitude of change characteristics to assign a level of visual impact
 - For night-time impact, the assessment also draws upon the guidance contained within AS4282 Control of the obtrusive effects of outdoor lighting (2019)
- Recommendation of overall management measures to avoid or minimise visual amenity impacts.

Further details on the assessment methodology are provided in the LCVIA (**Appendix H**).

7.5.1.1 Study area

Based on the relatively small scale and disturbance footprint of the Project, the following study areas were used for the assessment:

- One kilometre from the Project area for landscape character and public domain views
- Two kilometres from the Project area for private dwelling views.

7.5.2 Existing environment

7.5.2.1 Landscape character

The study area is comprised of one homogeneous LCZ, with a gently undulating landform and consists of low-lying rural plains alongside Wialdra Creek.

The LCZ includes large areas that are cleared of vegetation for rural uses, including grazing pastures and dryland arable paddocks with associated rural dwellings. The trees in this landscape are generally scattered in paddocks, and more densely grouped along paddock boundaries, roads and particularly along Wialdra Creek. There are groups of smaller rural lifestyle holdings to the north-west and east of the Project. The dwellings in this landscape are also located nearby agricultural buildings and often surrounded by vegetation within gardens.

The Castlereagh Highway passes through this LCZ, around 1.5 km northeast of the Project, with the landscape either side of the road forming the fore and middle ground areas of approach to Gulgong. Beryl Road is located along the southern boundary of the Project area, providing access to local properties.

Overall, the LCZ comprises landscape qualities and features of predominantly low scenic quality, and an overall low sensitivity. This landscape has the capacity to absorb changes due to the existing scenic quality and characteristics of the study area.

7.5.2.2 Visual catchment

The visual catchment area identifies areas where there is the potential for a direct line of sight between the Project and surrounding areas, including public views and views at surrounding residences.

The visual catchment mapping shown in **Figure 7-4** demonstrates the screening effect of the trees located along roads, along Wialdra Creek and in paddocks surrounding the Project, which would restrict and filter views from the north, east, south and west.



Key:

- Project area
- Disturbance footprint
- BESS area
- Contour (5m)
- Contour (1m)

Visibility:

- Visible
- Not visible
- Associated dwelling
- Neighbouring dwelling

Existing transmission lines:

- 330 kV
- 132 kV
- 66 kV

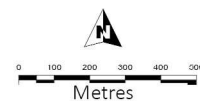


Figure 7-4. Visual catchment of the Project

7.5.2.3 Views from surrounding residences

Following further assessment of the visual catchment presented in **Figure 7-4** the dwellings identified in **Table 7-13** were considered to have potential views of the Project. Dwellings with a potential view to the Project have been further analysed in **Section 7.5.4.2**. Noting, the Associated Landowner dwellings are not considered as part of the assessment.

Table 7-13. Existing views from surrounding residences

Dwelling # location	Existing view	Viewpoint sensitivity	Scenic quality	Visual sensitivity
R1 278 Beryl Road	View from rear deck orientated north across a flat rural landscape to Wialdra Creek. Views to east contain existing local and district scale transmission poles and wires.	Moderate Primary view from dwelling on land zoned R5. Panoramic northerly view from deck / outdoor living area.	Low Flat landform, sparse vegetation, existing presence of energy infrastructure, houses, and farm structures.	Moderate
R2 278 Beryl Road	View from rear of house across flat rural landscape. Views contain existing local and district scale transmission poles and wires and the existing Beryl Substation on Beryl Road.	Low Secondary view from dwelling on land zoned R5. Partly obstructed view from informal outdoor area near sheds.	Low Flat landform, sparse vegetation, existing presence of energy infrastructure, houses, and farm structures.	Low
R3 83 Holleys Lane	Views to surrounding rural landscape partially enclosed by vegetation surrounding the dwelling and on intervening field boundaries. Views to south and southeast contain existing local and district scale transmission poles and wires. View to hills and mountains enclose views to the west.	Low Secondary view from dwelling on land zoned R5. Primary view is towards Wialdra Creek and the backdrop of hills to the west.	Low Flat landform, sparse vegetation, existing presence of energy infrastructure, houses, and farm structures.	Low
R4 115 Holleys Lane	View from garden entertainment areas to the rear of this dwelling. The view includes surrounding garden vegetation and the rural landscape. Existing view includes local and district scale transmission poles and wires to the south. View to the south include Beryl Road, the existing Beryl Substation and solar farm in the background.	Moderate Primary view from dwelling on land zoned R5.	Low Flat landform, sparse vegetation, existing presence of energy infrastructure, houses, and farm structures.	Moderate

Dwelling # location		Existing view	Viewpoint sensitivity	Scenic quality	Visual sensitivity
R8	148 Beryl Road	Primary views appear to be orientated to the north. Views west, towards the Project would include Holleys Lane, lined with mature trees, existing dwellings, sheds and vegetation at 5 Holleys Lane (associated with the Project).	Low Secondary view from dwelling on land zoned R5.	Low Flat landform, large trees and vegetation, existing houses, and farm structures, some presence of existing transmission lines.	Low
R10	126 Beryl Road	Views from dwelling partly screened by vegetation within the property with some views to the surrounding fields. Views to west are enclosed by existing shed. Some existing local and district scale transmission poles and wires visible.	Low Secondary view from dwelling on land zoned R5.	Low Flat landform, sparse vegetation, existing presence of energy infrastructure, houses, and farm structures.	Low
R11	58 Holleys Lane	Primary views appear to be north and northwest towards Wialdra Creek. There are existing poles and wires crossing this view. Views west and southwest from dwelling towards the Project include some screening by trees on Holleys Lane.	Low Secondary view from dwelling on land zoned R5.	Low Flat landform, sparse vegetation, existing presence of energy infrastructure, houses, and farm structures.	Low

7.5.2.4 Views from the public domain

The town of Gulgong is located around 6.3 km south-east of the Project. Dwellings in town are unlikely to experience views of the BESS due to distance and intervening landform and vegetation.

Viewpoints to the Project from the public domain are limited, due small number of publicly accessible roads in the study area. One view has been selected along Beryl Road, Viewpoint 1, where the Project would be prominent (refer to **Picture 7-4**). This viewpoint is located to the west of the Project, near the access road to Beryl Substation. This view is experienced by a relatively low number of receivers for a short duration from a moving vehicle.

Based on the existing conditions, Viewpoint 1 is considered to have the following qualities:

- Visual sensitivity: Very low
- Viewpoint sensitivity: Very low
- Scenic quality: Low.



Picture 7-1. Viewpoint 1 – View facing east from Beryl Road

7.5.2.5 Views at night

At night, the Project area and surrounding landscape would experience a relatively low level of lighting. There would be some light emitted from the scattered rural residences and outbuildings. This would include clusters of residences and along Beryl Road and Holleys Lane where there would also be vehicles travelling along roads and accessing properties. There would also be moving headlights from vehicles using the Castlereagh Highway where there is a greater concentration of traffic.

There would be a general sky glow above Gulgong, located about 6.3 km to the south-east of the Project, which would not noticeably influence the character of the study area.

Overall, the Project area and surrounding landscape has low district brightness and a moderate visual sensitivity at night.

The Project is located within the Dark Sky Region, approximately 100 km from Siding Spring Observatory. Developments within this area are required to apply good lighting design principles in accordance with the Dark Sky Planning Guideline (DPE 2016). These guidelines have been considered in **Section 7.5.6**.

7.5.3 Potential construction impacts

Construction activity would contrast with the existing character of the area and introduce construction vehicles, large-scale equipment and construction activities to the area. This will include a temporary construction compound and site laydown, located within the disturbance footprint. During this time there would be a potentially greater landscape character and view impacts for the duration of the works.

Construction visual impacts would be temporary in nature, and would be managed where possible, as described in **Section 7.5.6**. As such, construction activities are unlikely to result in an unacceptable level of visual impact.

7.5.4 Potential operational impacts

7.5.4.1 Landscape character impacts

During operation, the magnitude of change is low for the following reasons:

- The Project elements are of a size and scale that is compatible with the existing built structures in the surrounding area
- The Project would occupy a small geographical area, which is located adjacent to other existing energy infrastructure
- The Project in the long-term is reversible i.e. the landscape could be restored if the BESS was removed

Overall, there would be a low landscape character impact on the Wialdra Creek rural plain LCZ.

7.5.4.2 Visual impacts at surrounding residences

Seven dwellings were assessed for visual impacts associated with operation of the Project, including the presence of screening vegetation. The outcomes of the assessment are presented in **Table 7-14**, and are supported by aerial photographs, visibility diagrams, photomontages and 3D model views provided in the LCVIA (**Appendix H**).

Overall, the visual impact to surrounding residences during operation of the Project would be negligible with the exception of moderate-low impacts at R01 and low impacts at R02 and R03. Following the establishment of screening vegetation, visual impacts at all receivers are anticipated to be negligible.

Table 7-14. Visual impact at surrounding residences during operation

Dwelling # location	Visual sensitivity	Magnitude of change	Visual impact	Visual impact with screening vegetation
R1 278 Beryl Road	Moderate	Low Existing vegetation and structures within the eastern part of this property, would mostly obstruct views towards the Project. A small portion of the northern part of the Project would be visible in the background of the view from the deck, on the eastern most part of a mainly north oriented view. The Project would be glimpsed in the background of views and seen in the context of the existing transmission towers.	Moderate -low	Negligible The proposed landscape screening would substantially reduce visibility of the Project.
R2 278 Beryl Road	Low	Low The western side of the Project would be visible in the middle to background of this view, seen across a flat, open rural field. The Project would be seen in the context of the existing transmission lines which converge in the vicinity of the Project and the existing Beryl Substation.	Low	Negligible The proposed landscape screening would substantially reduce visibility of the Project.
R3 83 Holleys Lane	Low	Low The Project would be visible in the middle to background of this view,	Low	Negligible The proposed landscape screening would

Dwelling # location		Visual sensitivity	Magnitude of change	Visual impact	Visual impact with screening vegetation
			seen within the context of existing transmission lines. Existing vegetation within the garden and on intervening paddocks would partly obstruct the view of the Project.		substantially reduce visibility of the Project.
R4	115 Holleys Lane	Moderate	Negligible Intervening landform (including the dam) and vegetation within the garden and on adjacent paddocks would almost completely obstruct views towards the Project. Any visible glimpses would be located in the middle to background of views and seen in the context of the existing transmission poles and wires, Beryl Substation and solar farm.	Negligible	Negligible The proposed landscape screening would further screen any visible glimpses to the Project
R8	148 Beryl Road	Low	Negligible Intervening trees on Holleys Lane, structures and trees on neighbouring property (5 Holleys Lane) would screen views to the Project. Any glimpses to the Project would be viewed in the background.	Negligible	Negligible The proposed landscape screening would further screen any glimpses to the Project.
R10	126 Beryl Road	Low	Negligible Existing vegetation within the garden of this property and within adjacent paddocks, as well as the existing shed would largely obstruct views towards the Project. If visible, the Project would be glimpsed in the background of views and seen in the context of the existing transmission and solar farm infrastructure.	Negligible	Negligible N/A
R11	58 Holleys Lane	Low	Negligible Undulating landform and existing vegetation within the garden of this property and within adjacent paddocks, would largely obstruct views towards the Project. If visible, the Project would be glimpsed in the background of views and seen in the context of the existing transmission infrastructure.	Negligible	Negligible The proposed landscape screening would further reduce visibility of the Project, mostly screening the Project.

7.5.4.3 Visual impacts from the public domain

The visual impacts associated with the Project at Viewpoint 1 are presented in **Table 7-15**.

The Project would be visible from Beryl Road while vegetation screening is establishing, with visual impact at this location considered low (refer to **Picture 7-2**). However following the maturing of screening vegetation, visual impacts at this location would be negligible (refer to **Picture 7-3**).

Table 7-15. Visual impacts at Viewpoint 1 during operation

View	Visual sensitivity	Magnitude of change	Visual impact	Visual impact with screening vegetation
Viewpoint 1 – View facing east from Beryl Road	Very low	Moderate The Project would be seen in the context of existing transmission structures, a substation and solar farm, and viewed against a backdrop of vegetation along Wialdra Creek, assisting with its absorption into this view.	Low	Negligible The proposed landscape screening would substantially reduce visibility of the Project.



Picture 7-2. Photomontage of the Project at Viewpoint 1



Picture 7-3. Photomontage of the Project at Viewpoint 1 with screening vegetation

7.5.4.4 Visual impacts at night

During operation, there would be some minor security lighting provided within the fenced Project area. This lighting would meet the requirements of AS4282 Control of the obtrusive effects of outdoor lighting and would not noticeably alter the prevailing light levels in the study area.

There would not be any direct light spill on private dwellings due to the large distance between the Project and neighbouring dwellings. There would also be limited potential for additional sky glow and upward projected light with the implementation of cut off light fittings as would be expected for a design complying with the Australian Standards.

Further, the screening vegetation which would be provided around the perimeter of the facility would reduce the visibility of light sources from Beryl Road and surrounding residences. There may be some minor sky glow seen above the Project, however overall, there would be negligible visual impact at night in the long term as the vegetation establishes and matures.

As discussed in **Section 7.5.2.5**, the Project is located within the Dark Sky Region. Further to the above measures to minimise light spill the Project will also adopt the principles contained in the *Dark Sky Planning Guideline, Protecting the observing conditions at Siding Spring* (NSW DPE 2023) where possible.

7.5.5 Potential decommissioning impacts

During decommissioning there would be vehicles and large scale equipment used to dismantle and remove the Project infrastructure. However, at this time, the screening vegetation would be well established, and this activity is unlikely to result in a noticeable visual impact.

7.5.6 Environmental management measures

Proposed measures to manage and/or mitigate impacts to visual amenity from the Project are detailed in **Table 7-16**.

Table 7-16. Landscape and visual environmental management measures

Impact	Reference	Environmental management measure	Timing
Light spill	LV01	All lighting would be designed and operated in accordance with AS4282-2019 Control of the obtrusive effects of outdoor lighting.	Construction, operation
	LV02	This Project will seek to adopt the principles contained in the Dark Sky Planning Guideline, Protecting the observing conditions at Siding Spring (NSW DPE 2023) where possible.	Construction, operation
Visual impact	LV03	Where possible, buildings within the Project to be painted a colour to match the local landscape to reduce their prominence in any views towards the Project.	Detailed design
Vegetation screening	LV04	A landscape management plan will be prepared to guide the installation, establishment and maintenance of the proposed native vegetation and landscape works.	Detailed design, Construction
	LV05	The establishment period activities would be undertaken until the planting achieves an overall average height of 1 to 1.2 metres high.	Construction
	LV06	The installation of landscape works should be undertaken following major construction activity to avoid the potential for soil compaction and direct damage to establishing vegetation. If early planting of screening vegetation is required, the planted areas are to be fenced off to ensure no construction equipment or vehicle access that may damage the planted areas. Access for the landscape contractor to undertake establishment and maintenance activities is to be provided at all times.	Construction

7.6 Noise and vibration

An NVIA (**Appendix I**) was prepared by Jacobs for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.6.1 Assessment methodology

The methodology for the assessment involved:

- Establishing the existing acoustic environment, including the identification of noise and vibration sensitive receivers and carrying out unattended noise monitoring to understand existing background noise and determine the Rating Background Noise Levels (RBLs)
- Detailing the appropriate policy and criteria under which the Project will be assessed against
- Assessing the construction noise impacts in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change (DECC) 2009) (ICNG), specifically:
 - Establishing noise management levels (NML) and sleep disturbance levels to assess construction noise, utilising the measured RBL
 - Developing a noise model with construction noise data, including the locations and extents of construction work activities
 - Evaluating noise impacts based on a comparison of predicted noise levels against NMLs and sleep disturbance levels determined for the Project
- Construction vibration: Identify vibration sensitive structures and receivers within the vicinity of the Project in accordance with Assessing Vibration – a technical guideline (DEC 2006) and associated standards
- Construction road traffic: Identifying the potential traffic noise impacts at the nearest receivers to the Project access roads in accordance with the Road Noise Policy (Department of Environment, Climate Change and Water (DECCW) 2011) (RNP) and assessed using the Transport for NSW Construction and Maintenance Noise Estimator Tool.
- Operational noise in accordance with Noise Policy for Industry (EPA, 2017) (NPI), specifically:
 - Establishing 'Project Noise Trigger Levels' to assess operational noise, utilising the Project Intrusiveness Noise Levels and the Project Amenity Noise Levels
 - Developing noise model with the latest available equipment data for the batteries, inverters and transformer
 - Evaluation of noise impacts based on a comparison of predicted noise levels against noise management levels and criteria determined for the Project
- Provide appropriate mitigation and management measures to address the impacts where reasonable and feasible.

Detailed methodologies are provided in the NVIA (**Appendix H**).

7.6.1.1 Study area

The noise assessment focussed on a study area of two km from the Project.

7.6.1.2 Construction noise criteria

The measured RBLs near the Project receivers were found to be lower than 30 dB(A) during all time periods. In areas where RBLs are low, the NPI nominates minimum RBLs that may be used for noise assessments, and which have been adopted for this assessment (refer to **Table 7-17**).

Table 7-17. Adopted RBLs at Project receivers (based on NPI minimum assumed RBLs)

Time of day	Minimum assumed rating background noise level (dB(A))
Day (7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays)	35
Evening (6pm to 10pm)	30
Night (All remaining periods)	30

Based on the adopted minimum RBLs presented in **Table 7-17**, the NMLs for the Project are presented in **Table 7-18** and **Table 7-19**.

Table 7-18. Construction NMLs for residential receivers

Receiver	NML $L_{eq\ 15min}$ dB(A)			
	Day (during standard hours) 7:00 am – 6:00 pm Weekdays, 8:00 am – 1:00 pm Saturdays	Day (outside of standard hours) 7:00 am – 6:00 pm Outside of Standard Hours	Evening 6:00 pm – 10:00 pm	Night 10:00 pm – 7:00 am
All receivers	45*	40*	35*	35*

* RBLs used in NML derivation adopted from the NSW EPA Noise Policy for Industry minimum assumed RBLs (Table 2.1 of NPI).

Table 7-19. Construction NMLs for non-residential receivers

Non-residential receiver type	NML $L_{Aeq(15min)}$ (applies when properties are occupied and are in use)
Commercial	External Noise Level – 70 dB(A)
Industrial	External Noise Level – 75 dB(A)

7.6.1.3 Annoying' noise characteristics

Equipment that has the potential to produce a tonal noise, an impulsive noise or any other type of noise defined by the ICNG as 'particularly annoying', the noise level for that particular equipment would receive a + 5 dB(A) penalty.

BESS components may have the possibility to produce low frequency noise and tonal noise, both of which may result in a penalty to the overall noise levels.

No low frequency noise impacts were identified as part of this assessment. However, some receivers were predicted to experience a tonal noise impact during the full load charging scenario and full load discharging scenarios. As a result of this analysis, a 5 dB(A) penalty has been applied under these scenarios.

7.6.1.4 Sleep disturbance criteria

For locations where night construction and operation occur, the potential for noise levels to lead to sleep disturbance should be considered. Based on guidance in the ICNG and RNP, **Table 7-20** presents the sleep disturbance screening assessment thresholds for the residential receivers surrounding the Project.

Table 7-20. Sleep disturbance screening assessment thresholds

Receiver	$L_{Aeq, 15min}$	L_{Amax}
All receivers	40*	52*

* RBLs used in sleep disturbance assessment thresholds derivation adopted from the NSW EPA Noise Policy for Industry minimum assumed RBLs (Table 2.1 of NPI).

7.6.1.5 Road noise criteria

Road traffic noise impacts due to the construction of the Project were assessed against the following guidance from the application notes of the RNP:

‘...for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to **2 dB above** that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.

In reference to the day or night assessment criterion above, the assessment refers to the criterion provided in the RNP, shown in **Table 7-21** below.

Vehicle movements during operation would likely be negligible in nature and would not warrant assessment.

Table 7-21. Relevant road noise policy assessment criteria

Road Category	Type of project/land use	Assessment Criteria – dB(A)	
		Day (7am – 10pm)	Night (10pm – 7am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq} , (15 hour) 60 dB(A)	L _{Aeq} , (9 hour) 55 dB(A)
Local Roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	L _{Aeq} , (1 hour) 55 dB(A)	L _{Aeq} , (1 hour) 50 dB(A)

7.6.1.6 Operational noise criteria

The operational noise assessment performed in accordance with the NPI, which seeks to regulate noise impact from ‘industrial activity’ pertaining to noise from fixed industry and mechanical plant (including renewable energy development such as a BESS). To achieve this, the NPI applies two separate assessment noise levels:

- Project intrusiveness noise level (PINL): Assessment noise levels aimed at limiting the intrusiveness of the Project’s noise against the prevailing background noise, and
- Project amenity noise level (PANL): Assessment noise levels aimed at achieving suitable acoustic amenity for the surrounding land uses from industry.

The more stringent of these is used to define the operational project noise trigger levels (PNTLs) for a Project.

The PINL, PANL and the PNTL for the Project is presented in **Table 7-22**.

Table 7-22 PINL, PANL and PNTL

Receiver	Time of Day	PINL L _{eq} 15 minute dB(A)	PANL L _{eq} 15-minute dB(A)	PNTL L _{Aeq} , 15 minute dB(A)
All receivers	Day (7:00 am to 6:00 pm)	40	48	40
	Evening (6:00 pm to 10:00 pm)	35	43	35
	Night (10:00 pm to 7:00 am)	35	38	35

7.6.1.7 Construction vibration

Based on the construction noise inventory in **Section 3.5.5**, three pieces of equipment with the potential to produce vibration impacts have been identified. The safe working distances for this equipment is provided in **Table 7-23**.

Table 7-23. Vibration intensive equipment inventory

Equipment	Construction activity	Human comfort setback distance (m)	Cosmetic damage setback distance (m)
Vibratory roller (large)	Earthworks (all locations)	100	25
Air track drill	Connection works (Substation & Switchyard)	50	15
Horizontal drilling equipment	132 kV cable alignment – Under Beryl Road	4	2

7.6.2 Existing environment

7.6.2.1 Sensitive receivers

The nearest associated receiver to the Project is the Associated Landowner located 370 m to the east. The nearest Non-Associated receiver, R-01, approximately 420 m to the west of the Project.

Within the noise study area there are 28 Non-Associated residential receivers shown in **Figure 7-5**.

The study area also includes non-residential receivers that are not defined as noise-sensitive land uses. These include one commercial premises which is a panel beaters business located to the north-east, as well as the existing Beryl Substation and Beryl Solar Farm which are both located directly south of the Project.

7.6.2.2 Background noise

Background noise monitoring was performed over a two-week period in May and June 2023 at two monitoring locations shown in **Figure 7-5**. The background noise data is presented in **Table 7-24**.

The measured RBLs at both monitoring locations fall below the minimum assumed RBLs outlined in the NPI. As such, rather than adopting these exceedingly low background levels to derive the construction and operational noise targets, the 'minimum assumed RBLs' as presented in Table 2.1 of the NPI were adopted instead (refer to **Table 7-17**).

Table 7-24. Background noise levels based on monitoring

Monitor ID	Monitoring Location	Monitoring Duration	Measurement	Measured Noise Level – dB(A)		
				Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
NM1	5 Holleys Lane, Gulgong	24 th May – 7 th June 2023	L _{Aeq} (equivalent noise level)	45	38	35
			Rating Background Level (Background L _{A90})	28 ¹	26 ¹	24 ¹
NM2	5 Holleys Lane, Gulgong		L _{Aeq} (equivalent noise level)	47	43	42
			Rating Background Level (Background L _{A90})	27 ¹	28 ¹	28 ¹

Note – Minimum assumed RBLs adopted as per **Table 7-17**.

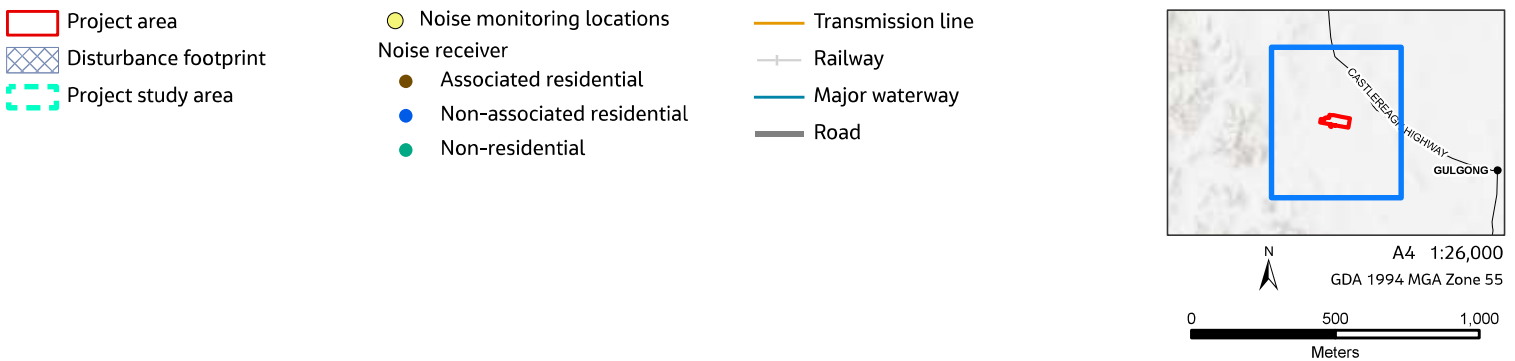
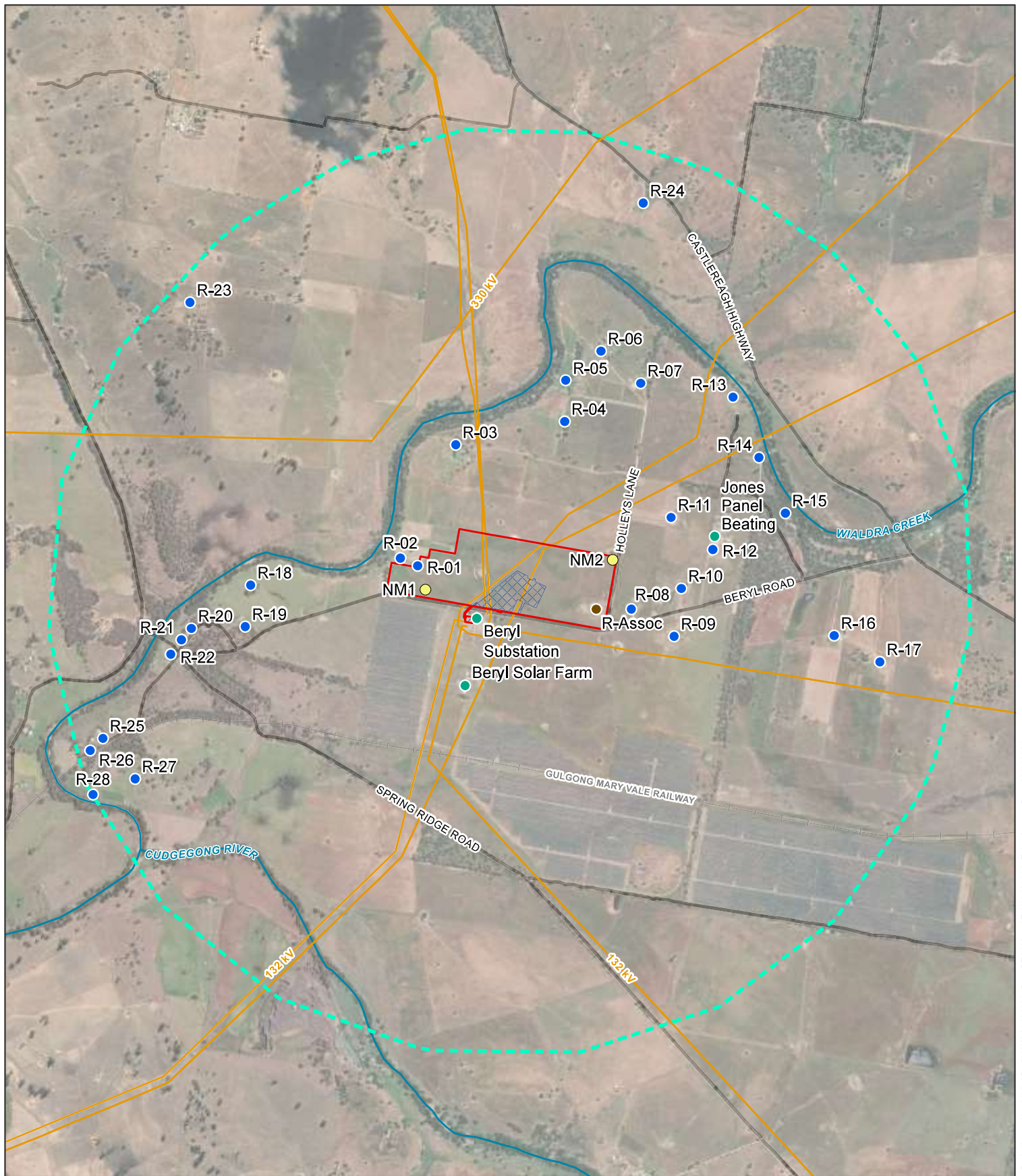


Figure 7-5 Sensitive noise receivers and monitoring locations

7.6.2.3 Vibration receivers

No vibration sensitive receivers are located within 1 km of the Project, including heritage items.

7.6.3 Potential construction impacts

7.6.3.1 Construction noise

Estimated noise levels at the nearest receivers were predicted from the anticipated noise levels generated during each month of the Project as per the indicative program in **Section 3.5.4**. Estimated noise levels were then compared with the NMLs (refer to **Table 7-18** and **Table 7-19**) to understand which receivers might be the most affected during each construction phase (refer to **Table 3-4**).

The assessment approach adopted considered a “worst-case” scenario which assumed all plant and equipment for each activity was operated closest to the respective receiver within their respective work location. It is anticipated that actual construction noise levels would be lower than predicted in this assessment.

Key outcomes of the construction noise impact assessment include:

- The construction months predicted to result in the highest noise levels at sensitive receivers are months three to five. During these months, three major construction stages would be taking place. During this time noise impacts could be up to 20 dB(A) above the Standard Hours NML, and 30 dB(A) above the Out of Hours Night NML, if these works were carried out at night at a number of receivers. The majority of works would be carried out during standard hours.
- During the majority of stages, all but the furthest receivers would experience noise at least a couple of dB(A) greater than the Standard Hours NMLs. The exceptions to this are months nine to eleven, where noise at all receivers would remain under the Standard Hours NMLs. During month 12, all Non-associated receivers with the exception of R-01 and R-02 would experience noise lower than the Standard Hours NMLs.
- No receivers have been predicted to be ‘Highly Noise Affected’ i.e. experience noise levels greater than 75 dB(A)
- Noise at Jones’ Panel Beating and Beryl Solar Farm buildings would remain below the relevant NMLs during all construction months. While the Beryl Substation buildings would experience noise up to 28 dB(A) over the industrial NML between months 1 to 8.

It is noted that a number of dwellings exist outside of the Project study area which may still be affected by construction noise from the Project. Noise contour maps are provided in **Appendix H**.

7.6.3.2 Sleep disturbance

While the majority of construction work is expected to take place during standard hours, there is the potential for some work to be carried out at night as described in **Section 3.5.2**. When construction is carrying out at night, residential receivers have been predicted to have the potential to experience sleep disturbance as summarised below:

- Construction months three to five produced the greatest amount of noise over the sleep disturbance screening levels. At the most affected receiver (R-01) construction noise may be up to 25 dB(A) greater than the $L_{Aeq\ 15min}$ sleep disturbance screening levels, while the instantaneous L_{Amax} noise level may be up to 16 dB(A) greater than the L_{Amax} sleep disturbance screening level.
- For L_{Aeq} sleep disturbance, similarly to the impacts against the NMLs, within work months one to eight, all receivers in the study area would experience noise greater than the $L_{Aeq\ 15\ min}$ sleep disturbance screening level.
- During months nine to eleven, only R-01 would experience noise above the $L_{Aeq\ 15\ min}$ sleep disturbance screening level (by 1 dB(A))
- During month twelve, noise at receivers above the L_{Aeq} sleep disturbance screening level would only occur at the receivers less than 1.5 km from the Project

- Unlike the $L_{Aeq\ 15\ min}$ sleep disturbance, noise greater than the L_{AMax} sleep disturbance screening level at receivers was less widespread. During months four to five, up to 22 receivers were impacted by noise greater than the L_{AMax} sleep disturbance screening level. This reduced to 16 – 17 receivers in months three and six, 10 – 13 receivers in months one, two, seven and eight, and finally no receivers being impacted by noise greater than the L_{AMax} sleep disturbance screening level in months nine to twelve.

As described above, a number of dwellings exist outside of the Project study area which may still be affected by construction noise from the Project. Noise contour maps are provided in **Appendix H**.

7.6.3.3 Construction vibration

No vibration impacts at nearest receivers have been predicted as a result of the construction of the Project. Due to the nature of the works being undertaken at Beryl Substation, some of the substation infrastructure may fall within the setback distances for these pieces of equipment and care would need to be taken around these structures.

7.6.3.4 Construction traffic noise

Noise from construction traffic was predicted to remain below the relevant RNP noise traffic noise level along Castlereagh Highway and Beryl Road during the day and night periods.

7.6.4 Potential operational impacts

7.6.4.1 Operational scenarios

Four operational scenarios have been investigated for the noise assessment, including:

- Full load charging
- Half load charging
- Full load discharging
- Half load discharging.

The noise assessment considers the worst-case BESS noise impacts, however in practice, BESS' generally charge during the Day when prices are lower and discharge during the Evening when prices are higher for only a short duration and lower temperatures than the 'worst case noise enhancing meteorological conditions' that are being conservatively used. This is also backed up by 7-day average information from the NEM (refer to **Figure 7-6**).



Figure 7-6. Time of day operations for BESS' in NSW (7 day average, 26 April 2024)

Light blue = charging, Dark blue = discharging. Source: Open NEM (2024)

7.6.4.2 Tonal noise

Based on the results of the tonality test, R-01, R-02 and R-08 have been predicted to experience a tone greater than the level applicable in the NPI under the full load charging scenario. Under the full load discharging scenario only R-01 has been predicted to experience a tone greater than the level applicable in the NPI. As such, the receivers under the relevant scenarios will receive a 5 dB(A) penalty.

7.6.4.3 Operational noise

Predicted noise levels at all receivers have been assessed against the PNTL (same as PINL) and PANL for the four separate operational scenarios. Receivers where operational noise levels have been predicted to be greater than the PNTL or PANL in at least one scenario are shown in **Table 7-26**, and summarised below:

■ PNTL

- The greatest level of noise over the PNTLs under the full load charging scenario was at R-08, which was both the most affected receiver and also a recipient of the tonal penalty. Noise at this receiver may be up to 10 dB(A) greater than the evening and night PNTLs. R-01 is the next most affected receiver, which also had a tonal penalty and hence was predicted to experience noise up to 8 dB(A) above the evening and night PNTLs. Noise at R-02, the other receiver to experience the tonal penalty, would experience noise up to 6 dB(A) over the PNTL. R-03, the only receiver to experience noise over the PNTLs but not experience a tonal penalty, would experience noise 2 dB(A) over the PNTLs
- Noise from the Project under the full load discharging scenario would be greatest at R-01 specifically as a result of the tonal penalty. Noise at this receiver may be up to 8 dB(A) greater than the evening and night PNTLs. R-08 is the next most affected receiver, with noise up to 5 dB(A) above the evening and night PNTLs. Noise at R-02 and R-03 all are greater than the evening and night PNTLs by 1 dB(A)
- Noise from the Project under the half load scenarios was lower than the full load scenarios, with only R-08 experiencing noise over the evening and night PNTLs, with levels being 3 dB(A) above the PNTLs in both the half-load charging and discharging scenarios.

■ PANL

- Noise from the Project under the Full Load operational scenario would comply with the PANL at all receivers during the Day periods, including at the receivers where the received noise would likely include a penalty of +5dB(A) for tonal acoustic characteristics.
- During the Evening period, one receiver during the full load charging scenario (R-08) may experience levels up to 2 dB(A) greater than the PANL due to the tonal penalty.
- During the Night period, under full load charging scenario, R-01, R-02 and R-08, may experience noise levels up to 7 dB(A) greater than the PANLs due to the tonal penalty. Under the full load discharging scenario, at R-01 and R-08, noise levels may be up to 5dB(A) greater than the PANL.
- Under the half load charging and discharging operational scenarios, noise from the Project is predicted to comply with the PANL at all receivers, during all time periods.

As shown in **Table 7-25** and **Figure 7-7**, noise impacts from the Project can be effectively controlled and compliance with the PANLs can be achieved at all receivers during all time periods under worst-case noise enhancing meteorological conditions, if the BESS operated at half-load charging during the Evening and Night time periods and half-load discharging during the Night time period. The Project achieves the PANLs during the day under all scenarios.

As described above, the Project would generally charge during the Day when prices are lower and discharge during the Evening when prices are higher for only a short duration and lower temperatures than the 'worst case noise enhancing meteorological conditions' that are being conservatively used.

As the Project approaches detailed design, the selection of components and further options for noise mitigation for all Project noise sources will be re-explored to determine if the plant noise can be reduced to allow full load operation during all times of day while producing noise which achieves the PANLs at all nearby receivers.

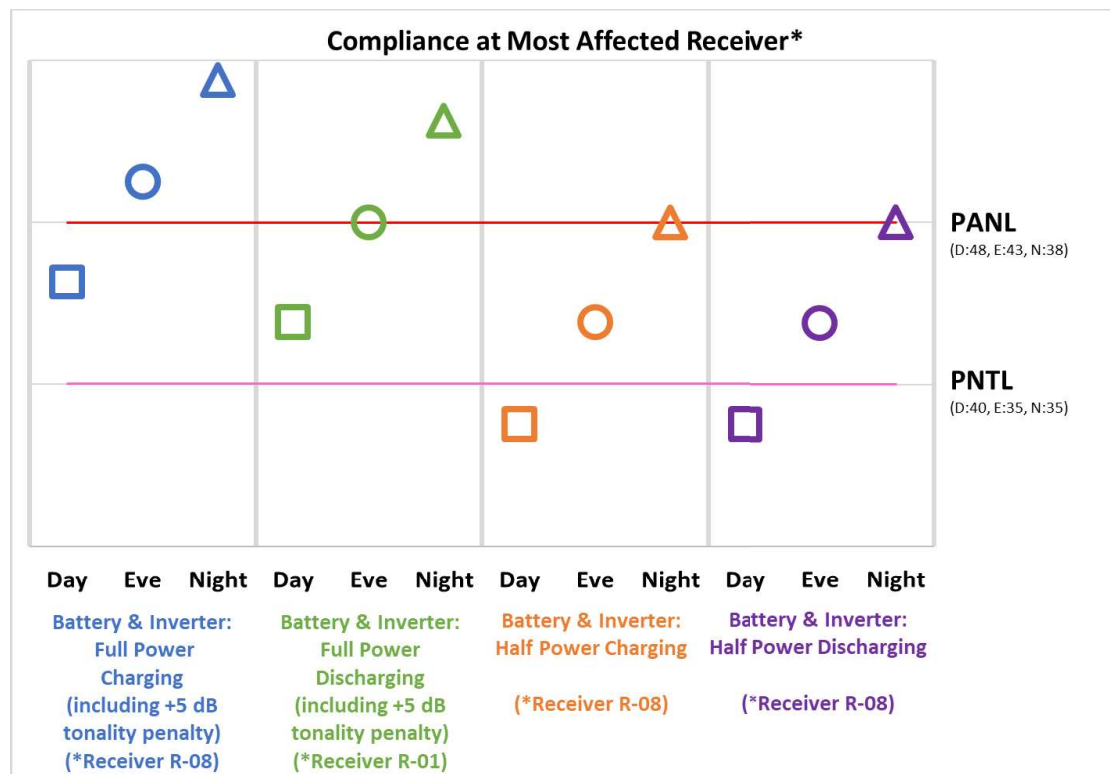


Figure 7-7. Compliance of operational scenarios with noise objectives

Table 7-25 Comparison of operational scenarios to noise objectives

Noise objective	Operational scenario	Time period		
		Day	Evening	Night
Project noise trigger levels	Full load charging	Noise levels do not achieve PNTLs	Noise levels do not achieve PNTLs	Noise levels do not achieve PNTLs
	Full load discharging	Noise levels do not achieve PNTLs	Noise levels do not achieve PNTLs	Noise levels do not achieve PNTLs
	Half load charging	Noise levels achieve PNTLs	Noise levels do not achieve PNTLs	Noise levels do not achieve PNTLs
	Half load discharging	Noise levels achieve PNTLs	Noise levels do not achieve PNTLs	Noise levels do not achieve PNTLs
Project amenity noise levels	Full load charging	Noise levels achieve PANLs	Noise levels do not achieve PANLs	Noise levels do not achieve PANLs
	Full load discharging	Noise levels achieve PANLs	Noise levels achieve PANLs	Noise levels do not achieve PANLs
	Half load charging	Noise levels achieve PANLs	Noise levels achieve PANLs	Noise levels achieve PANLs
	Half load discharging	Noise levels achieve PANLs	Noise levels achieve PANLs	Noise levels achieve PANLs

Table 7-26 Predicted operational noise levels at most affected receivers against PNTL and PANL

Operational Scenario	Receiver	Predicted noise level L _{Aeq,15min} dB(A)	PNTL L _{Aeq,15min} dB(A)			Noise above PNTL L _{Aeq,15min} dB(A)			PANL L _{Aeq,15min} dB(A)			Noise above PANL L _{Aeq,15min} dB(A)		
			Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
Full load charging	R-01	43 ¹	40	35	35	3	8	8	48	43	38	-	-	5
	R-02	41 ¹				1	6	6				-	-	3
	R-03	37				-	2	2				-	-	-
	R-08	45 ¹				5	10	10				-	2	7
Full load discharging	R-01	43 ¹				3	8	8				-	-	5
	R-02	36				-	1	1				-	-	-
	R-03	36				-	1	1				-	-	-
	R-08	40				-	5	5				-	-	2
Half load charging	R-01	35				-	-	-				-	-	-
	R-02	33				-	-	-				-	-	-
	R-03	34				-	-	-				-	-	-
	R-08	38				-	3	3				-	-	-
Half load discharging	R-01	35				-	-	-				-	-	-
	R-02	33				-	-	-				-	-	-
	R-03	34				-	-	-				-	-	-
	R-08	38				-	3	3				-	-	-

Note ¹ – 5 dB(A) tonal penalty applied

7.6.4.4 Sleep disturbance

Noise levels at R-01, R-02 and R-08 would be 1 to 5 dB(A) greater than the sleep disturbance screening level ($L_{Aeq,15min}$) under the full load scenario, once again as a result of the tonal penalty. Noise levels at all other scenarios have been predicted to be below the screen disturbance screening level.

7.6.4.5 Impacts at non-residential receivers

Noise levels remain well below the relevant project amenity noise level for non-residential receivers under all operational scenarios.

7.6.4.6 Consideration of noise barriers

The Project design includes silencers applied to the inverters to attenuate noise impacts. Further mitigation to address noise impacts, such as the usage of noise barrier was also explored.

Jacobs' own experience with the use of barriers to mitigate noise from BESS projects has found that while the barriers work well for mitigating noise from sources close by to the barrier, noise sources located to the centre of the BESS do not obtain a similar degree of mitigation from the barrier. This means that while barriers may provide some noise reduction benefit, the barrier may need to be extremely tall in order to achieve cost-effective noise mitigation.

Noise barriers were investigated for this noise assessment and it was found that for this Project, noise barriers are not a reasonable mitigation measure for providing sufficient noise mitigation required for noise compliance. This is primarily due to the terrain and topography preventing a noise barrier from providing adequate noise mitigation to the receivers to the east, as the relative elevations of the noise sources and noise receivers would not enable a reasonably tall noise barrier to obstruct the line of sight.

Due to the limited noise mitigation outcomes and the potential non-noise impacts associated with the noise barriers, the adoption of such barriers to address noise impacts for this Project has been deemed neither reasonable nor feasible.

7.6.5 Potential decommissioning impacts

The activities and equipment adopted for the assessment of construction noise are an appropriate representation of the noise-producing activities during decommissioning, though the decommissioning will be undertaken under a shorter timeframe and hence noise and vibration impacts will be less temporally intensive. As such, the construction noise impacts displayed in **Section 7.6.2.3** are an appropriate representation of decommissioning noise.

7.6.6 Environmental management measures

Proposed measures to manage and/or mitigate noise and vibration impacts from the Project are detailed in **Table 7-27**.

Table 7-27. Noise and vibration environmental management measures

Impact	Reference	Environmental management measures	Timing
Construction and decommissioning noise	NV1	Where reasonable and feasible, standard noise mitigation measures will be adopted, including: - Wherever possible and safe, limit work to standard hours of construction - Select low-noise plant and equipment - Ensure equipment mufflers operate in a proper and efficient manner - Where possible, use quieter and less vibration emitting construction methods	Construction, decommissioning

Impact	Reference	Environmental management measures	Timing
		- Only have necessary equipment on-site and turn off when not in use - Where possible, concentrate noisy activities at one location and move to another as quickly as possible - Vehicle movements, including deliveries outside standard hours, would be minimised and avoided where possible - All plant and equipment is to be well maintained and, where possible, fitted with silencing devices - Use only the necessary size and powered equipment for tasks - Implement training to induct staff on noise sensitivities - Where possible, consider the application of less intrusive alternatives to reverse beepers such as 'squawker' or 'broadband' alarms - Consider the installation of temporary construction noise barriers or earth mounds for concentrated, noise-intensive activities - Where practicable, install enclosures around noisy mobile and stationary equipment as necessary - Where possible, avoid simultaneous operation of two or more noisy plant close to receivers - The offset distance between noisy plant and sensitive receivers would be maximised - Plan traffic flow, parking and loading/unloading areas to minimise reversing movements - Complete routine monitoring to evaluate construction noise levels and evaluate whether the mitigation measures in place are adequate or require revision	
Operational noise	NV2	As the Project progresses to detailed design, the noise impacts of the Project will be re-explored to investigate further options to reduce noise levels at the nearest noise-sensitive receivers with the aim of complying with the PANLs (if possible) during full charge/ discharge scenarios under all times of day.	Detailed Design
Cumulative construction noise	NV3	Discuss works schedules and timings with the proponents of other developments to gain an understanding of when noisy work will take place surrounding the Project area. Should respectively Project schedules and work priorities change, proponents should commit to regular meetings to ensure all proponents are aware of the changes.	Prior to construction, construction
	NV4	Where possible, schedule works to occur at different times of the day to prevent multiple noisy activities from various developments taking place at the same time.	Prior to construction, construction

7.7 Traffic and transport

A TTIA (**Appendix J**) was prepared by Jacobs for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.7.1 Assessment methodology

The methodology for the assessment involved:

- Establishing a study area for the assessment
- Describing the existing road network, including road function, traffic volumes and patterns and Transport for NSW approved heavy vehicle routes
- Analysing the most recent 5-year period of crash data from Transport for NSW to identify high-level trends and crash clusters that may affect Project activities and access routes
- Quantifying hourly traffic generation and route distribution (split by vehicle class) of the Project
- Describing the Project construction and operation access requirements including movements utilising the existing road network
- Assess the mid-block capacity and a turn warrant to determine the performance of the road network with and without vehicles associated with Project construction, operation and decommissioning
- Identify any temporary road closures, diversions and / or traffic restrictions and delays resulting from Project activities
- Describing the OSOM vehicle requirements, including haulage routes and site access arrangements, and assess the impacts of OSOM vehicles on the safety and function of the surrounding road network
- Assess the impacts of the Project on road safety, pedestrian and cyclists, public transport and school bus routes
- Propose measures to mitigate and / or manage any identified adverse impacts resulting from the Project on the existing traffic and transport network

For the purpose of this assessment, a single 'trip' is defined as consisting of two one-way movements. A 'movement' is defined as a single, one-way, vehicle pass-through.

7.7.1.1 Study area

The study area for this assessment consists of the existing transport network servicing the Project, including the roads which form part of the proposed access routes for construction and operational vehicles.

7.7.1.2 Traffic volumes

To understand traffic patterns on Beryl Road and Castlereagh Highway, the following data sources were used:

- Daily traffic volumes (2021) on Castlereagh Highway were sourced from the Bellambi Height BESS EIS (EMM, 2023)
- A traffic survey was undertaken as part of this traffic impact assessment from the 9th to 16th of November 2023. Counts were undertaken on Beryl Road (west of Holleys Lane) and Castlereagh Highway (north of Beryl Road).

7.7.1.3 Mid-block road capacity

A mid-block road capacity assessment has been conducted to assess the impact of Project construction traffic on the capacity and performance of Castlereagh Highway and Beryl Road. The mid-block road capacity assessment was undertaken for the following two scenarios:

- 2025 'Without Project' – general background traffic only, without vehicles associated with construction of the Project

- 2025 'With Project' – general background traffic combined with peak hourly construction vehicles expected for the Project.

Based on the growth trend between 2021 and 2023, which showed minimal to no growth in traffic volumes on Beryl Road and Castlereagh Highway, no growth factor was applied to 2023 traffic volumes for the 2025 scenarios.

The road capacity assessment has been undertaken for the morning (AM) and afternoon (PM) traffic peak hours on Castlereagh Highway (north of Beryl Road) and Beryl Road (east of Project access). It should be noted that although the traffic peak hours are outside of the Project construction peak hours, this assessment assumes a conservative worst-case scenario where both peak hour traffic volumes (network and Project) would overlap.

7.7.1.4 Vehicle and workforce distribution

The following assumptions have been made for the purposes of the assessment:

- Based on local township locations and the NSW approved heavy vehicle network, it is assumed that all construction vehicles (light and heavy) would arrive to the Project area from Castlereagh Highway (north or south)
- Origins of construction workers have been estimated based on local township population (e.g. Gulgong, Dubbo, Mudgee, etc), distance from the Project area and distribution of existing traffic on Castlereagh Highway (based on surveyed data). Based on this approach, it is assumed that about 50% of workers would access the Project area from the north via Golden Highway and Castlereagh Highway onto Beryl Road, and 50% from the south using Castlereagh Highway then left onto Beryl Road
- It has conservatively been assumed that all peak hour heavy vehicles would arrive and leave during the peak hour resulting in 10 peak hour trips used for the traffic impact assessment.

7.7.1.5 OSOM preliminary assessment

The following assumptions were considered for the preliminary OSOM route assessment:

- While the final design of the BESS components is yet to be confirmed, this preliminary assessment has assumed a design vehicle of 19 m semi-trailer with maximum transport vehicle height of 5.3 m, for delivery of the transformer
- It is acknowledged, however, that the specialised vehicle used to transport BESS materials would be dependent on the final design and the delivery contractor.

7.7.2 Existing environment

7.7.2.1 Road network

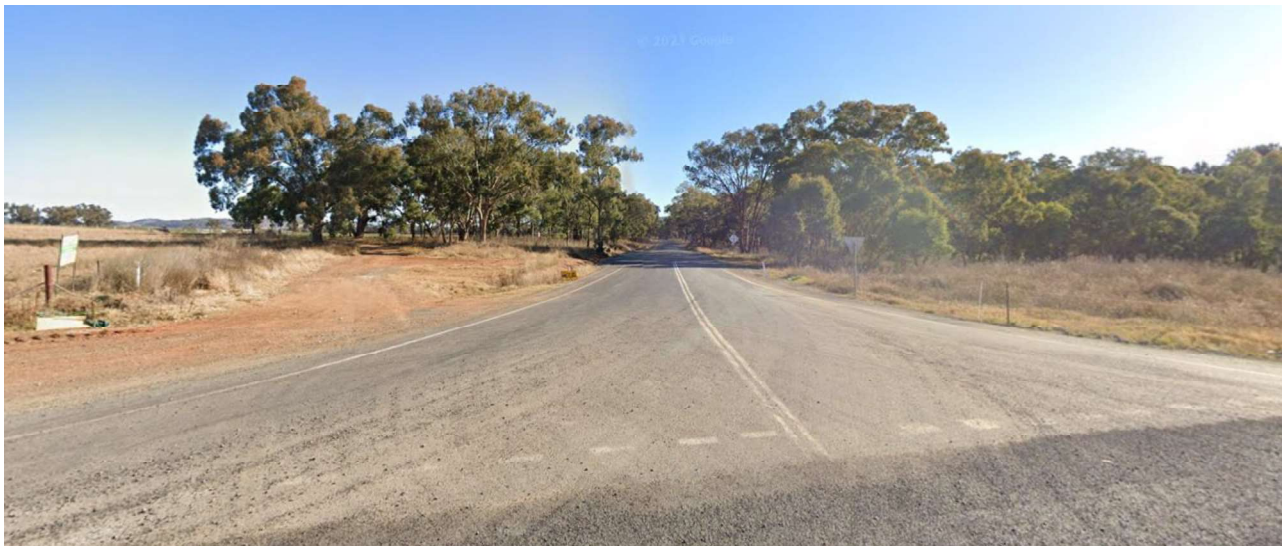
The key roads considered within this assessment and their characteristics are listed in **Table 7-28** and shown in **Figure 1-2**. A description of each key road is provided in the sections below.

Table 7-28. Key roads and characteristics

Road	Lanes	Posted Speed (km/h)	Classification	Surface Condition	Controlling Authority
Castlereagh Highway	2 (One lane in each direction)	100	State	Sealed	TNSW
Beryl Road	2 (One lane in each direction)	80	Local	Sealed	MWRC

Beryl Road

Beryl Road is a 3.9 km sealed local road which extends in the west-east direction between Spring Ridge Road and Castlereagh Highway. Beryl Road has a typical speed limit of 80 km/hr and is bordered mostly by farmland and rural surroundings. Beryl Road supports one-lane, two-way traffic with sealed shoulders and marked centre and edge line markings, as shown in **Picture 7-4**. Direct access point to the Project area is proposed to be on Beryl Road.



Picture 7-4. Beryl Road access from Castlereagh Highway (facing west)

(Source: Google Street View, November 2023)

Castlereagh Highway

Castlereagh Highway is a State Road which extends in the north-south direction between Golden Highway and Great Western Highway near Lithgow. Castlereagh Highway has a typical speed limit of 100 km/hr and is encompassed mostly by farmland and rural surroundings. It supports one-lane, two-way traffic with sealed shoulders and marked centre and edge line markings. Castlereagh Highway is about 2.2 km east of the Project area and provides access via the Beryl Road connection, as shown in **Picture 7-5**.



Picture 7-5. Castlereagh Highway at Beryl Road intersection (facing south)

(Source: Google Street View, November 2023)

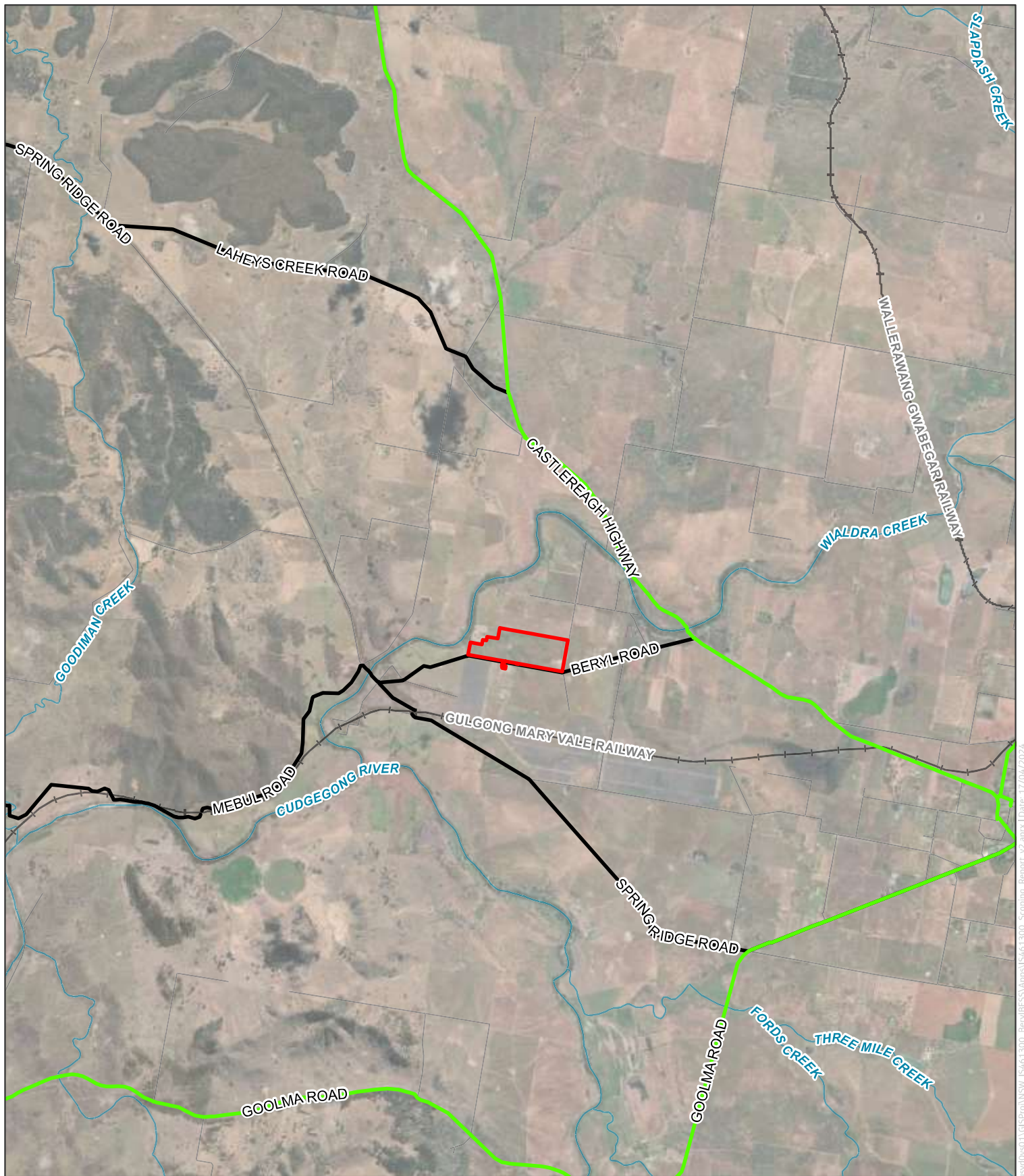
7.7.2.2 Heavy vehicle haulage routes

Heavy vehicle haulage to the Project area would be road-based only and via Castlereagh Highway and Beryl Road. Near the Project, Castlereagh Highway and Beryl Road are approved heavy vehicles access routes. Castlereagh Highway permits 23 m B-double routes, and Beryl Road is an approved heavy vehicle route with travel conditions. A permit would be required to be sought from the National Heavy Vehicle Regulator (NHVR) in consultation with MWRC to allow heavy vehicle access on Beryl Road near the Project area. Roads forming the approved heavy vehicle route, and proposed heavy vehicle route for the Project, are shown in **Figure 7-8**.

7.7.2.3 OSOM haulage routes

Castlereagh Highway is part of the NSW OSOM load carrying vehicles network (which permits eligible vehicles operating under the Multi-State Class 1 Load Carrying Vehicles Mass Exemption Notice and the Multi-State Class 1 Load Carrying Vehicles Dimension Exemption Notice). Permits would be required to be sought from NHVR in consultation with MWRC to allow OSOM vehicle access on Beryl Road. Roads forming part of the NSW OSOM load carrying network near the Project are shown in **Figure 7-9**.

Full OSOM haulage routes are detailed in **Section 7.7.3.3**.



LEGEND

Project area

— Approved B-double routes
— Approved routes with travel conditions

— Railway
— Roads
— Waterway

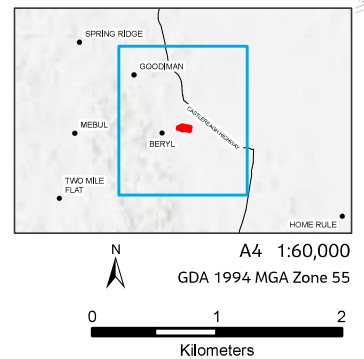


Figure 7-8 Proposed heavy vehicle routes



LEGEND

Project area

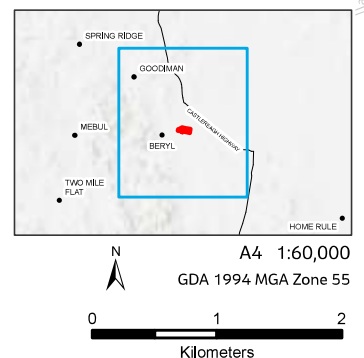
Approved OSOM route

+

 Railway

Roads

Waterway



Data Sources: NSW Department of Planning and Environment (2023); Transport for NSW (2023); Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2008); JACOBS (2023); Australian Bureau of Statistics (2021)

Figure 7-9 Transport for NSW approved OSOM load carrying vehicle routes near the Project

7.7.2.4 Traffic volumes and patterns

The average number of daily vehicles are presented in **Table 7-29**. The traffic survey data indicates the following:

- The directional daily traffic flow split for both Beryl Road and Castlereagh Highway is fairly even in both directions
- Daily traffic volumes on Beryl Road are quite low with approximately 80 vehicles on average per day in each direction
- Traffic volumes on Castlereagh Highway have remained consistent from 2021 to 2023 with around 700 vehicles on average daily in each direction
- A high portion of heavy vehicles on Beryl Road and Castlereagh Highway during the traffic survey period.

Table 7-29. Daily traffic volume

Location	Direction	2021 (EMM, 2021)		2023 (Jacobs, 2023)	
		Daily Traffic Volume	% Heavy Vehicles	Daily Traffic Volume	% Heavy Vehicles
Beryl Road, West of Holley's Lane	Eastbound	-	-	84	17%
Beryl Road, West of Holley's Lane	Westbound	-	-	80	18%
Castlereagh Highway, North of Beryl Road	Northbound	683	16%	696	14%
Castlereagh Highway, North of Beryl Road	Southbound	715	16%	708	14%

7.7.2.5 Existing road capacity and performance

A mid-block capacity assessment was undertaken to assess the existing capacity and performance of key roads in the study area. The results are presented in **Table 7-30** for the key assessed roads. The results of the mid-block capacity assessment indicate that Beryl Road and Castlereagh Highway currently operate satisfactorily at a Level of Service (LoS) A in both the AM and PM peak periods. These results indicate that the network is currently operating well within its capacity, which is primarily due to their relatively low traffic volumes.

Table 7-30. Midblock performance (bi-directional) in 2023 AM and PM peak periods

Road	Direction	Capacity (veh/hr)	AM peak			PM peak		
			Volume (veh/h)	V/C ratio	LoS	Volume (veh/h)	V/C ratio	LoS
Beryl Road	Eastbound	900	10	0.01	A	9	0.01	A
	Westbound	900	8	0.01	A	7	0.01	A
Castlereagh Highway	Northbound	1478	56	0.04	A	61	0.04	A
	Southbound	1478	68	0.05	A	54	0.04	A

Note: There are six levels of service – LoS A to C are good to satisfactory, D is nearing capacity, E is at capacity and F is unsatisfactory. Observed traffic peak hours for Beryl Road is 8:00 am to 9:00 and 4:00 pm to 5:00 pm. Observed peak hours for Castlereagh Highway is 10:00 am to 11:00 am and 4:00 pm to 5:00 pm

7.7.2.6 Road safety

A review of crash data in the five-year period from January 2017 to December 2021 near the Project area identified the following:

- A total of 12 crashes (with an average of two crashes per year) were observed on sections of Castlereagh Highway which are likely to interact with Project traffic (refer to **Figure 7-10**). Crashes ranged from minor injury to fatal incidents
- There was one crash noted at the intersection of Beryl Road and Castlereagh Highway reported in 2021 and ranked as a moderate injury
- Majority of the crashes in the area were noted to be off-road, vehicle-object collisions, occurring in daylight and resulting in injury to the driver.

At the time of writing, safety upgrades including rumble strip installation along more than 189 km of the Castlereagh Highway between Dunedoo and Lithgow (including through Beryl and Gulgong) were undertaken and completed (January 2024) by the NSW government (Saving Lives Accelerated Program). Some line marking as part of this upgrade is yet to be completed and expected to be completed by February 2024. These upgrades aim to improve safety and reduce the risk of head-on and run-off road crashes on Castlereagh Road including near the Project area.

The crash data comprised self-reported crashes in the five-year period from January 2017 to December 2021 for Gulgong including Beryl Road and Castlereagh Highway as shown in **Figure 7-10**.

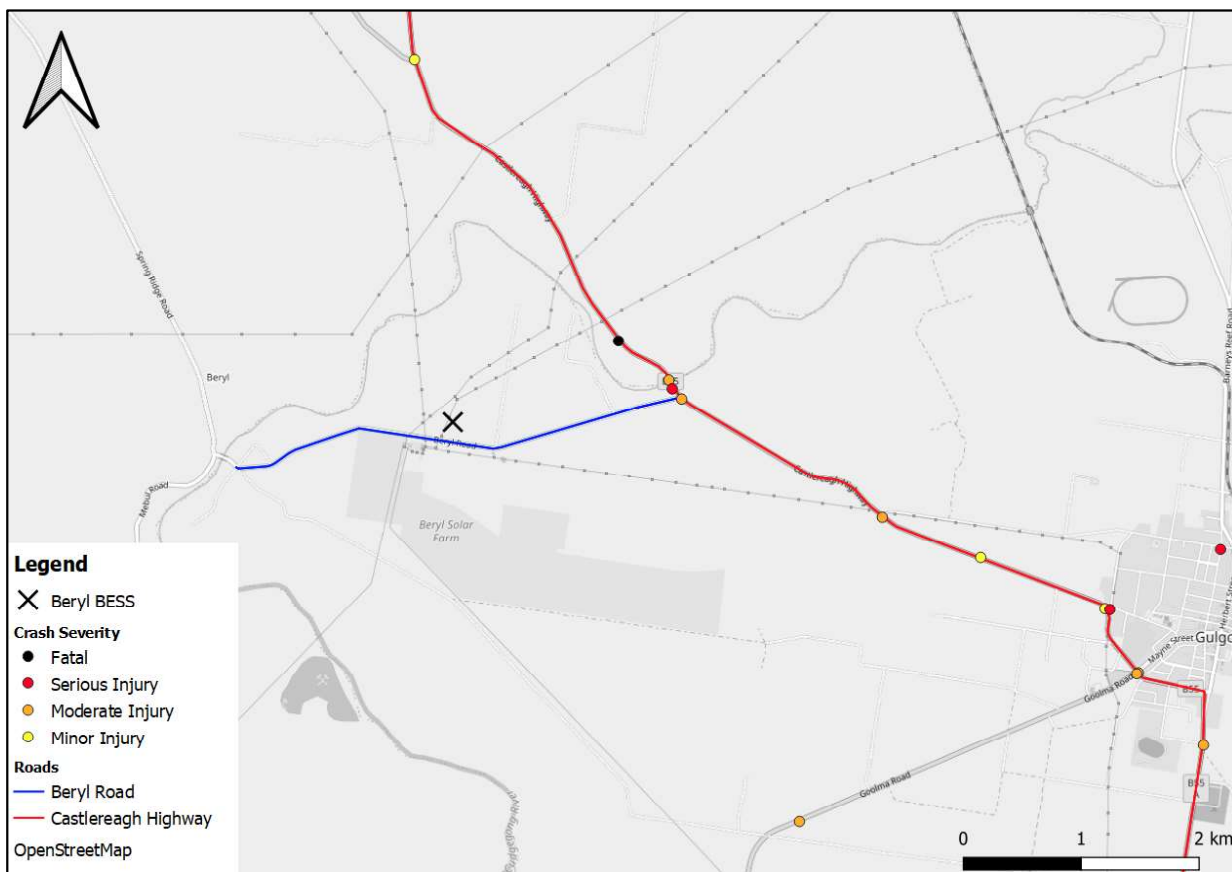


Figure 7-10. Crash data map near the Project area (2017-2021)

7.7.2.7 Public and active transport network

Parking

There are no formal on-road car parking spaces on Beryl Road near the Project area.

Bus services

School bus routes in the area typically operate to and from Gulgong utilising Spring Ridge Road, Laheys Creek Road (south) and Castlereagh Highway. A school bus service, MP07, operates along Castlereagh Highway between Gulgong and Mudgee, with a bus stop located on the corner of Fisher Street and Grevillea Street in Gulgong (about 7 km south-east of the Project area).

An informal stop may be located on the corner of Beryl Road and Castlereagh Highway. The bus route is expected to approximately operate between 7:30 AM to 8:30 AM in the morning and 3:00 PM and 4:30 PM in the afternoon.

The nearest coach stop is approximately 7 km from the Project area at Gulgong Coach Stop, Herbert Street.

Rail

There are currently no train services operating in the vicinity of the Project area. The Gulgong Railway Station located in the township of Gulgong is no longer operational as a passenger service.

Active transport network

There are no formal pedestrian or cycling facilities provided on Beryl Road or Castlereagh Highway near the Project area. Roads are generally surrounded by rural farmland and do not contain designated active transport paths or connections.

7.7.3 Potential construction impacts

The main traffic generating activities associated with Project construction includes staff travel of and the haulage of construction plant, equipment and materials to the Project area.

Traffic generated by the construction workforce is assumed to consist of a mix of light vehicles and heavy vehicles. The following average and peak traffic generation that is anticipated is provided in **Table 7-32**. A total of two OSOM vehicle movements would occur during the construction of the Project.

Table 7-31. Anticipated vehicle movements

Construction activity	Average		Peak hours^ in AM and PM	
	Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
Enabling	2	2	1	1
Construction	40 (during peak construction), 15 at other times	10 (during peak construction), 5 at other times	15	5
Testing and commissioning	25 during peak commissioning	10	15	5
Demobilisation	5	4	2	2
OSOM	2 total			

^ Morning peak = 6:00 AM to 7:00 AM, Evening Peak = 6:00 PM to 7:00 PM.

7.7.3.1 Impacts on road capacity and performance

Road capacity

Table 7-32 summarises the results of the road capacity assessment during Project construction, including Passenger Car Units (PCU) per hour for morning and afternoon peaks. The results indicate that the existing road network is expected to have ample capacity to accommodate the traffic demand during the peak construction of the Project. The results indicate that Beryl Road and Castlereagh Highway would remain to operate satisfactorily with LoS A during peak construction hours of the Project ('with Project' scenario).

Table 7-32. Assessment of road capacity impacts during construction

Road	Direction	Capacity (PCU/h)	Without Project		With Project			
			V/C Ratio (LoS)		Volume (PCU/h)		V/C Ratio (LoS)	
			AM peak	PM peak	AM peak	PM peak	AM peak	PM peak
Beryl Road	Eastbound	900	0.01 (A)	0.01 (A)	32	9	0.04 (A)	0.01 (A)
	Westbound	900	0.01 (A)	0.01 (A)	8	29	0.01 (A)	0.03 (A)
Castlereagh Highway	Northbound	1478	0.04 (A)	0.04 (A)	67	73	0.05 (A)	0.05 (A)
	Southbound	1478	0.05 (A)	0.04 (A)	79	65	0.05 (A)	0.04 (A)

Impact to Beryl Road

The installation of the 132 kV underground cabling from the transformer to the existing Beryl Substation and the construction of the Project site access would require temporary road works during construction. Given the generally low traffic volumes on Beryl Road, impacts on the operational efficiency of Beryl Road are considered to be minor and manageable (refer to management measures in **Section 7.7.6**).

7.7.3.2 Impacts at intersections

Turn warrant assessments were carried out to determine whether traffic associated with Project construction would require a higher-order turn treatment at the following junctions:

- Castlereagh Highway/Beryl Road intersection
- The proposed site access (Beryl Road/Project area).

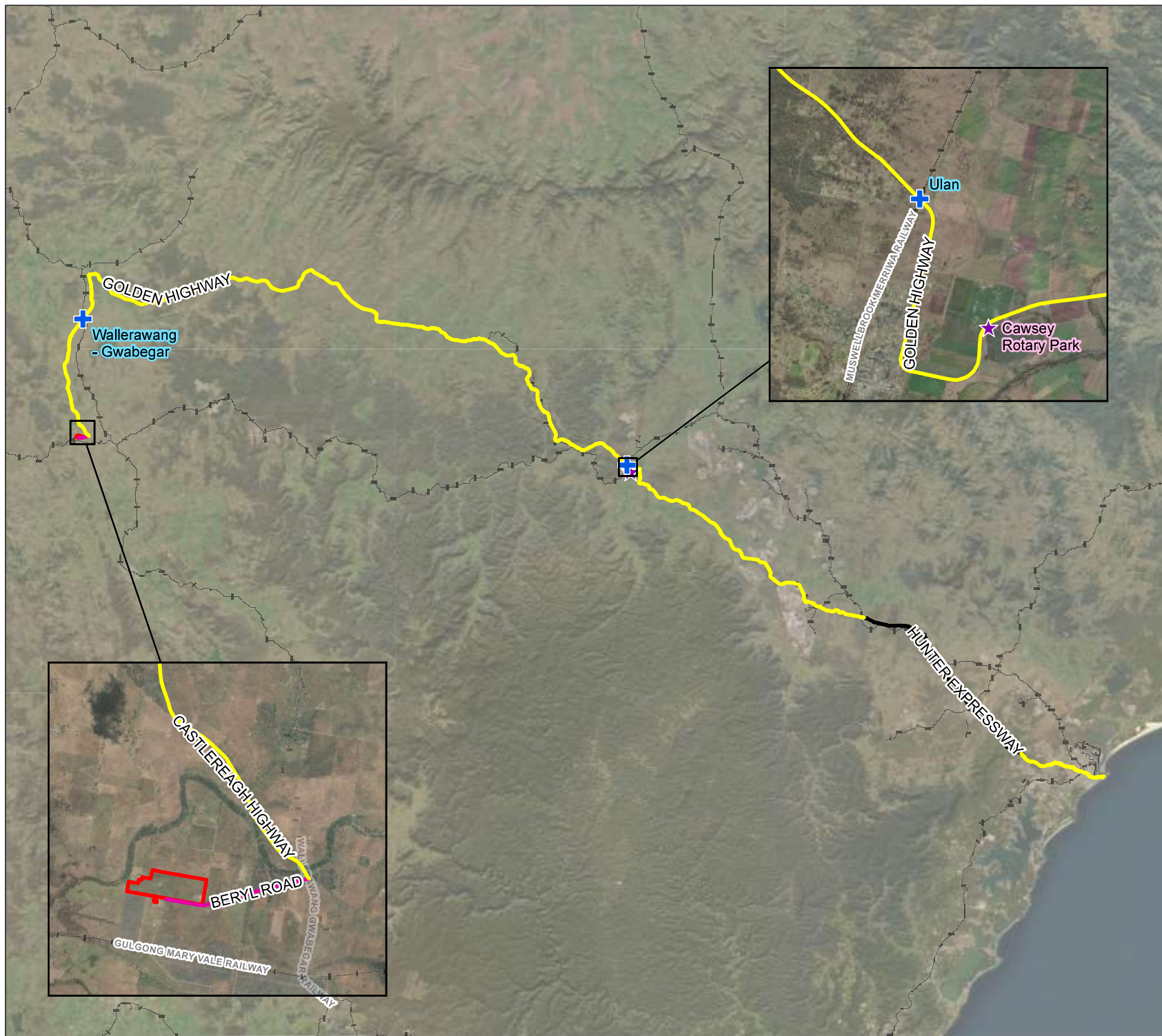
Assessments were undertaken for 2025 peak hour construction traffic combined with 2025 general background traffic volumes. The assessment conservatively assumed that all 20 construction vehicles (15 light, 5 heavy) travel to the site via Castlereagh Highway onto Beryl Road and would arrive during the peak hour as a worst-case scenario.

The turn warrant assessment results indicate that a basic left turn and a basic right turn would be sufficient for both the Castlereagh Highway/Beryl Road intersection, and the site access intersection on Beryl Road. Swept path analysis of the OSOM vehicle travelling to the Project area indicates that no further widening would be required. Swept path diagrams are included in **Appendix J**.

It is to be noted that the Castlereagh Highway/Beryl Road intersection has been recently upgraded as part of impact mitigation of the Beryl Solar Farm Project. No further upgrade is proposed as a result of the Project.

7.7.3.3 Impacts of Oversize and/or Overmass vehicles

A preliminary desktop OSOM route assessment was conducted on the proposed OSOM haulage routes from the Port of Newcastle to the Project area to identify potential issues, pinch points and potentially at-risk road structures which may require consideration at this early planning phase of the Project. Based on the preliminary OSOM route shown in **Figure 7-11**, no modifications have been identified. As part of the OSOM permit application, a detailed OSOM Transport Management Plan would be developed to determine most suitable route based on final OSOM vehicle dimensions and load weight.



LEGEND

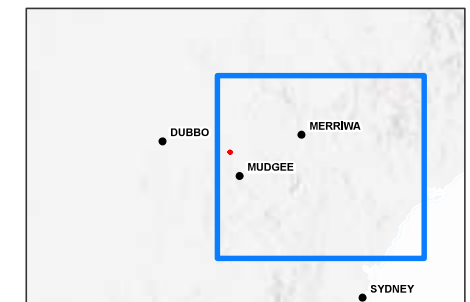
- ▭ Project area
- OSOM Route**
 - Approved Routes
 - Approved Routes with Travel Conditions
 - Approval required
 - ★ Potential pullover/rest stop area
 - + Restricted Structures with conditional access - Railway level crossings
 - +— Railway

0 25 50
Kilometres



A4 1:1,100,000

GDA 1994 MGA Zone 55



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Data Sources: NSW Department of Planning and Environment (2023); Transport for NSW 2023; Imagery Sources: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2023), Australian Bureau of Statistics (2021)

Figure 7-11 Proposed OSOM route haulage - Port of Newcastle to Project area

7.7.3.4 Impacts to road and/or pavement conditions

An increase in heavy vehicles during construction may potentially lead to damage to the existing road infrastructure. A number of road maintenance measures are included in **Section 7.7.6** to mitigate and manage impacts attributable to the Project construction.

7.7.3.5 Impacts on road safety

Additional vehicles using key roads are unlikely to have an impact on future crash frequency due to overall low construction traffic volumes. In addition, the turn warrant assessments (which are based on achieving a specific level of safety performance) indicate that the existing turn treatments would be suitable to accommodate the forecast traffic volumes generated by the Project.

Beyond these key intersections, all roads in the study area are expected to have sufficient spare mid-block capacity to accommodate additional traffic volumes generated by the Project without adversely impacting the operation or safety of the existing road network.

7.7.3.6 Impacts on parking, property access and/or emergency services

No impact to existing car parking or existing property access is anticipated as parking for construction vehicles would be provided within the construction compound and laydown areas within the Project area, away from public roads.

No impacts to emergency services are anticipated during construction. Where temporary partial road closures are needed, the construction contractors would consult and/or notify the affected property owners, relevant road authority and emergency services of any changes to the road network. This would entail appropriate traffic management procedures as listed in **Section 7.7.6**.

7.7.3.7 Impacts to bus services

The Project has sought to minimise impacts to bus services in the surrounding area, including along Castlereagh Highway by scheduling OSOM deliveries outside of school hours or at night and avoiding heavy vehicle movements during school times where possible to prevent any conflicts with school traffic and school bus schedules.

Potential informal bus stop on the corner of Beryl Road may need to be temporarily relocated to avoid potential conflict with construction vehicles. Further conflict avoidance would be achieved through the management of release times of deliveries.

Overall, impacts to school bus services are anticipated to be minimal due to the relatively low construction traffic volumes for the Project and the implementation of management measures listed above and presented in **Section 7.7.6**.

7.7.3.8 Impacts to rail services and active transport

Given there are no active rail facilities near the Project, impacts are not anticipated.

7.7.3.9 Impacts on active transport

Impacts to pedestrians and cyclists would be limited to minor amenity impacts at farmland due to the addition of light and heavy construction vehicles on the road network.

7.7.4 Potential operational impacts

During operation, traffic movements would be minimal with light vehicles occasionally needing to access the Project area for maintenance activities. Heavy vehicles may also occasionally access the Project area to replace larger components as necessary. In the event of a major component change, a permit would be sought from the NHVR (if required) for the delivery of any OSOM plant and equipment to the Project area and the conditions of this permit implemented by the haulage contractor.

It is expected that the existing local road network would be more than adequate to accommodate the expected operational traffic volumes. As such, no material traffic impacts are anticipated during operation.

7.7.5 Potential decommissioning impacts

The standard construction hours for Project would apply to the decommissioning phase. Decommissioning of the Project would generate significantly lower amount of vehicle trips compared to construction, therefore given the outcomes of the construction impact assessment, minimal traffic impacts are anticipated during the decommissioning phase of the Project.

7.7.6 Environmental management measures

Proposed measures to manage and/or mitigate traffic and transport impacts from the Project are detailed in **Table 7-33**.

Table 7-33. Traffic and transport environmental management measures

Impact	Reference	Environmental management measure	Timing
Impacts to the local road network	TT01	A Construction Traffic Management Plan (CTMP) will be prepared as part of the CEMP and will include: - Confirmation of haulage routes - Access arrangements to the Project area - Preferred times of transport to and from the Project area to minimise impacts on the road network - Measures to minimise the number of workers using private vehicles - Management of OSOM vehicles - The maximum parameters of the materials to be transported to and from the Project area - Site-specific traffic control measures (including signage) to manage and regulate traffic movement including for the temporary road works which may be required on Beryl Road - Relevant traffic safety measures, including driver induction, training, safety measures and protocols - Requirements for, and placement of, traffic barriers - Requirements and methods to consult and inform the local community of impacts on the local road network due to the development-related activities - Consultation with Transport for NSW, the NHVR and MWRC - Consultation with the emergency services to ensure that procedures are in place to	Prior to construction

Impact	Reference	Environmental management measure	Timing
		maintain safe, priority access for emergency vehicles ▪ A response plan for any construction-related traffic incident ▪ Monitoring, review and amendment mechanisms ▪ Individual traffic management requirements at each phase of construction ▪ Coordination strategy with other major developments to minimise cumulative construction impacts. The CTMP will be prepared in consultation with Transport for NSW and MWRC and approved by the Consent Authority.	
	TT02	Group transport, such as shuttle buses for workstreams of more than 20 persons as well as ride sharing systems, will be implemented, where practical, to reduce the number of traffic movements on the local road network.	Construction, decommissioning
	TT03	Dedicated and demarcated parking areas for light and heavy vehicles will be provided. Vehicles associated with the Project will not be permitted to park on public areas and will be contained within the Project area.	Prior to construction
	TT04	Heavy vehicle movements to and from the Project area will be scheduled to minimise traffic disruption to the surrounding road network. This may include, but is not limited to: ▪ Scheduling the movement of construction material, equipment and waste to occur outside of peak periods and school times/zones where practical ▪ Scheduling heavy vehicle deliveries to be evenly dispersed as far as practical to minimise convoys or platoons and queuing outside the Project area or on the road network.	Prior to construction, construction, operation, decommissioning
Heavy vehicles	TT05	A separate OSOM Transport Management Plan will be prepared as part of the CTMP and will include: ▪ Identification of the final OSOM route ▪ Detailed review of impacted road infrastructure ▪ Measures to provide an escort for the loads ▪ Times of transporting to minimise impacts on the road network ▪ Location of rest areas and require rest stops along the route ▪ The maximum parameters of the materials to be transported to and from the Project area ▪ Communication strategy and liaising with emergency services and police	Prior to construction

Impact	Reference	Environmental management measure	Timing
		- Communication strategy and liaising with relevant power, utilities and other relevant authorities including Transport for NSW and MWRC. E.g. consultation and consent obtainment from the Australian Rail Track Corporation (ARTC) for traversing the two level crossings along route - Any minor temporary civil infrastructure work which may be required to accommodate OSOM movements.	
	TT06	A vehicle access permit will be sought (from NHVR in consultation with MWRC) for all B-doubles and OSOM vehicle movements on Beryl Road. The heavy vehicle and OSOM movements will be in accordance with the permit requirements and be outside of peak traffic periods and school times/zones where possible.	Prior to construction
	TT07	A dilapidation report will be submitted prior to construction and decommissioning works and post construction and decommissioning. Road dilapidation surveys will be undertaken along Beryl Road between Castlereagh Highway and Project area access in accordance with Austroads guidelines and standards. Any development related damage identified in post dilapidation survey will be rehabilitated / repaired.	Prior to/post construction
	TT08	During detailed design, detailed 3D swept path assessments will be undertaken for intersections and proposed road upgrades in consultation with relevant road authorities. Any design will be developed to the standard and satisfaction of the NSW road authorities, including Transport for NSW, as appropriate under Section 138 of the <i>NSW Roads Act 1993</i> .	Detailed design
Road safety	TT09	A Driver Code of Conduct will be prepared as part of the CTMP and be used to outline the rules and behaviours which drivers associated with the Project will be required to adhere to. The Driver Code of Conduct will outline arrangements for light and heavy vehicle drivers, including: - General requirements, including site induction requirements - Travelling speeds and safe driving practices, particularly through residential areas and school zones - Fatigue management - Adherence to designated haulage routes and heavy vehicle noise - Public complaint resolution and penalties and disciplinary action.	Prior to construction, construction, operation, decommissioning
	TT10	Public roads will not be obstructed by any materials, vehicles, skip bins or the like, under any circumstances.	Construction, operation, decommissioning

Impact	Reference	Environmental management measure	Timing
	TT11	'Trucks Turning' warning signs will be installed on both approaches to the intersection of Castlereagh Highway/Beryl Road and Beryl Road/Project area to advise existing road users of the increased heavy vehicle volumes. The signs will be removed upon the completion of construction work.	Construction, decommissioning
	TT12	All vehicles transporting loose materials will have the entire load covered and/or secured to prevent any large items, excess dust or dirt particles depositing onto the roadway during travel to and from the Project area.	Construction, decommissioning
	TT13	Speed reductions, use of fog lights during periods of low visibility, cessation of work and site shutdowns will be implemented as required during periods of adverse weather.	Construction, operation, decommissioning
Road upgrades	TT14	The proposed Project access/Beryl Road intersection will need to be developed with rural basic left and rural basic right turn treatments in accordance with Austroads guidelines. Applicant will enter into agreement with Council for Council to perform all road upgrade construction works.	Detailed design

7.8 Water

A hydrology and hydraulic assessment (**Appendix K**) and site water balance (**Appendix L**) was prepared by Jacobs for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.8.1 Assessment methodology

The methodology for the assessment involved:

- A review of existing background information relevant to the Project area
- Flood modelling (TUFLOW) the 1% Annual Exceedance Probability (AEP) event for the existing case flooding at the Project area and surrounds.
- Describing the existing environment including, climate, surface water, groundwater, flood depth, velocity and hazard
- Quantification of water demand and water supply arrangements
- Assessing the impacts of construction, operation and decommissioning activities on water quality, groundwater and flooding. A review of existing flooding conditions indicated that impacts on flooding and impacts to sensitive receivers would be minor. As such a qualitative impact assessment has been undertaken
- Recommendation of management measures to minimise potential impacts.

7.8.2 Existing environment

7.8.2.1 Climate

The Project area is located within a temperate climate region characterised by warm summers and cool winters. Long term temperature data from Gulgong Post Office (#62013) indicates average minimum and maximum temperatures range from approximately 15 degrees Celsius (°C) to 30°C (January to March) and 5°C to 13°C (June to July). Temperatures in autumn and spring tend to be mild.

There is only a moderate level of seasonality to rainfall within the Project area, and that rainfall is typically low in most months. Lowest average rainfall is recorded in April (44.2 mm) and May (44.3 mm), followed by August. Highest monthly rainfall is recorded in January (70.2 mm) followed by December and November. Between April and October there is very little variation between monthly rainfalls.

7.8.2.2 Catchment overview

The Project is located within the Macquarie-Bogan River Catchment in central west NSW which has a catchment area of 74,800 km². This catchment also forms part of the Macquarie-Castlereagh catchment of the Murray-Darling Basin and includes the three major river networks of the Castlereagh, Macquarie and Bogan River which comprises about 7% of the area of Murray-Darling Basin.

At a local level, the Project is located in the middle of a small lateral catchment of about 1 km² within the lower Wialdra Creek Catchment, a tributary of the Cudgegong River.

7.8.2.3 Waterways and drainage

The local catchment generates two distinct ephemeral watercourses (Strahler first order stream), one mapped waterway and one unmapped waterway, that cross the Project in a westerly direction and flow down towards Wialdra Creek (600 m to the west of the Project, refer to **Figure 1-2**). Wialdra Creek (a seventh order Strahler stream) is about 20 km long and flows south-west until it joins the Cudgegong River west of Gulgong. Both watercourses are diffuse and shallow depressions within the Project area (refer to **Picture 2-1**). The mapped drainage line is an ephemeral flow path which meets the definition of waterfront land in accordance with the WM Act.

The catchment also contains four small farm dams one of which is within the Project area, approximately 100 m downstream of the Project.

The relevant water sharing plan that applies to the Project is the Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source.

The Project area is mapped as environmental sensitive/groundwater vulnerable under the Mid-Western Regional LEP. Wialdra Creek is also mapped as environmental sensitive riparian land/watercourse.

7.8.2.4 Surface water quality

The nearest water quality monitoring site is located in Cudgegong River at Yamble Bridge which is located approximately 17 km downstream of the confluence with Wialdra Creek. Water quality is generally influenced by flow, particularly turbidity which is higher with increased flow although median levels remain below the basin plan targets and electrical conductivity which is higher during low flow suggesting saline groundwater contributions that get diluted with increased flow (DPE, 2022g). Generally, the water quality is considered good with most indicators meeting the basin plan target. The exceptions were total phosphorus which had median concentrations exceed the basin plan target of 0.035 mg/L and dissolved oxygen which fell below the basin plan target of 90-110% saturation (DPE, 2022g).

7.8.2.5 Wetlands

The closest Nationally Important Wetlands and Ramsar Wetland for the Project area is the Macquarie Marshes and Nature Reserve, which are approximately 200 km northwest.

7.8.2.6 Groundwater

Groundwater in the Macquarie-Castlereagh River region is an important source for stock, domestic, irrigation, industrial, town needs and groundwater-dependent ecosystems. Groundwater in the fractured rock of the Lachlan Fold Belt (Murray Darling Basin) is found in shallow weathered zones and in the deeper fractured rock.

Groundwater bores in the surrounding area are expected to contain highly saline water and typically yield less than 5 litres per second. Groundwater resource within the Project area have been mapped as vulnerable in the Mid-Western Regional LEP.

There are 20 groundwater boreholes located within five km radius of the Project area, 19 of which are privately owned and used for water supply (BOM, 2024). The closest bores being water supply bores (GW061396 and GW804188) located 737 m north and 552 m north west of the Project area respectively. These boreholes are used for water supply and have a bore depth of 7 m and 28.5 m respectively.

The relevant ground water management plan the Project area is the Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020.

7.8.2.7 Flooding

The Project area is outside of the main flow conveyance zone of Wialdra Creek.

Within the Project area, flooding is caused by runoff from small catchments to the south west of the Project area and flow paths discharge into Wialdra Creek to the west of the Project area.

Flood modelling demonstrated that the Project area and surrounds are partially inundated in the 1% AEP event from surface water flow paths. Ponding and minor overland flow paths are also seen throughout other areas of the Project area, however, the Project is flood free from regional flooding of Wialdra Creek. Mapping of the modelled flood depths identified that the western section of the Project area experiences a maximum flood depth of 0.34 m, and the BESS location has an average flood depth of approximately 0.2 m (refer to **Figure 7-12**).

Due to the relatively flat ground, flood velocities for the 1% AEP are generally low with maximum flow velocities of 1.1m/s and 0.9m/s for the two flow paths through the Project area.

The hazard classification in the 1% AEP event across the Project only reaches category H1, which indicates the existing conditions is generally safe for people, vehicles and buildings.

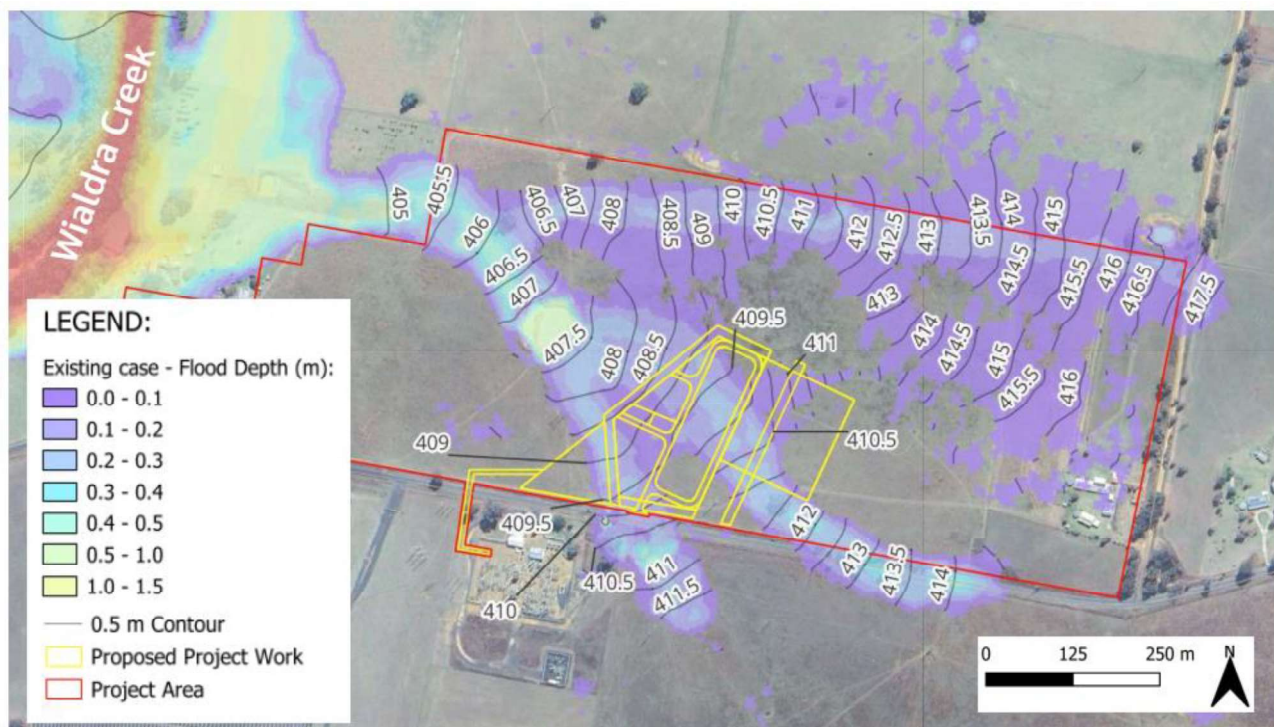


Figure 7-12. Existing flood depth (regional combined with overland) - 1% AEP event

7.8.2.8 Water sources

Gulgong township relies on two water supply sources; a primary full water supply sourced from off-stream storage supplied by releases from Windamere Dam, and a secondary partial supply from groundwater bores in the Lachlan Fold Belt. The total entitlements from these two sources combined amount to 250 ML/year.

7.8.3 Potential construction impacts

The construction of the Project is expected to result in minor ground disturbance, associated with the construction of the access tracks and concrete footings for the BESS infrastructure, the foundations for the switchyard and transformer, and the proposed underground cable between the switchyard and the Beryl Substation.

The following sections provide an assessment of the potential impacts to surface water quality, groundwater and flooding risks of the Project on surrounding areas during construction of the Project.

7.8.3.1 Surface water quality

During construction potential impacts to surface water quality of downstream waterways include:

- Erosion of soils and sedimentation as a result of stockpiling and cabling activities, and construction of hardstand areas and access tracks, which would elevated turbidity
- Removal of vegetation, which could increase risk of erosion and sediment-laden runoff, nutrients and other contaminants
- Contamination from accidental spillage of wastewater, fuels or hazardous materials
- Migration of litter off-site.

As the Project area is relatively flat with no channelised flows (both watercourses are shallow and diffuse) the potential for surface water quality impacts during construction is considered low.

Minor, localised disruption to drainage would occur during construction, associated with activities such as vegetation clearance and earthworks, which may trap or impede surface flows across the Project area.

During construction, temporary diversions and erosion and sediment controls would be implemented to divert surface water flows around the Project and minimise mobilisation of sediment into receiving watercourses. As such, potential construction impacts related to site runoff are considered minor and manageable with the implementation of management measures in **Section 7.4.7** and **Section 7.8.6**.

7.8.3.2 Waterfront land

As described in **Section 4.2**, construction works would be located within 40 m of a mapped ephemeral flow path that is classified as waterfront land under the WM Act. The waterway is shallow with poorly defined banks and would require diversion around the Project. Whilst these works are proposed in a first order stream they would not impact on the bankful level (i.e. the water level, or stage, at which a waterway is at the top of its banks and any further rise would result in water moving into the floodplain).

Based on the proposed works and waterway type, waterway crossings are not required to consider the Guidelines for riparian corridors on waterfront land (DPE, 2022b) and Guidelines for watercourse crossings on waterfront land (DPE, 2022c) and Additionally, as the Project is classified as SSD, a controlled activity approval is not required, however, works within or near watercourse would be undertaken with consideration given to the relevant guidelines

7.8.3.3 Groundwater

No water supply bores would be required for the Project and no extraction of groundwater for construction use is proposed. The Project is therefore not anticipated to impact on adjacent licensed water user or existing groundwater infrastructure. The availability of groundwater to GDEs associated with Wialdra Creek outside the Project area is also not expected to be impacted.

The Project would require levelling, or excavation below existing surface levels to establish suitable foundation conditions for infrastructure, and for the installation of underground services. However, excavations would be shallow (up to a maximum of a few metres in depth) and localised, and groundwater is not expected to be intercepted by excavations.

Indirect impacts to the groundwater environment during construction of the Project may occur as a result of potential spills or leaks of materials occurring during construction and migrating to the water table. Potential spills or leaks may include oils, lubricants and fuels used by construction plant. The risk of significant groundwater contamination from leaks and spills would be minimal, as managed through the implementation of management measures outlined in **Section 7.8.6**.

7.8.3.4 Flooding and hydrology

As parts of the Project are at risk of inundation in the 1% AEP, the following is required during construction to mitigate impacts to overland flooding:

- Earthworks are required to raise the BESS, switchyard and transformer area above the 1% AEP water level (up to 0.34 m)
- Construction materials within the laydown area would be located outside of the overland flow paths or alternatively the flow path would be re-directed around the laydown areas. However, it is important to note that the portions of the laydown areas that have been modelled to be transversed by shallow overland flows are short duration events. As such, a lower standard of protection could be considered during detailed design given the temporary works will only remain for a short time period
- Implementation of the management measures in **Section 7.8.6** to mitigate risks associated with overland flow during trenching and underground cabling of the power supply where the transmission line crosses the flow path. Due to the relatively shallow flows and low flow velocities impacts are expected to be minimal and easily mitigated.

Construction of the Project is not expected to increase the risk of flooding to downstream dwellings.

7.8.3.5 Water demand during construction

During construction, water would primarily be used for the establishment of the BESS infrastructure and dust suppression, as well as being used for watering planted screening vegetation. The total water demand during construction is estimated to be 8.5 ML/year (0.089 ML/day) of non-potable water and 1.46 ML/year of potable water for site personnel. Water would be trucked to the Project area in by water trucks from a private commercial supplier.

7.8.4 Potential operational impacts

During operation, the Project's maintenance and decommissioning activities would involve less disturbance compared to the construction phase.

The following sections provide an assessment of the potential impacts to surface water quality, groundwater and flooding risks of the Project on surrounding areas during operation of the Project.

7.8.4.1 Surface water quality

Risks to surface water quality are primarily associated with the establishment of new permanent impervious surfaces, which may increase localised velocity and presents a minor risk of localised erosion and scouring and subsequent sedimentation of downstream receivers and deterioration in water quality. The increase in impervious areas is small compared to the watercourse catchment area and there would be negligible increases in runoff peak rates, volumes and durations of flow or geomorphic changes in Wialdra Creek as a result of the Project.

Additionally, potential risks to water quality during operation can result from inappropriate storage of materials, hydrocarbon spills or leaks from machinery within the operation and maintenance facility or elsewhere on site. However, only minor quantities of fuel, chemicals and hazardous materials would be stored and used on-site during operation.

There would be a minor risk of localised erosion and scouring of ground surfaces within the Project, for example at drainage discharge areas, however these would be managed as part of detailed design and covered in **Section 7.8.6**.

The Project would not dam or redirect ephemeral waterways or flow paths which may deliver surface water to properties downstream and would not impact on water availability of water to licensed water users.

7.8.4.2 Groundwater

During operation, the introduction of impervious surfaces for the BESS infrastructure would lead to a very small reduction in the infiltration of stormwater runoff to the underlying soils and recharge of groundwater. However, this would have negligible impact on groundwater levels or availability. Therefore no operational impacts are expected on groundwater.

7.8.4.3 Flooding and hydrology

A flood protection level of the 1% AEP flood level would be required as a minimum, with a preference of 0.5 m freeboard, for the switchyard and BESS facilities. The existing overland flow flood depths at the operations and maintenance facilities are approximately 0.1 m, in the 1% AEP event.

The potential hydrologic and flooding impacts of the Project operation is expected to be similar to the potential construction phase. There are expected to be minor and localised impacts on flooding due to partial obstruction of flows and loss of flooding storage caused by filled hardstand areas within the Project area. As per construction, overland flows would be diverted around the Project to discharge the farm dam downstream. As such impacts to the farm dam are unlikely.

The underground or overhead transmission line will have negligible impact during the operation phase, as the buried cable or overhead should not impede the overland flow path.

While a minor increase in flooding may result from the increased impervious area, this is not expected to increase the flood risk to downstream users/dwellings.

Road access (from Beryl Road) to evacuation centres and towns are situated on high ground and are likely to remain flood free even in large events.

Under extreme flood events (i.e. PMF), there is a risk of damage to the BESS and associated infrastructure and power supply which could result in a release of pollutants. This release of pollutants would be small compared to external sources that would also be impacted such as sewage treatment and heavy industry which would pose a greater risk to the environment than the BESS (i.e. the whole surrounding area, including the Beryl Substation would be inundated).

7.8.4.4 Water demand during operation

During operation, water demand would be minimal and would be limited to potable supply for site facilities, watering of screening vegetation and top-up of any fire water management systems if required. Water would be supplied by the water tanks that would be installed at the Operation and Maintenance facility.

7.8.5 Potential decommissioning impacts

The equipment required and activities undertaken for decommissioning would be similar to that used during Project construction. This would include delivery of decommissioning equipment to the Project area and use of the equipment, transport of materials and disposal of waste. Therefore, decommissioning of the Project would present a similar risk as described in **Section 7.8.3** but at a reduced scale.

7.8.5.1 Water demand during decommissioning

During decommissioning, water demand would be minimal and the water would be brought to site by water trucks as required for dust suppression.

7.8.6 Environmental management measures

Proposed measures to manage and/or mitigate impacts to water, including surface water, groundwater and flooding, are outlined in **Table 7-34**.

Table 7-34. Environmental management measures for water impacts

Impact	Reference	Environmental management measure	Timing
Surface water quality	W1	A Construction Soil and Water Management Plan (CSWMP) will be prepared as a sub-plan to the CEMP which will outline measures to manage soil and water impacts associated with the construction works. The CSWMP will include but not be limited to: - Measures to minimise/manage erosion and sediment transport both within the construction footprint and off-site, including the requirement for preparation of ESCP for construction (refer to EMM L2) - Measures to manage stockpiles - Measures to manage accidental spills including the requirements to maintain materials such as spill kits, including an emergency spill response procedures - Designated areas (with established spill capture and management controls) for refuelling and minor maintenance activities will be limited to - Requirements for regular visual water quality checks (for hydrocarbon spills/slicks, turbid plumes)	Prior to construction, construction, decommissioning

Impact	Reference	Environmental management measure	Timing
		and other water quality issues) at waterways in proximity to works. Requirements for all fuels, chemicals and liquids to be stored on level ground away from waterways in sealed bunded area within construction compound.	
Concrete works	W2	To avoid ingress of concrete waste material offsite, the CEMP will outline procedures to capture, contain and appropriately dispose of any concrete waste from concrete work, including designated lined, bunded and controlled concrete washout areas.	Prior to construction, construction
Water use	W3	To minimise water use, the following measures would be implemented: - Adopting efficient watering strategies and utilising water efficient equipment to minimise water consumption. - Install rainwater captures systems on site buildings to be utilised for irrigation and other Project needs.	Construction, operation
Geomorphic impacts and scouring during flood events	W5	To minimise risk of erosion and scouring the following will be implemented: - Permanent operational infrastructure and landforms will be designed where possible to minimise risk of scour and erosion associated with surface water runoff - Provision of scour protection discharge areas, drains and other at risk locations and monitoring of these locations to determine effectiveness and requirement for remedial works	Detailed design
Impacts to the Project area resulting from flooding	W6	The Project design will provide filling for any necessary infrastructure so that it is above the 1%AEP level	Detailed design
Farm dams and surface water resources	W7	Where possible, the design will: - Minimise located infrastructure in flow paths to avoid changes to runoff and natural flow regime - Constructing hardstand areas, access tracks and Project facilities to avoid reduction of inflows to farm dams and surface water resources	Detailed design
	W8	Potential impacts to flow paths associated with Project infrastructure in proximity to existing farm dams will be discussed and management measures (such as diversions) will be confirmed in consultation with landowners to avoid impacts to farm dam inflows.	Detailed design
Flood and surface water quantity impacts from temporary construction work and facilities	W9	Locating material stockpiles and construction facilities outside the 1% AEP flood extent by managing overland flow paths	Construction
	W10	Drainage swales and channels will be installed to convey runoff and flows around construction areas	Construction

7.9 Hazards

This section provides the findings in relation to hazards associated with battery storage, bush fire risk and EMF.

7.9.1 Preliminary hazards analysis

A Preliminary Hazards Analysis (**Appendix M**) was prepared by Jacobs for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.9.1.1 Assessment methodology

The methodology for the assessment involved:

- A review of the Project design and arrangement of BESS infrastructure, including spacing of BESS enclosures
- A risk screening based on the State Environmental Planning Policy (Resilience and Hazards) 2021 in relation to the storage of hazardous materials, transport of hazardous materials and other types of hazards. The risk screening was prepared in accordance with Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (DoP, 2011a), Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis (DoP, 2011b) and Multi-Level Risk Assessment (DoP, 2011c).
- Addressing the hazards and risks associated with the Project, notably associated with the following:
 - Risk from material reactions and as a consequence, fires associated with electrical infrastructure and flammable material – This includes spontaneous ignition from a thermal runaway event at the BESS
 - Environmental risk from spills causing land contamination
 - Health and safety risk to the community, staff and contractors.
- The application of risk matrix for assessing the hazard scenarios identified (refer to **Table 7-35**)
- A review of other credible PHAs for similar sized projects, literature and recommendations from battery hazards assessments, as well as review of battery incident investigations, such as the Victoria Big Battery fire
- Recommended management measures and strategies to avoid or minimise potential risks to as low as reasonably practicable.

7.9.1.2 Criteria

A risk matrix was used to assess the potential hazards using the consequence and likelihood criteria presented in **Table 7-35**.

Table 7-35. Risk matrix

Consequence					
Consequence	1 (Minor)	2 (Moderate)	3 (Serious)	4 (Major)	5 (Critical)
Health & Safety	First aid treatment.	Medical treatment required.	Serious injury requiring urgent treatment.	Permanent and serious disablement.	Fatality
Environment (E) & Community (C)	E: Onsite release, containable with minimal damage. Localised impact on energy usage. C: Workforce concern.	E: Onsite release with some damage, no offsite damage. Numerous and/or widespread but small-scale impacts on energy and waste. Remediation in terms of days. C: Local community concern.	E: Offsite release, no significant environmental damage. Remediation in terms of weeks. C: Regional concern.	E: Major offsite release, short to medium term environmental damage. Remediation in terms of months. C: Widespread community outcry. Regional concern	E: Major offsite release, long term environmental damage. Remediation in terms of years. C: Extreme community outcry. National concern.
Consequence likelihood	1 (Minor)	2 (Moderate)	3 (Serious)	4 (Major)	5 (Critical)
Remote Once every 50 - 100 years	1	2	3	4	5
Highly unlikely Every 10 - 50 years	2	4	6	8	10
Unlikely Every 3 - 10 years	3	6	9	12	15
Likely Every 1- 3 years	4	8	12	16	20
Highly Likely At least once a year	5	10	15	20	25

Risk response	
15-25 – Extreme	Unacceptable level of risk - Controls must be implemented to reduce the risk.
9-14 – High	Unacceptable level of risk - Controls must be implemented to reduce the risk
5-8 – Medium	Implement controls to reduce risk as low as reasonably practicable.
1-4 – Low	Controls are acceptable. Requires monitoring

7.9.1.3 Existing environment

There is low population density in the vicinity of the Project area. There is a rural residence within the Project area which includes two residential dwellings and sheds. There are 50 Non-associated Landowners within five km of the Project area. Existing land use within the Project area is low intensity agriculture currently limited to light grazing.

Beryl Solar Farm and Beryl Substation are located immediately south of the Project. Gulgong township is located 6.3 km to the south-east of the Project.

7.9.1.4 Potential impacts

7.9.1.4.1 Risk screening and hazardous materials

The following outcomes of the risk screening for the PHA are summarised below:

- The expected storage of hazardous materials associated with the Project would not exceed the relevant risk screening threshold
- The expected transport of hazardous materials associated with the Project would not exceed the relevant risk screening threshold.

Based on the above, the Project would not be considered potentially hazardous. However, as DPHI also requires assessment of other types of hazards, the following potential hazards are assessed further in **Section 7.9.1.4.2**:

- Uncontrolled thermal runaway reaction or decomposition within the lithium-iron phosphate batteries in the BESS potentially leading to propagation to other infrastructure
- Environmental impact or health and safety impact from exposure if there is a spill of pollutant from the battery enclosures, transformers or landing gantries, e.g. cooling medium or oil. This risk will be mitigated during detailed design
- Potential health impact due to EMF emitted from the high voltage transmission connection between the Beryl BESS transformer yard and Transgrid 132 kV switchyard
- Accidental contacts with existing live electrical overhead power lines near the Project area that will cause electric shock and fatal electrical injury
- Potential health impact due to offsite noise generated during construction and operation stage.

7.9.1.4.2 Hazard identification and risk analysis

Lithium-iron phosphate (as like lithium-ion) batteries are susceptible to a failure mode called thermal runaway which can result in a self-sustaining fire within a battery energy storage medium. Thermal runaway can be caused by:

- Battery mechanical damage
- Defects within the battery unit
- Improper operation.

As a result, the prevention, detection and control of thermal runaway events is an important technology design consideration for battery manufacturers.

BESS technology is rapidly maturing as more installations are commissioned, and technology providers develop improved methods of managing and eliminating failure modes that have historically resulted in some events leading to thermal runaway. With the advancement of technology, there is an increased likelihood that battery technology will become more reliable and less susceptible to extreme impacts from known failure modes.

A summary of the key hazards and the associated risk levels are outlined in **Table 7-36**. The highest risk level associated with the Project is medium. Medium level risks can be managed with the measures inherent to the BESS and Project design, and the additional measures provided in **Table 7-37**.

The assessment concludes that with the standard sizing of BESS enclosures, separation distances and balance of plant, the nominated capacity of the BESS would be able to be accommodated within the designated area within the Project area.

Overall, the assessment considers the hazards and associated risks can be mitigated to so far as reasonably practical through adoption of controls in place with the Project requirements and various recommendations arising from the PHA.

Further, to prepare for emergency response during the operation of the Project, a comprehensive fire safety study will be prepared in consultation with Fire and Rescue NSW, which will include an assessment of the capabilities of the local fire and rescue services to respond to events such as thermal runaway. The fire safety study will be implemented to ensure appropriate emergency response plans and other management measures are in place during the operation of the Project.

Table 7-36. Hazard analysis summary

Potential hazard	Consequence	Likelihood	Risk level
Thermal runaway occurs because battery defect	3 – Serious	Highly unlikely	6 – Medium
Thermal runaway because of improper operation of the battery	3 – Serious	Highly unlikely	6 – Medium
Thermal runaway occurs because of mechanical damage	3 – Serious	Highly unlikely	6 – Medium
Thermal runaway propagation from one battery enclosure to another	3 – Serious	Highly unlikely	6 – Medium
Thermal runaway escalates to a battery deflagration/explosion event	3 – Serious	Highly unlikely	6 – Medium
External fire (such as equipment fire, bush fire, other equipment fire, fire at neighbouring facility) triggers thermal runaway or asset damage	1 – Minor	Highly unlikely	2 – Low
Incident or injury to emergency services personnel responding to an incident	3 – Serious	Remote	3 – Low
Surface water leaving the site has negative impact on surrounding biota	1 – Minor	Highly unlikely	2 – Low
EMF from the transmission connection causes health impacts	1 – Minor	Highly unlikely	1 – Low
Groundwater contamination during construction and operations	1 – Minor	Highly unlikely	2 – Low
Fire caused from site operations spreads offsite	2 – Moderate	Remote	2 – Low
Offsite noise impacts from construction and operations activities	2 – Moderate	Highly unlikely	4 – Low
Electrical short-circuit caused from accidental contacts with bare exposed existing overhead power lines (live lines)	3 – Serious	Highly unlikely	6 – Medium
Construction workers exposed to contaminated substances at site	2- Moderate	Highly unlikely	4 – Low
Light pollution impacts offsite community	1 - Minor	Highly unlikely	2 – Low
Construction and operations traffic causes community impacts	1 - Minor	Remote	1 – Low
Import of contaminated material during construction	1 - Minor	Remote	1 – Low

Potential hazard	Consequence	Likelihood	Risk level
Accidental damage to existing underground infrastructure services (e.g. underground cables) during construction	2- Moderate	Highly unlikely	4 – Low

7.9.1.5 Environmental management measures

Proposed measures to manage and/or mitigate potential hazards associated with the Project are detailed in **Table 7-37**.

Table 7-37. Hazards environmental management measures

Impact	Reference	Environmental management measure	Timing
Hazards	PHA1	Undertake a detailed Hazard and Operability Study (HAZOP) and design review of the selected designs with specific attention on the inherent design features that detect, control and prevent thermal runaway.	Detailed design
Thermal Runaway	PHA2	Specify requirements for suppliers and designers to demonstrate robust designs to prevent, monitor and (where unable to eliminate the possibility) control thermal runaway and undertake specialist safety in design assessments such as a fire risk assessment to inform the design and selection of the battery technology.	Detailed design
	PHA3	Implement a design principle that assumes a thermal runaway event within an enclosure will occur during the lifetime of the asset and therefore limits deflagration energy release (and prevents the spread of fire to adjacent enclosure by adopting appropriate design controls such as suitably designed enclosures and separation distances).	Detailed design
	PHA4	Determine credible scenarios from a thermal runaway event once the technology and its size are determined to quantify the amount of potential hazardous by-products that must be managed and establish the Project design basis accordingly (e.g. amount of combustion and pollution, fire water uses for containment (if applicable), volumes of retention dams etc.).	Detailed design
Quality control	PHA5	Implement a robust quality plan and inspections throughout the supply chain and during installation. This should include factory and site acceptance testing.	Detailed design, commissioning
Hazards	PHA6	Develop and implement suitable asset management plans to ensure proper maintenance of the facility in line with manufacturers' recommendations and good industry practice throughout the operations phase.	Operation
Fire safety	PHA7	Prepare a fire safety study in consultation with Fire and Rescue NSW (FRNSW) and to the satisfaction of the operational requirements of FRNSW.	Detailed design
Emergency response	PHA8	Make provisions for training and education of operations staff and emergency response services to understand the technology to safely manage potential incident responses.	Operation

7.9.2 Bush fire risk

A bush fire assessment (**Appendix N**) was prepared by Cool Burn for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.9.2.1 Assessment methodology

The methodology for the assessment involved:

- A desktop review of available information and data sources to characterise the existing environment including bush fire prone land mapping
- A review of the Project design
- Recommend actions to mitigate the risk to an acceptable level commensurate with the bushfire risk
- Demonstrating how the Project meets the aims and objectives of NSW RFS Planning for Bushfire Protection 2019 (RFS, 2019).

7.9.2.2 Existing environment

Vegetation and topography

The Project area is characterised as generally flat with mix of native and non-native vegetation including grasslands. The hazard vegetation would be grassland, and effective slope is generally upslope/flat.

Bushfire prone mapping

The Project area is not mapped as within designated bushfire prone land, however, the Project area and surrounding grasslands, woodlands and agricultural areas have capacity for vegetation growth and development such that they could sustain a bushfire (grassfire), and subsequently constitute bushfire threat.

Fire danger index

The Fire Danger Index (FDI) measures the degree of danger of fire in Australian vegetation, based on a measure of vegetation dryness, air temperature, wind speed and humidity. The FDI for the region is 80 for forested areas and 110 for grasslands. Over the next 25 years, more days of higher fire danger may be anticipated due to climate change.

Fire history and ignition sources

The predominant sources of bushfire ignition in the region are lightning and accidental ignitions by farm machinery, equipment and rural operations. The Project area is within managed agricultural lands and has no recorded fire history mapped within the NPWS Fire History – Wildfires and Prescribed Burns dataset (NSW DCCEEW, 2024).

A fire is known to have occurred at the Beryl Solar Farm, immediately south of the Project area, and burned about 30 ha. The fire was contained with no threat to people or neighbouring properties, and the ignition of the fire has not yet been determined. A small grassfire was ignited by a neighbouring landholder lawnmowing demonstrating the grassfire and ignition risk potential.

7.9.2.3 Potential impacts

Depending on the severity of the fire, warning time, personnel or equipment present at the time, and the effectiveness of management measures, a bush fire could, in the worst case, lead to loss of life and/or psychological impacts for personnel, as well as potential loss and damage to assets.

The Project has included the following design elements to reduce bush fire risk:

- Maximum setback from residential receivers
- A minimum 10 m APZ is proposed for all operational infrastructure. An APZ provides mitigation for any fire ignition occurring from within the infrastructure (e.g. electrical fire) to ignite and spread into the surrounding vegetation (and subsequently be the causal factor of a bushfire)

- Proposed vegetation screening will be planted outside the minimum APZ and managed under a landscape or vegetation management plan so that they are managed in perpetuity as a low threat and do not increase the threat toward the structures
- Fire prevention systems will be built into the design of the BESS
- The Project will include a water supply dedicated for firefighting purposes
- Clear and safe access is critical for bushfire emergency response, safe firefighting and site evacuation provided at Beryl Road
- Alternate access is also provided along the eastern boundary and the existing power line easement access to Beryl Road (20m west from the main entry point) in the case of an emergency.

Based on the above design inclusions and the management measures provided in **Section 7.9.2.4**, it is expected that the operation of the Project would not introduce new bush fire risks to the Project area.

7.9.2.4 Environmental management measures

Proposed measures to manage and/or mitigate bush fire risks from the Project are detailed in **Table 7-38**.

Table 7-38. Bush fire risk environmental management measures

Impact	Reference	Environmental management measure	Timing
Emergency management	BF01	A Bushfire and Emergency Management Operation Plan (BEMOP) will be prepared to support emergency management for the Project and ensure bushfire protection actions are maintained in accordance with NSW RFS Planning for Bushfire Protection 2019. The BEMOP will guide annual monitoring of the fire mitigation works for the Project operations and surrounding landholding, including: ▪ Asset Protection Zone (APZ) and landscape fuel load management (refer to EMM BF02, BF03) ▪ Access provisions. Main access, internal roads and alternate egress will provide for safe, reliable, and unobstructed passage by a Cat 1 firefighting vehicle and maintained for the life of the development. ▪ Water supplies as per Fire Safety Study specifications. Water supply to be accessible and have appropriate firefighting appliance connections ▪ Emergency Response. The BEMOP will be developed in consultation with the local NSW RFS District Office and be communicated to relevant stakeholders.	Detailed design, operation
APZ	BF02	APZs will be a minimum 10 m width around Project infrastructure (including the BESS compound, switch room and transformer, operation and maintenance facility). APZ to be managed as Inner Protection Area for the life of the Project and will apply the following vegetation management requirements: ▪ There will be no trees or shrubs within the APZ ▪ Grass will be kept mown to no more than 100 mm in height and leaves and vegetation debris will be removed ▪ Roads and paved/cleared areas are suitable within the APZ.	Detailed design, operation

Impact	Reference	Environmental management measure	Timing
		Temporary construction and laydown areas, site access and associated fencing do not require specific APZ.	
Landscaping	BF03	Landscape maintenance will include the APZ and proposed vegetation screening to reduce fire intensity and rate of spread as it may approach a structure or structures - APZ management to manage fuel loads as required - Vegetation screening not within the 10 m APZ and maintained to remove dead/dry vegetation and fuel build-up - The vegetation screens will be managed under a landscape or vegetation management plan so that they are managed in perpetuity as a low threat and do not increase the threat toward the Project - Ongoing monitoring and maintenance It is anticipated that the Associated Landowner will continue ongoing agricultural practices such as grazing, cropping, and slashing within the remainder of the Project area which will act as bush fire fuel management.	Operation

7.9.3 Electromagnetic fields

An EMF assessment (**Appendix O**) was prepared for the Project by Jacobs in response to the SEARs. A summary of the assessment are provided in this section.

7.9.3.1 Assessment methodology

The methodology for the assessment involved:

- Modelling of key HV equipment associated with Project in the HIFREQ module of Current Distribution, Electromagnetic Interference, Grounding, and Soil Structure Analysis (CDEGS) to calculate electromagnetic fields generated by the Project. Multiple operating configurations are possible (i.e. the magnitude of current flowing in individual conductors) depending on the demand for power at any given point in time. The worst-case demand has been assumed in assessing the EFs and MFs generated by the Project
- Considering two impact scenarios:
 - The EMFs generated by the Project infrastructure without the existing infrastructure (i.e. Beryl Substation, existing transmission lines)
 - The EMFs generated by the Project infrastructure with the existing infrastructure (i.e. cumulative impacts considered)
- Applying The Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz to 100 kHz) (International Commission on Non-Ionising Radiation Protection (ICNIRP, 2010) reference levels compared to calculated levels at 1 m above the normal standing surface of a person (refer to **Table 7-39**).

7.9.3.1.1 ICNIRP criteria

The ICNIRP guideline reference levels are reproduced in **Table 7-39**.

Table 7-39 ICNIRP EMF reference levels and AIMD limits

Exposure Scenario	Electric Field Strength (kV/m)	Magnetic Field Strength (μT)
General Public – all areas	5	200
Active Implantable Medical Devices (AIMD)	5	100

7.9.3.2 Potential impacts

EMF associated with the Project would only occur during Project operation (i.e. when electricity is being generated).

A comparison between the calculated Project EMFs, the cumulative impacts associated with existing electrical infrastructure and the ICNIRP reference levels are presented below in **Table 7-40**.

The electric and magnetic fields generated by the Project infrastructure are small in publicly accessible areas and well below the ICNIRP reference levels. The closest sensitive receiver (Associated Landowner) is located more than 400 m from the Project. At this distance from the Project, the electric and magnetic fields from the proposed infrastructure would be much lower than the ICNIRP reference levels.

Table 7-40: Summary of EMF calculation results

Impact Scenario	Calculated Maximum Electric Field Strength (kV/m)	Electric Field Strength Reference Level (kV/m)	Calculated Maximum Magnetic Flux Density (μT)	Magnetic Flux Density Reference Level (μT)
Beryl BESS project infrastructure only	0.2	5	17	200 (100 for AIMD)
Beryl BESS project infrastructure and existing infrastructure	3	5	24	200 (100 for AIMD)

7.9.3.3 Environmental management measures

Based on the results of the assessment, environmental management measures to manage EMF are not required.

7.10 Social impacts

A SEIA (**Appendix O**) was prepared by Ethos Urban for the Project in response to the SEARs in accordance with the Social Impact Assessment Guideline (the SIA Guideline) (DPE, 2023). A summary of the assessment in relation to social impacts is provided in this section.

7.10.1 Assessment methodology

The methodology for the assessment involved:

- Review of relevant policy context
- Social baseline analysis of the existing socio-economic environment to define the social locality, analyse demographic information and map the social infrastructure relevant to the Project
- Carry out stakeholder and engagement to inform the assessment
- Analysis of stakeholder and community consultation findings
- Scoping of social impacts for different phases of the Project including the identification of impacts for detailed assessment
- Identification of key social impacts of the Project to provide findings on the social significance of each identified impact or benefit
- Identification of mitigation strategies to manage impacts and enhance benefits of the Project.

7.10.1.1 Study area

The study area has been defined in terms of two different social localities taking into consideration the need to factor in both local social impacts (defined as the primary social locality (PSL)) and those likely to occur on a broader scale (defined as the secondary social locality (SSL)). A definition and description of each study area is provided in **Table 7-41** and shown in **Figure 7-13**.

Table 7-41. Study area definition

Study area	Definition	Relevance to the assessment
PSL	▪ The surrounding area approximately 1 km from the Project area. The PSL boundary is determined by the geography of the locality, which includes Wialdra creek, local farming access roads and a decommissioned railway alignment which form the boundaries of the PSL. These features are generally visible, physical barriers in the local landscape.	▪ The PSL is likely to contain localised social impacts relating to the immediate surrounds of the Project area, for example temporary impacts associated with the construction of new buildings (i.e., amenity values, access, noise, air quality) ▪ The community in the PSL would likely also experience longer term operational impacts such as noise and visual impacts of the Project.
SSL	▪ The LGAs of MWRC, Warrumbungle Shire, and Dubbo Regional. These LGAs have been identified due to the substantial amount of renewable energy construction occurring across the region, and the three LGAs are also located within the CWO REZ.	▪ The community in the SSL would likely experience the broader scale benefits of the Project, including direct and indirect job creation, business and investment opportunities, and community funding. ▪ The community in the SSL would also experience cumulative impacts of concurrent development in the CWO REZ.

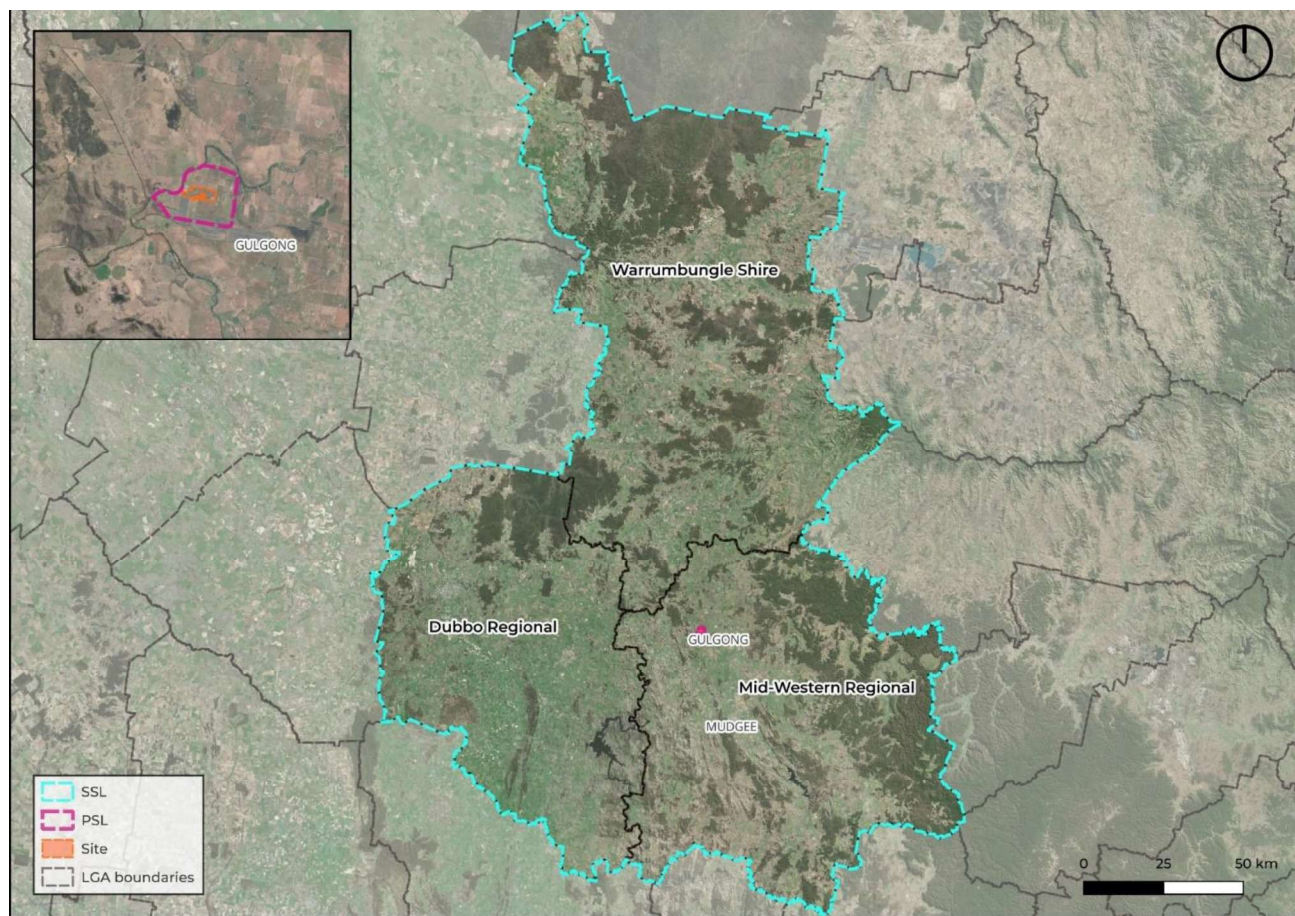


Figure 7-13. PSL and SSL for the social impact assessment

7.10.2 Existing environment

7.10.2.1 Regional and local context

The Project is located in the Central West and Orana region of NSW, at the geographic heart of NSW with regional centres, historic towns and villages and diverse economies and lifestyles. The region is home to the Wiradjuri people – 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), the Lachlan River (Kalari) and the Murrumbidgee River (Murrumbidjeri), which border their lands. Aboriginal people account for approximately 6.8% of the Mid-Western Regional LGA (ABS, 2021).

Tourism is an important industry in the area, and it contributes significantly to the local economy. The Mid-Western region has a diverse range of natural and cultural attractions, including national parks, wineries, historic sites, and events. According to the MWRC’s website, tourism is a key industry in the region and attracts over 691,000 visitors each year (MWRC, 2024).

Based on the locations and the social infrastructure/business activities in each township, the townships most likely to interact with the Project from a social and economic impact perspective are described in **Table 7-42**.

Table 7-42. Largest townships near the Project within the SSL

LGA and township	Driving distance to the Project	Description
MWRC LGA		
Gulgong	10 minutes south-east of	- Gulgong has a population of approximately 2,000 persons - Founded as a gold mining settlement, the township today predominantly functions as a service hub for local agricultural activities and has a tourism role due to its historic features.
Mudgee	35 minutes south	- Mudgee has a population of approximately 11,700 persons. It is the second largest town in the SSL and is the regional service centre for the Cudgegong River Valley region and MWRC - While the Mudgee district is historically noted for gold mining, the township now operates as a regional services hub for local agriculture including viticulture, sheep and cattle grazing, cropping etc, as well as mining.
Rylstone	70 minutes south-east	- Rylstone has a population of approximately 660 persons - Traditionally known for its history including gold mining and agriculture. Services are limited as township is principally residential in nature and mainly supports agricultural activities for the wider municipality.
Dubbo Regional LGA		
Dubbo	75 minutes north-west	- Dubbo has a population of approximately 41,000 persons and is the largest town in the SSL - Dubbo is the major regional centre for NSW's Central West region and supports a range of major civic, education, health and commercial services for a network of smaller townships nearby.
Wellington	55 minutes west	- Wellington has a population of approximately 4,700 persons - The township functions as a local service hub for surrounding agriculture areas and attracts visitors to the Wellington Caves Complex, Lake Burrendong State Park, and Mount Arthur Reserve.
Warrumbungle Shire LGA		
Dunedoo	30 minutes north	- Dunedoo has a population of approximately 750 persons - The township is situated at the intersection of the Castlereagh and Golden Highways, and is traditionally known for its history in mining, agriculture, military and Aboriginal heritage.
Coolah	50 minutes north-east	- Coolah has a population of approximately 795 persons - The township is located centrally in the LGA and predominantly functions as a service hub for local agricultural activities, and provides the gateway to the Coolah Tops National Park.
Mendooran	60 minutes north-west	- Mendooran has a population of approximately 270 persons - The township contains very limited retail and commercial offerings

Demographic information from ABS ERP 2022

7.10.2.2 Demographic profile

Based on the 2021 ABS Census of Population and Housing data (ABS, 2021) for ABS Statistical Area 1 (SA1), the demographic profile of the PSL can be characterised by:

- Median age of the PSL population is 40.8 years old which is slightly higher than the SSL (39.3 years) and lower than the Regional NSW baseline (42.4 years). In comparison to the SSL and Regional NSW baseline, the PSL has a larger cohort of people aged 35-49 and people ages 70-84

- The PSL has generally lower level of education obtained compared to SSL and Regional NSW
- Median annual household income in the PSL (\$108,680) which is significantly higher than the SSL (\$79,670) and Regional NSW (\$75,280)
- The PSL has less cultural diversity compared to SSL and Regional NSW baseline, with higher proportion of people born in Australia (93.9%)
- The PSL has a higher proportion of family households (76.2%), and families with children, compared to SSL (68.6%) and Regional NSW (68.8%)
- Dwellings in the PSL are entirely comprised of separate houses
- The most common tenure type in the PSL is ownership with a mortgage (51.6%) and is significantly higher rate than SSL (33.3%) and Regional NSW (32%)
- The PSL (90.3%) and SSL (86.4%) have more prevalent long term health conditions compared to Regional NSW (50.2%). Within the PSL the most prevalent health conditions are asthma, stroke and kidney disease
- There is a lower proportion of people who need assistance in the PSL (5%) and SSL (6.8%) compared to Regional NSW (7.3%).

7.10.2.3 Population trends and forecasts

The historical and projected population from 2016 to 2036 for the PSL and SSL is presented in **Table 7-43**.

Based on the below table, key findings include:

- Population of the PSL is projected to increase by 10 people and 7,540 people in the SSL between 2024 and 2036
- Population is projected to grow at a rate below that of NSW (1.0%) around 0.7% annually between 2024 and 2036
- Warrumbungle Shire is projected to experience a decline in population of 890 persons over the period.

Table 7-43. Population trend and projections for the study areas and NSW

	2016	2024	2026	2031	2036	2024 to 2036
Population (no.)						
PSL	20	25	30	30	35	+10
MWRC	24,550	26,210	26,660	27,750	28,810	+2,600
Dubbo Regional	51,400	56,770	57,820	60,220	62,600	+5,830
Warrumbungle Shire	9,560	9,090	8,950	8,580	8,200	-890
SSL (Total)	85,510	92,070	93,440	96,560	99,610	+7,540
Annual Growth (no.)						
MWRC		+210	+230	+220	+210	+220
Dubbo Regional		+440	+530	+480	+480	+490
Warrumbungle Shire		-80	-70	-70	-80	-70
SSL (Total)	-	+570	+690	+620	+610	+630
Annual Growth (%)						
MWRC		+0.8%	+0.9%	+0.8%	+0.8%	+0.8%
Dubbo Regional		+0.8%	+0.9%	+0.8%	+0.8%	+0.8%
Warrumbungle Shire		-0.9%	-0.8%	-0.8%	-0.9%	-0.9%

	2016	2024	2026	2031	2036	2024 to 2036
SSL (Total)	-	+0.6%	+0.7%	+0.7%	+0.6%	+0.7%
NSW	-	+0.9%	+0.6%	+1.1%	+1.1%	+1.0%

Source: ABS, 3218.0 Regional Population Growth, Australia; Department of Environment and Planning – NSW State and Local Government Population Projections 2022, 2022 NSW Common Planning Assumption Projections; Victoria in Future, 2019

Note: Figures rounded; some rows and columns may not sum due to rounding

7.10.2.4 Socio-economic disparity

The Socio-Economic Indexes for Areas (SEIFA) provides a measure of the relative socio-economic advantage and disadvantage of geographical areas using ABS Census data. SEIFA provides an indication of the collective socio-economic characteristics of the communities in the study areas and can highlight potential vulnerable communities that may be disproportionately affected by the Project. Lower values generally represent areas of higher relative disadvantage while higher values generally represent areas of least disadvantage.

The SEIFA for the study areas are shown in **Figure 7-14**. The PSL experience moderate to high levels of comparative disadvantage. By contrast, Gulgong – the nearest town – has substantially higher levels of disadvantage, with the northern side of the town comprising a very disadvantaged area, while the southern side of the town experiences disadvantage, though to a lesser extent.

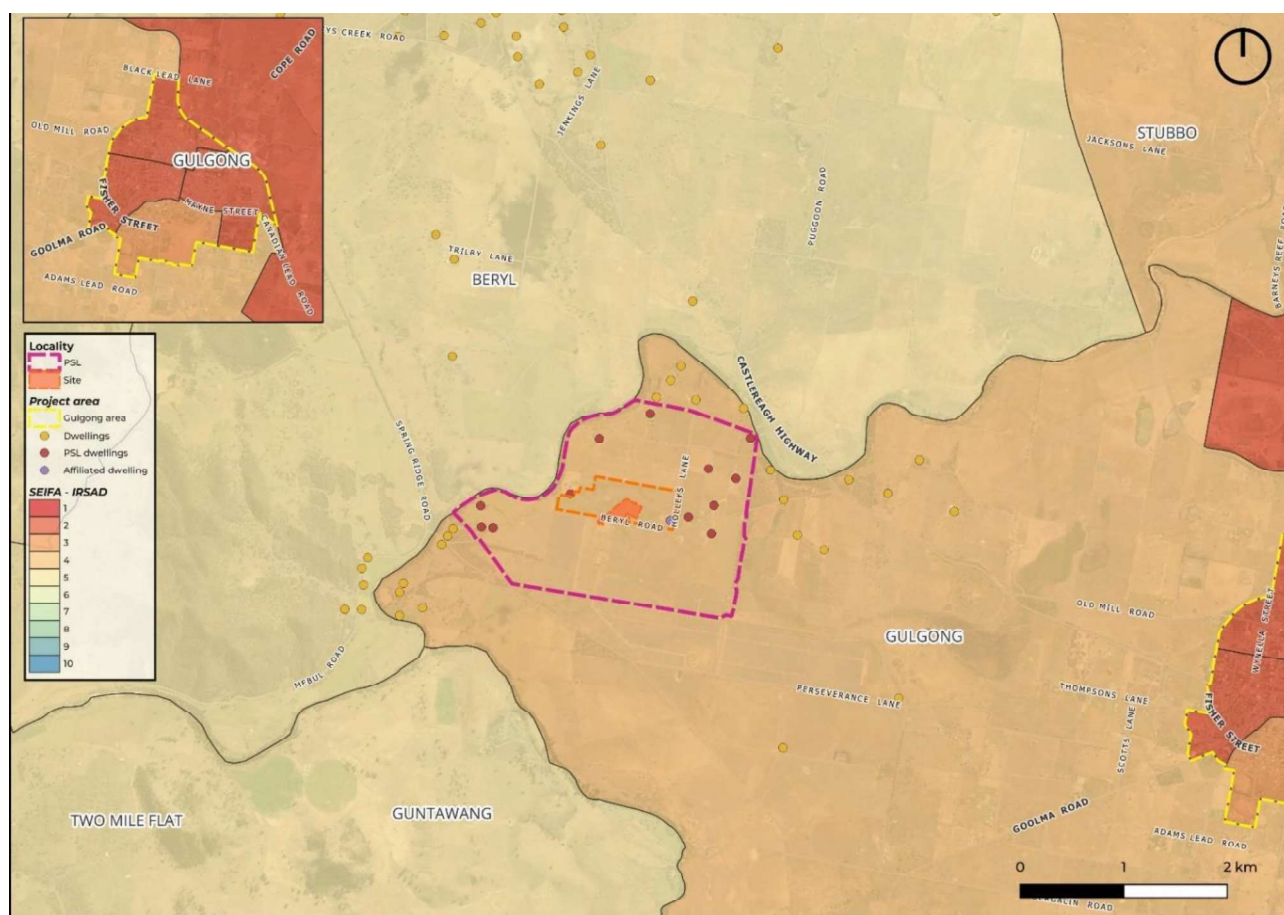


Figure 7-14. SEIFA map

7.10.2.5 Community values

Based on SEIA engagement with key stakeholders, the key community values and concerns included:

- Multiple energy infrastructure development proposed in the local and broader region, which can:
 - Change the area from rural residential/agricultural to different land uses
 - Loss of tourism
 - Increase the number of construction workers in the area, which can change the community characteristics of public spaces, and also affect housing availability and prices
 - Cause community fractions as some people benefit financially and some do not
- Specific concerns about the Project, including:
 - Potential for the BESS to catch on fire and propagate off site, or from potential bush fires that can impact the Project
 - Unknown health impacts from living near the BESS, for residents and cattle, during operation as well as in the long term
 - Visual changes around the Project area as a result of the Project and the need for landscape vegetation screening that is effective.

7.10.2.6 Social infrastructure and township services

Key social infrastructure located in the study area would support the Project workforce during construction, operation and decommissioning phases. However the influx of workforce could also place a higher demand on social infrastructure within the study area, creating potential access issues for local communities who also need these social infrastructure, services or networks. Local social infrastructure near the PSL is concentrated in the Gulgong township as shown in **Figure 7-15**.

Beryl Battery Energy Storage System
Environmental Impact Statement



Figure 7-15. Social infrastructure near the Project

7.10.3 Potential construction impacts

A number of potential positive and negative social impacts have been identified during construction of the Project, detailed in **Table 7-44**, and include:

- Potential reduction in community cohesion between landowners who will receive financial benefits and those who will not
- Impact of construction traffic on people's daily routine and access
- Impact on amenity, including dust, noise and vibration and visual impacts
- Potential loss of collective memories and cultural values
- Increased employment opportunities
- Increased patronage for local businesses.

Cumulative social impacts are described in **Section 7.13.6**.

Table 7-44. Summary of social impacts and significance evaluation during construction of the Project

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
Potential reduction in community cohesion	Way of life, community, livelihoods	Potential reduction in community cohesion between the Associated Landowner who receive financial benefits from the Project and who would not receive same direct benefits. The Project can contribute to tension or conflict among local community members with different views on energy sector and development.	Negative	Likely	Moderate	High	- Implementing a CSEP (refer to EMM S01) to provide information and address community and stakeholder concerns - Development of a Community Shared Benefit Strategy (EMM E02) which includes a community fund to be available to the wider community for initiatives like annual grants to local community organisations or specific programs.	Likely	Minor	Medium
Impact of construction traffic	Way of life, accessibility	Potential inconvenience and disruption caused by construction traffic on people's daily routine, affecting how people access work and amenities.	Negative	Possible	Minimal	Low	Implementing a CTMP (EMM TT01) to mitigate construction traffic and impacts on local access.	Unlikely	Minimal	Low
Impact on amenity	Health and wellbeing, way of life	Impact from construction noise and dust, potential contamination of air, water and land resources, which can affect health and wellbeing for sensitive receivers if not mitigated or managed.	Negative	Likely	Minor	Medium	Impacts associated with dust, visual amenity and noise are outlined in Section 7.4, Section 7.5 and Section 7.6 to mitigate construction impacts on sensitive receivers closest to the Project and the broader community.	Likely	Minimal	Low

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
Construction noise	Way of life, health and wellbeing	Construction noise levels are anticipated to be exceeded during months three – five of construction within a 2250 m radius of the project area	Negative	Likely	Minor	Medium	Construction noise management measures (Section 7.6).	Possible	Minimal	Low
Loss of collective memories and cultural values	Community, culture	Potential loss of collective memories and cultural values, as a result of the appearance of the Project area being altered, which can impact on sense of place associated with Aboriginal heritage and cultural memory.	Negative	Unlikely	Minimal	Low	- No Aboriginal objects, sites, areas of potential archaeological deposits or specific cultural values were recorded during field survey with a RAP - In the unlikely event that unexpected Aboriginal heritage items are encountered during works, the Unanticipated Finds Protocol (EMM AH01) will be implemented.	Unlikely	Minimal	Low
Increased employment opportunities	Livelihood	Potential benefits of increased employment opportunities in the area for local and regional workers during construction.	Positive	Likely	Minimal	Medium		Likely	Minor	Medium
Increased patronage for local businesses	Livelihood	Potential benefits of increased patronage for local businesses, where construction workers would spend on amenities and services.	Positive	Likely	Minor	Medium		Likely	Minor	Medium

7.10.4 Potential operational impacts

A number of potential positive and negative social impacts have been identified during operation of the Project, detailed in **Table 7-45**, and include:

- Potential reduction in community cohesion between landowners who will receive financial benefits and those who will not
- Fear of fire risk and other health and wellbeing impacts
- Change in visual appearance
- Impacts of operational traffic on access.

Cumulative social impacts are described in **Section 7.13.6**.

Table 7-45. Summary of social impacts and significance evaluation during operation of the Project

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
Potential reduction in community cohesion	Way of life, community, livelihoods	Potential reduction in community cohesion between the Associated Landowner who receive financial benefits from the Project and who would not receive same direct benefits. The Project can contribute to tension or conflict among local community members with different views on energy sector and development.	Negative	Likely	Moderate	High	- Implementing a CSEP (refer to EMM S01) to provide information and address community and stakeholder concerns - Development of a Community Shared Benefit Strategy (EMM E02) which includes a community fund to be available to the wider community for initiatives like annual grants to local community organisations or specific programs	Likely	Minor	Medium
Fear of fire risk and other health and wellbeing impacts	Health and wellbeing	Mental health and wellbeing may be impacted by additional stress and anxiety caused by these fears and living in proximity to the Project. This may include mental stress associated with fear or perception of long-term physical health effects caused by living adjacent to the Project, as well as perception of fire risk.	Negative	Likely	Moderate	High	- There are no specific bushfire or EMF risks associated with the BESS infrastructure. - Hazard and bush fire environmental management measures (Section 7.9.1.5 and Section 7.9.2.4) would be implemented to prevent or manage any risks - Implementing a CSEP (EMM S01) to provide information and address community concerns.	Likely	Minor	Medium

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
Change in visual appearance	Way of life, community	Impact on the visual appearance around the Project area, as viewed from the public street or road and from immediate neighbouring properties. Potential for a change in local residents' sense of place and perceived impact on property values.	Negative	Likely	Minor	Medium	- Vegetation screening has been included in the Project design - Landscape and visual amenity EMMs (Section 7.5.6) to reduce visual impacts in the locality.	Likely	Minimal	Low
Operational noise	Way of life, health and wellbeing	The operation noise during full load charging and discharging scenarios during worst-case meteorological conditions may impact receivers within 550 m of the Project (three dwellings), exceeding project noise level triggers.	Negative	Likely	Minor	Medium	Operational noise impacts from the plant can be effectively controlled and compliance with the project amenity noise levels (PANL) can be achieved at all receivers by operating BESS at half-load charging during the Evening and Night period and half-load discharging during the Night time period.	Possible	Minimal	Low
Operational traffic	Way of life, accessibility	Potential operational traffic impact on people's daily living and routine or causing inconvenience.	Negative	Likely	Minimal	Low	- Traffic movements would be minimal with light vehicles occasionally needing to access the site for maintenance activities - Heavy vehicle movements to and from the Project area will be scheduled to minimise traffic disruption to	Unlikely	Minimal	Low

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
							the surrounding road network.			
Diversification of income	Livelihood	The Associated Landholder will receive direct financial benefits. A VPA scheme and community benefit fund is being prepared whereby Council will receive additional funding to support community needs	Positive	Likely	Minor	Medium	The community benefit fund will be focussed on the Gulgong region	Likely	Minor	Medium

7.10.5 Potential decommissioning impacts

Decommissioning activities would pose similar potential impacts and benefits as construction activities, albeit over a shorter timescale. Impacts may be associated with dust, noise, and vibration caused by use of heavy machinery and vehicle traffic associated with decommissioning activities. Benefits may include local employment for works in Gulgong and the wider MWRC.

The rehabilitation of the Project area would have positive benefits on the landscape by reinstating a rural or 'natural' character.

As described in **Section 3.7**, a Decommissioning and Rehabilitation Plan will be prepared for the Project.

7.10.6 Environmental management measures

Proposed measures to manage and/or mitigate social impacts from the Project are detailed in **Table 7-46**.

Table 7-46. Social environmental management measures

Impact	Reference	Environmental management measure	Timing
Community and stakeholder engagement	S01	The Community and Stakeholder Engagement Plan (CSEP) will be implemented and updated to help provide timely and accurate information to the community during all phases of the Project. The plan will include but not be limited to: ▪ Mechanisms to provide details and timing of proposed activities, potential impacts and mitigation measures to nearby residents and communities, visitors and motorists ▪ Processes for engaging with affected residents and stakeholders about potential impacts and proposed management measures ▪ Process for receiving and responding to queries and complaints regarding the Project's construction.	Prior to construction, construction, operation, decommissioning

7.11 Economic impacts

A SEIA (**Appendix O**) was prepared by Ethos Urban for the Project in response to the SEARs. A summary of the assessment in relation to economic impacts is provided in this section.

7.11.1 Assessment methodology

The methodology for the assessment involved:

- A review of information including independent CIV report and investment figures, estimated employment numbers
- A economic baseline analysis to define the EIA study area, determine available workforce size and skills composition in the EIA study area
- Discussions with real estate agents in Gulgong on 11th December 2023 and in Mudgee on 12th December 2023.
- An assessment of Project employment (direct and indirect) over construction and operational phases, and applying Australian Bureau of Statistics (ABS) multipliers where relevant
- An estimation of Project investment, and the estimated share of investment retained in the EIA study area, based on benchmarking analysis of similar sized energy developments
- Identification of business and industry participation opportunities
- An assessment of employment, land use and agricultural impacts, accommodation and housing impacts, and cumulative impacts related to concurrent construction of development in the EIA study area particularly in the CWO REZ
- An estimation of economic stimulus impacts including Project wages and spending, landowner and community benefit scheme payments, as well as broader economic benefits for NSW over the life of the Project
- Identification of management measures relating to accommodation, workforce, procurement and community benefit sharing.

7.11.1.1 Study area

The study area (EIS study area) for the assessment includes three LGAs; MWRC, Warrumbungle Shire, and Dubbo Regional.

The local and regional communities within the study area, to differing extents, have the potential to contribute to the Project and derive economic benefits from both the construction and ongoing phases of the Project.

7.11.2 Existing environment

7.11.2.1 Demographics

Population trend and forecast information is provided in **Section 7.10.2.3**.

7.11.2.2 Labour force, occupation and business

The study area has a labour force of 48,650 persons and an unemployment rate of 2.6% as of June 2023, which is significantly lower than the rate for NSW (3.2%) (refer to **Table 7-47**).

Table 7-47. Labour force for study area and NSW (number of persons)

Region	Labour force	Unemployed	Unemployment rate
MWRC	13,200	220	1.7%
Dubbo	30,870	860	2.8%
Warrumbungle	4,580	170	3.7%
Study area (Total)	48,650	1,250	2.6%
NSW	4,457,400	142,700	3.2%

Source: ABS, 3218.0 Regional Population Growth, Australia; Department of Environment and Planning – NSW State and Local Government Population Projections 2022, 2022 NSW Common Planning Assumption Projections; Victoria in Future, 2019

Notes: All figures rounded. Columns may not sum due to rounding

Within the study area, the occupational structure is presented in **Table 7-48**, which includes a high proportion of employed residents in construction-related industries (34.1%).

Table 7-48. Occupation in the study area, 2021

Occupation	Study area (no.)	Study area (%)	NSW (%)
Managers	5,610	13.9%	14.3%
Professionals	6,720	16.7%	25.4%
Technicians and Trades Workers	5,910	14.7%	11.6%
Community and Personal Service Workers	5,480	13.6%	10.4%
Clerical and Administrative Workers	4,550	11.3%	12.8%
Sales workers	3,410	8.5%	7.9%
Machinery Operators and Drivers	3,290	8.2%	5.9%
Labourers	4,520	11.2%	8.0%
Inadequately described/ Not Stated	750	1.9%	1.8%
Total	40,240	100.0%	100.0%

Source: ABS, Census of Population and Housing, 2021, TableBuilder – Usual Place of Residence

Note: Figures rounded. Columns may not add up due to rounding.

There are also about 1,630 construction related businesses in the study area representing 16.6% of all businesses in this locality. This indicates a reasonable presence of the types of businesses that have the potential to service construction, operation and decommissioning needs of the Project. A number of other industries are also expected to potentially benefit from direct and indirect impacts including:

- Retail trade,
- Accommodation and food services
- Financial and insurance services
- Rental, hiring and real estate services
- Health care and social assistance.

These sectors make up approximately 24.5% of all businesses located in the study area and their services would likely support personnel for the Project.

7.11.2.3 Accommodation capacity

Key findings of the accommodation capacity within the study area include:

- Based on an audit of commercial and private accommodation located within the major townships up to 60 minutes-drive from the Project, there are approximately 87 establishments with 1,812 rooms total capacity in the Project area (**Table 7-49**)
- Most accommodation providers are located at Dubbo and Mudgee, reflecting their role as regional hubs, however, Dubbo is unlikely to be the primary choice for accommodation due the 75-minute drivetime from the Project. Other smaller townships also provide visitor accommodation options, including at Gulgong, Wellington and Dunedoo, which support tourism that centres around the region's history, scenic values and wine industry
- While room occupancy rates are not available at a local level, there are occupancy rates published for Central NSW in which the study area is located. For Central NSW region the average annual occupancy rate is 68%. This indicates a reasonable supply of available rooms, however this trend may be different at a local level near the Project area.
- There is a higher share of unoccupied private dwellings (11.1%) when compared to the NSW average (9.4%). The number of unoccupied dwellings total 4,040. Specifically, MWRC and Warrumbungle LGA have a significant share of unoccupied dwellings (15.0% and 17.5% respectively), which can indicate a potential availability if these dwellings enter the market to support the Project or other infrastructure development in the region. However, such a high share of unoccupied dwellings also fulfills an important role in providing supply to support existing or future population (refer to **Table 7-43**).
- About 880 active short-term rentals (estimated at 2,200 rooms) are currently advertised in the study area. However, it is likely that many of these rooms already play a role in servicing a range of visitor sectors including business travellers, tourists, seasonal agriculture workers and the visiting friends and family cohort
- The depth of supply may not be sufficient to service the accommodation demands associated with multiple concurrent infrastructure development proposed in the study area, and the CWO REZ.

Overall, the study area has a good supply of commercial accommodation and short-term rentals but a low supply of established rental properties. Importantly, much of this accommodation will not be available to major infrastructure projects, with this accommodation required to support local housing and key industry sectors such as agriculture, mining and tourism.

Table 7-49 Commercial accommodation in the study area, February 2024

Township	Establishments	Rooms	Cabins	Total Supply (Rooms)
Mudgee	24	471	35	506
Gulgong	9	114	12	126
Dubbo	34	864	77	941
Wellington	11	108	29	137
Dunedoo	3	18	15	33
Rhylstone	2	27	n/a	27
Kandos	4	42	n/a	42
Study Area	87	1,644	168	1,812

7.11.3 Potential construction impacts

7.11.3.1 Labour force and business participation

The Project would generate direct construction employment, with estimated 40 FTE during the peak construction.

As indicated in **Section 7.11.2.2**, the study area is anticipated to have a moderate supply of construction-related workers (13,720 workers) however their capacity to work on the Project would be limited by the multiple concurrent infrastructure development in the region that would each have a demand for construction workers and the generally low unemployment rate in the study area. On this basis, the following employment split is considered realistic:

- **Local employment** – 5% or an average of 1 FTE job expected to be sourced from the study area, rising to 2 FTE local jobs during peak
- **Non-local employment** – 95% or an average of 19 FTE jobs expected to be sourced from outside the study area, rising to 38 FTE non-local jobs during peak.

The Project would also generate indirect construction employment. By applying an industry-standard multiplier for the construction industry of 1.6 (based on ABS Type B multipliers) the Project is estimated to support an additional 30 FTE jobs indirectly on average over the construction period of 12 months, and 65 FTE indirectly during peak.

Indirect or flow-on jobs (captures industry and consumption effects) include those supported locally and in the wider economy (including within other parts of NSW, and nationally). It is assumed that 20% of the indirect jobs or 5 FTE jobs are supported in the study area.

The total monthly construction employment during average and peak construction is summarised in **Table 7-50**.

Table 7-50. Construction employment summary

Construction	Direct monthly employment		Indirect monthly employment		Total monthly employment	
	FTE	FTE in study area (5% share)	FTE	FTE in study area (20% share)	FTE	FTE in study area
Average	20	1	30	5	50	6
Peak	40	2	65	15	105	17

Source: RAC (2024); Ethos Urban (2024), ABS (2024) Input-Output Tables.

Note: Figures rounded

The study area has a comparably moderate supply of construction-related businesses (1,630 businesses), as well as approximately 2,400 businesses that are likely to benefit directly or indirectly from the Project. However, the availability of business and services would be constrained as the demand rises with multiple concurrent infrastructure projects in the region.

Dubbo is expected to be the main township with business capacity to services some of the construction demands of the Project, with limited support services from smaller townships.

7.11.3.2 Housing and accommodation

During peak construction, 38 non-local FTE would need to be accommodated in the study area, which is likely to span several months. During non-peak construction, the average number of non-local FTE across the 12 month construction phase is estimated at 19 FTE workers, which can reduce during period of low site activity.

Based on the outcomes of **Section 7.11.2.3**, it is expected that there would be a shortage of local accommodation options in the study area. A Construction Workforce Accommodation Strategy has been prepared for the Project (**Appendix O**) which proposes the following strategy:

- Prioritising the use of already established worker camps from nearby renewable energy projects.
- Exploring the potential of housing non-local workers in homes within the local region that are currently vacant or significantly underutilised
- In limited circumstance a small number of short-term Project workers might be housed in commercial and private rental accommodation if this is beneficial to local providers e.g. those with high vacancy rates, during off peak seasons

The Construction Workforce Accommodation Strategy will continue to be development, monitored and implemented during the life of the Project, as detailed in **Section 7.11.6**.

7.11.3.3 Agriculture impacts

Approximately 4.2 ha of existing agricultural land would be used for the Project, and this land has been used for non-intensive grazing purposes. The Project would not impact on the Project area's capability for hosting more intensive agricultural uses. There is an opportunity for the continuation of non-intensive grazing across the remaining land around the Project area within the Associated Landowner's property.

Due to the nature of the Project and the current use of the land, there would be no net loss of employment associated with construction of the Project.

7.11.3.4 Local, regional and State economic stimulus

Given 95% of the total FTE workforce during construction would be sourced from outside the study area, this level of employment would equate to \$1.4 million in wages (2023 dollars) on the basis that each non-local worker is employed for the 12-month construction phase. A considerable proportion of these wages would be spent in the study area where these workers would be based. An estimated \$715,000 in wages (2023 dollars) would likely be direct to local and regional businesses, as well as service providers as spending, which can include:

- Housing expenditure
- Retail expenditure
- Recreational spending
- Personal, medical and other services.

Based on the anticipated spending, it would generate the equivalent of approximately 4 FTE jobs (on average per month, included in indirect employment calculations in **Section 7.11.3.1**) in the services sector and associated supply chains in the study area. These jobs are included in the indirect employment estimates outlined above in **Section 7.11.3.1**.

The Project is also estimated to deliver the following key State wide economic benefits during construction:

- Capital investment: \$55 million or 40% of total project capital investment (recognising the large import component associated with BESSs)
- Construction employment: 45 FTE jobs or 90% of total average construction employment (direct and indirect)

7.11.4 Potential operational impacts

7.11.4.1 Labour force and business participation

During operation, the Project would support ongoing employment of 2 FTE directly and 5 FTE indirectly, with 3 FTE of these positions supported in the EIA Study Area, as summarised in **Table 7-51**.

Table 7-51. Operation employment summary

Operation	Direct monthly employment		Indirect monthly employment		Total monthly employment	
	FTE	FTE in study area (5% share)	FTE	FTE in study area (20% share)	FTE	FTE in study area
Total	2	1	5	2	7	3

7.11.4.2 Housing and accommodation

During operation, it is expected that non-local workers would likely relocate permanently to towns in the study area and would either rent or buy housing. It is expected that demand for housing during operation would be met by current housing supply in the study area with minimal social impacts.

7.11.4.3 Agriculture impacts

As per **Section 7.11.4.3**, due to the nature of the Project and the current use of the land, there would be no net loss of employment associated with operation of the Project.

7.11.4.4 Local, regional and State economic stimulus

Ongoing economic stimulus associated with operational of the Project would include:

- Associated Landowner would receive annual lease payments to host the Project
- The Project would contribute community payments to the MWRC under a VPA
- Annual contributions to a community benefit fund focussed on the Gulgong region, that would be spent on community projects
- The Project would support 3 FTE jobs in the study area which would provide an estimated stimulus of approximately \$300,000 (2020 dollars) in Year 1 of operations
- The total operational economic stimulus over 30 years of operation would be approximately \$20 million (2023 dollars, Consumer Price Index adjusted). This would include operational wages, Associated Landowner payments, VPA arrangements with MWRC.

Operation of the Project is also estimated to deliver the key State wide economic benefits of ongoing employment of 6 FTE jobs, or 90% of total operating employment (direct and indirect).

7.11.5 Potential decommissioning impacts

Decommissioning activities would involve a significant on-site workforce, although this expected to be less than the construction workforce to dismantle the infrastructure and other workers to transport project components from the site for disposal or recycling. The Project area then would require a range of resources to undertake rehabilitation activities.

Decommissioning would therefore support some employment, and business contracts and provide a spending stimulus to the study area over the decommissioning period.

7.11.6 Environmental management measures

Proposed measures to manage and/or mitigate economic impacts from the Project are detailed in **Table 7-52**.

Table 7-52. Economic environmental management measures

Impact	Reference	Environmental management measure	Timing
Workforce accommodation	E01	The Construction Workforce Accommodation Strategy will be implemented and updated for the Project to mitigate workforce accommodation impact. Key strategies include: ▪ Prioritising the use of already established worker camps from nearby renewable energy projects. ▪ Exploring the potential of housing non-local workers in homes within the local region that are currently vacant or significantly underutilised ▪ Implementing a program to monitor and review the effectiveness of the strategy over the life of the Project, including regular monitoring and review during the construction phase.	Construction
Community Shared Benefit Strategy	E02	Implement Community Shared Benefit Strategy at commencement of construction that provides support local community organisations and specific programs. While guidelines and management structures for the operation of a community fund will need to be put in place; there is potential for this to be governed through a Voluntary Planning Agreement (VPA) or other proposed mechanism with Council.	Prior to construction, construction

7.12 Waste

A preliminary waste management plan (**Appendix R**) and was prepared by Jacobs for the Project in response to the SEARs. A summary of the assessment is provided in this section.

7.12.1 Assessment methodology

The methodology for the assessment involved:

- Classification and quantification of anticipated wastes generated during construction, operation and decommissioning of the Project
- Review of nearby solid waste facilities and wastewater treatment facilities
- Describe the principles, procedures and management strategy for waste generated by the Project to avoid to the extent possible waste being disposed of at Council landfills or burdening the local waste management infrastructure.

7.12.2 Existing environment

The solid waste facilities located closest to the Project are shown in **Table 7-53**. Waste volumes unable to be accommodated by MWRC would be directed to alternative waste management facilities, if required.

The wastewater treatment facilities near the Project are listed in **Table 7-54**. Outside MWRC and Warrumbungle Council regions, the nearest facilities are all more than 100 km from the Project.

Table 7-53. Solid waste facilities near the Project

Solid waste facilities	Council	Distance (km)
Gulgong Waste Facility	Mid-Western Regional	8
Home Rule Rural Waste Transfer Station	Mid-Western Regional	11
Ulan Rural Waste Transfer Station	Mid-Western Regional	24
Cooyal Rural Waste Transfer Station	Mid-Western Regional	26
Goolma Rural Waste Transfer Station	Mid-Western Regional	31
Mudgee Waste Facility	Mid-Western Regional	32
Birriwa Rural Waste Transfer Station	Mid-Western Regional	33
Dunedoo	Warrumbungle Shire	45
Cassilis Waste Transfer Station	Upper Hunter Shire	68
Wellington Waste Transfer Station	Dubbo Regional	74
Coolah	Warrumbungle Shire	80
Mendooran	Warrumbungle Shire	84

Table 7-54. Wastewater treatment facilities near the Project

Wastewater treatment facilities	Council	Distance (km)
Gulgong Sewage Treatment Plant	Mid-Western Regional	9
Mudgee Sewage Treatment Plant	Mid-Western Regional	26
Dunedoo Sewage Treatment Plant	Warrumbungle Shire	45
Coolah Sewage Treatment Plant	Warrumbungle Shire	80
Rylstone Sewage Treatment Plant	Mid-Western Regional	82
Kandos Sewage Treatment Plant	Mid-Western Regional	86

Wastewater treatment facilities	Council	Distance (km)
Merriwa Sewage Treatment Plant	Upper Hunter Shire	108
Dubbo Sewage Treatment Plant	Dubbo Regional	112

7.12.3 Potential impacts

7.12.3.1 Waste generation and management

Waste generated by the Project would predominantly be during Project construction and decommissioning. Waste generated during the operation would be minimal as it would only involve maintenance and monitoring activities with a small operational workforce.

A summary of the estimated quantities of materials, the treatment/disposal strategy and treatment/disposal locations are provided in **Table 7-55**. The estimated quantity of waste streams is provided where known, however there are some waste types that would be subject to detailed design and the quantities would depend on the technology supplier/manufacturer requirements.

Based on the results of the waste generation estimates, the quantities of recovered materials and residual materials requiring disposal associated with the Project is very low. In addition, the proposed waste management strategy for the Project (refer to **Section 7.12.4**) includes a number of steps that are consistent with the waste hierarchy, the principles of the circular economy and the principles of Smart Waste Management, thereby minimising an adverse impact on the environment or the Council's existing waste management infrastructure.

Special waste, hazardous waste and general (packaging) solid waste that is generated by the Project would be required to be removed from the Project area for treatment and/or disposal at facilities that are located outside the Council jurisdictional area.

It is proposed that liquid waste be disposed at the Gulgong Sewage Treatment Plant, as the quantities are very low and this is the most practical and environmentally sound solution. It is also proposed that due to the very low quantities general solid waste and recyclables that are generated that these materials be collected by existing local commercial waste collectors for transport to the Mudgee Waste Facility.

The procurement process provides the construction contractors and equipment suppliers/maintenance providers the flexibility to identify the most practical and environmentally sustainable management options for recovery and/or disposal of materials that would be generated by the Project.

Further consultation with MWRC would be carried out when waste stream quantities are confirmed and technology supplier is chosen during detailed design, and the preliminary waste management strategy would also be updated accordingly.

7.12.3.2 Resource use and availability

The quantity of materials required for the Project are unlikely to impact on the availability of local or regional resources.

Table 7-55. Anticipated waste generation and treatment strategy

NSW EPA classification	Waste stream	Phase	Waste description	Estimated quantity	Treatment/disposal strategy
Special waste	Waste tyres	Construction	Used or damaged tyres from plant and equipment	Unknown quantity, expected to be <5 tyres over the 12-month construction period	Procurement Process - Require that the company retained to replace tyres will remove used/damaged tyres from the Project area for processing outside Council region.
		Operation		None	
		Decommissioning		Unknown quantity, expected to be <2 tyres over the 3-month decommissioning period	
Liquid waste	Sewage	Construction	Pump out of portable toilets	28,000 litres (L) per week at peak	Expect that the Portaloo contractor/ waste service contractor remove liquid waste from the Project area and take to Gulgong Sewage Treatment Plant as this is in very close proximity to the Project area.
		Operation	Pump out of septic tank	2,800 L per month	
		Decommissioning	Pump out of portable toilets	14,000 L per week at peak	
	Coolant	Construction	Used coolant from plant and equipment	Unknown volume	Procurement Process - Require that the equipment service company remove coolant from the Project area for processing or disposal outside Council region
		Operation		Unknown volume	
		Decommissioning		Unknown volume	
Hazardous waste	Fuels, lubricants and chemicals	Construction	Containers that previously contained Class 1, 3, 4, 5 or 8 substances used for plant	Minimal	Procurement Process - Require that the equipment service company will remove waste chemicals and waste oils from the Project area for processing outside the Council region.
			Used oil from plant and equipment	Unknown volume	
			Oil from refilling transformer	None	Not required as inverter transformers are transported oil filled.

NSW EPA classification	Waste stream	Phase	Waste description	Estimated quantity	Treatment/disposal strategy
		Operation	Containers that previously contained Class 1, 3, 4, 5 or 8 substances used for plant	Minimal	Procurement Process - Require that the equipment service company will remove waste chemicals and waste oils from the Project area for processing outside the Council region.
			Used oil from plant and equipment	Unknown volume	
		Decommissioning	Containers that previously contained Class 1, 3, 4, 5 or 8 substances used for plant	Minimal	
			Used oil from plant and equipment	Unknown volume	
	Batteries	Construction	Used batteries from tools, etc	Minimal	Procurement Process - Equipment service contractor for recycling or processing outside of the Council area.
		Operation			
		Decommissioning			
	Hydrocarbon-contaminated soils	Construction	Spills from plant and refuelling	None to Minimal	Procurement Process - Require that the equipment service company will remove contaminated soils from the Project area for processing or disposal outside the Council region
		Operation			
		Decommissioning			
	BESS batteries	Construction	Batteries and other materials from the BESS	Minimal	Expected to be collected by the supplier if faulty
		Operation		Minimal	Procurement Process - Equipment service contractor for processing outside the Council region.
		Decommissioning		All batteries (approximately 324 battery enclosures)	
Restricted solid waste	None identified	During all phases	n/a	n/a	n/a
		Construction	Clearing of vegetation	Low volume (4.07 ha)	

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NSW EPA classification	Waste stream	Phase	Waste description	Estimated quantity	Treatment/disposal strategy
General solid waste (putrescible)	Vegetation/green waste	Operation		Very low volume	Onsite composting/reuse where possible, otherwise treatment or landfill facility outside Council region.
		Decommissioning		None	
	Residual solid waste/food waste	Construction	Waste from workers	196 L per week (20.58 kg per week) at peak	Mudgee Waste Management Facility – Not viable to transport low volume outside Council region.
		Operation		19.6 L per month (2.06 kg per month)	
		Decommissioning		98 L per week (10.29 kg per month)	
General solid waste (non-putrescible)	Excavated natural materials (soil)	Construction	Earthworks spoil	Approximately 1,800m ³	Mudgee Waste Management Facility – Not viable to transport low volume outside Council region.
		Operation	n/a	None	n/a
		Decommissioning	Earthworks spoil	Minimal	Reuse onsite where possible. Otherwise, treatment or landfill facility outside Council region.
	Site office waste/materials	Construction	Source separated materials (Cardboard, plastic, glass, metal)	504 L per week (35.28 kg per week) at peak	Treatment, reuse or landfill facility outside Council region.
		Operation		50.4 L per month (3.53 kg per month ¹)	
		Decommissioning		252 L per week (17.64 kg) at peak	
	Packaging waste	Construction	Packaging waste (e.g., boxes) as required for transportation of BESS components	Unknown volume	Procurement process requires removal by supplier (extended producer responsibility) for recycling/reuse outside of the Council area
		Operation		Minimal	
		Decommissioning		Unknown volume	

NSW EPA classification	Waste stream	Phase	Waste description	Estimated quantity	Treatment/disposal strategy
	Packaging waste	Construction	Oil drums	Approximately 150 x 200L oil drums	Procurement process requires removal by supplier (extended producer responsibility) for recycling/reuse outside of the Council area
		Operation		Minimal	
		Decommissioning		None	
	Packaging waste	Construction	Cable drums	Unknown	Procurement process requires removal by supplier (extended producer responsibility) for recycling/reuse outside of the Council area
		Operation		Minimal	
		Decommissioning		None	
	Packaging waste	Construction	Pallets	Unknown volume	Procurement process requires removal by supplier (extended producer responsibility) for recycling/reuse outside of the Council area
		Operation		Minimal	
		Decommissioning		Unknown volume	
	Construction, maintenance or decommissioning waste	Construction	Timber, metal, asphalt, concrete, glass, plastic, rubber, plasterboard, ceramics, bricks from the installation of foundations and underground services and above ground civil, mechanical and electrical plant and equipment	Unknown volume	Procurement process requires removal by supplier (extended producer responsibility) for recycling/reuse outside of the Council area
		Operation		Minimal	
		Decommissioning		Unknown volume	
	Electrical waste	Construction	Cables	Lengths of LV and DC cables offcuts are expected to be up to 200 m	Procurement process requires removal by supplier (extended producer responsibility) for recycling or reuse outside of the Council area
		Operation		Minimal	
		Decommissioning		Lengths of LV and DC cables would be approximately 20 km	

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NSW EPA classification	Waste stream	Phase	Waste description	Estimated quantity	Treatment/disposal strategy
	Concrete waste	Construction	Concrete waste from concrete works, including concrete pump wash water	Minimal	Procurement process requires removal by supplier (extended producer responsibility) for recycling/reuse outside of the Council area
		Operation		None	
		Decommissioning		Approximately 500m ³	
	Grit and sediment from erosion controls	Construction	Collected in, and removed from, stormwater treatment devices and/or stormwater management systems	As generated	Treatment or landfill facility outside Council region.
		Operation			
		Decommissioning			

7.12.4 Environmental management measures

Proposed measures to manage and/or mitigate waste from the Project are detailed in **Table 7-56**.

Table 7-56. Waste environmental management measures

Impact	Reference	Environmental management measure	Timing
Waste generation	WS01	The preliminary Waste Management Plan will be implemented and regularly updated to manage waste generated by the Project during construction, operation and decommissioning. The plan will confirm the following: ▪ A summary of the waste types, classification and estimated annual quantities of wastes produced during construction of the Project ▪ Measures to manage waste disposal in accordance with the principles of the waste hierarchy, with emphasis on reduce, reuse, recycle prior to disposal of its wastes ▪ Procedure for assessing, classifying and storing waste in accordance with the Waste Classification Guidelines (EPA, 2014) and management options ▪ Procedures for storage, transport and disposal of waste ▪ Monitoring, record keeping and reporting, such as waste tracking data demonstrating the lawful disposal of contaminated products, waste or residues generated at the facility. Further consultation with MWRC would be carried out when waste stream quantities are confirmed and technology supplier is chosen during detailed design	Construction, operation, decommissioning
Training	WS02	All staff will receive appropriate levels of training as part of the on-boarding induction, so everyone is aware of how to segregate waste correctly and the potential issues associated with materials that require special handling. Regular toolbox meetings will include discussion on waste management issues and updates on how to minimise waste. Waste management related toolbox topics would also be covered following any waste-related incidents or matters	Construction, operation, decommissioning
Record keeping	WS03	Records will be maintained regarding the quantities and management practices for the following six waste classes of waste, as required by the NSW waste legislation	Construction, operation, decommissioning
Waste separation	WS04	Clear and effective signage will be provided on all waste bins and containers to help identify where these materials should be placed	Construction, operation, decommissioning

7.13 Cumulative impacts

The Project is located in the CWO REZ, where EnergyCo is the Infrastructure Planner responsible for coordinating transmission, generation and storage projects, as well as coordinating the potential impacts and benefits to communities who would be hosting these projects.

There is a significant number of new developments proposed, approved, under construction or seeking expansion within and around the CWO REZ, including more than 30 major energy infrastructure projects. These developments are expected to bring substantial investment in communities and job opportunities in the region. However, the scale and cumulative impacts of the new development in the CWO region can impact on communities and the environment during construction and operation.

While the CWO REZ and the future developments within the zone would contribute to cumulative impacts, it is important to note that not all proposed developments would be constructed or become operational. Given the CWO REZ has been over-subscribed, it is likely that not all of the developments in the zone would proceed or contribute to the currently predicted extent of cumulative impacts. Nonetheless, this cumulative impact assessment has considered potential cumulative impacts of the Project in the context of the potential impacts of the CWO REZ.

This cumulative impact assessment builds on the findings of the technical assessments carried out as part of this EIS to consider impacts from a proposed development in combination with other relevant future development that are anticipated or reasonably foreseeable.

7.13.1 Assessment methodology

The cumulative impact assessment was undertaken in accordance with the CIA Guidelines (DPE, 2022d) and involved:

- Identification of relevant future and existing developments (which have publicly available information) that could have cumulative impacts (refer to **Table 7-58** and **Figure 7-16**). This was informed by desktop assessment and consultation with MWRC
- Application of a screening criteria to determine which developments and key matters can result in a material cumulative impact in combination with the Project (refer to **Table 7-57**)
- Assessment of cumulative impacts for each key matter that may result in a material cumulative impact (**Section 7.1** to **Section 7.12**).

Table 7-57. Screening criteria for cumulative impact assessment

Screening criteria	
Location	▪ Direct overlap – Construction footprints of a development intersect with the Project ▪ Construction footprints are in close proximity to the Project.
Timeframe	▪ Concurrent or consecutive construction or operational programs with the Project
Status	▪ Changes to existing projects (expansions, modifications, closure) ▪ Approved projects (approved but construction has not commenced) ▪ Projects under assessment (application of the project has been exhibited and is currently under assessment) ▪ Related development (development that is required for the project but subject to separate development).
Scale	▪ A development was considered relevant where it is a large-scale major development or infrastructure project that could cause cumulative impacts with the Project.

The level of assessment (standard or detailed) and type of assessment (quantitative or qualitative) required for each key matter assessed was based on the scale and nature of the potential cumulative impacts, available information in publicly available planning documents and uncertainties associated with each relevant future development. Where construction timeframes are not known, predictions have been made about the likelihood of overlapping construction periods, based on the most current and publicly available information at the time of writing this EIS.

The following matters were not considered further in this assessment given the potential impacts would be localised and minor or where there is no potential overlap:

- Aboriginal heritage
- Historical heritage
- Land
- Water
- Hazards, including bush fire and EMF.

Table 7-58. Relevant future development with potential cumulative impacts

Project	Distance from Project area	Status	Estimated Workforce		Timeframe (targeted)		Potential cumulative impacts					
			Construction	Operation	Construction	Operation	Biodiversity	Visual amenity	Noise	Traffic and transport	Social	Economic
Beryl Solar Farm	0.01 km south	Operational	n/a	-	-	Operational	✓	✓	✓			
Mavis Solar Farm	1.1 km east	EIS preparation	150	5	2025 to 2026	2026 to 2065		✓	✓		✓	✓
Bellambi Heights BESS	2.4 km north	Approved	100	10	2024 to 2026	2026 to 2051		✓	✓	✓	✓	✓
Mayfair Solar Farm	5 km north-east	EIS preparation	150	2	2025 to 2026	2026 to 2046		✓	✓		✓	✓
Tallawang Solar Farm	5.3 km north	RTS	420	13	2025 to 2058	2028 to 2058	✓		✓	✓	✓	✓
CWO REZ Transmission Project	10 km north	Assessment	1507	50	2024 to 2027	2027 to 2077			✓	✓	✓	✓
Barneys Reef Wind Farm	12 km north	EIS preparation	340	10	2024 to 2026	2026 to 2056			✓		✓	✓
Stubbo Solar Farm	15.5 km north-east	Approved	507	10	2024 to 2026	2026 to 2050					✓	✓
Piambong Wind Farm	16 km south-west	EIS preparation	400	15	2026 to 2028	2028 to 2058					✓	
Orana Wind Farm	16 km north-west	EIS preparation	580	27	2026 to 2028	2028 to 2058					✓	
Narragamba Solar Farm	16 km south-west	EIS preparation	400	10	2025 to 2028	2028 to 2053					✓	✓

Project	Distance from Project area	Status	Estimated Workforce		Timeframe (targeted)		Potential cumulative impacts					
			Construction	Operation	Construction	Operation	Biodiversity	Visual amenity	Noise	Traffic and transport	Social	Economic
Spicers Creek Wind Farm	22 km north west	Assessment	250	12	2025 to 2027	2027 to 2057					✓	✓
Ulan Solar Farm	25 km north-east	EIS preparation	120	4	2024 to 2025	2025 to 2055					✓	✓
Birriwa Solar Farm	25 km north	Assessment	800	15	2024 to 2027	2027 to 2057	✓			✓	✓	✓
Cobbora Solar Farm	29 km north-west	EIS preparation	700	8	2024 to 2027	2027 to 2057					✓	✓
Liverpool Range Wind Farm MOD 1	30 km north-east	RTS	800	47	2024 to 2027	2027 to 2052					✓	✓
Sandy Creek Solar Farm	30 km north-west	Approved	700	15	2025 to 2027	2027 to 2057					✓	✓
Dapper Solar Farm	32 km north-west	EIS preparation	350	20	2025 to 2027	2027 to 2057				✓	✓	✓
Ulan Coal (Modification 6)	33 km north-east	Amendment report	n/a	n/a	2023	2023 to 2033					✓	
Uungula Wind Farm	33 km south-west	Approved	262	12	2023 to 2026	2026 to 2056					✓	✓
Bowdens Silver Mine	34 km south-east	Approved	320	228	2024 to 2026	2026 to 2045					✓	✓
Moolarben Coal OC3 Extension	35 km east	Assessment	250	0	2025 to 2028	2028 to 2038					✓	✓

Project	Distance from Project area	Status	Estimated Workforce		Timeframe (targeted)		Potential cumulative impacts					
			Construction	Operation	Construction	Operation	Biodiversity	Visual amenity	Noise	Traffic and transport	Social	Economic
Burrendong Wind Farm	37 km south-west	RTS	250	15	2023 to 2026	2027 to 2057	✓				✓	✓
Dunedoo Solar Farm	38 km north	Approved	125	3	2025 to 2026	2026 to 2053					✓	✓
Valley of the Winds Wind Farm	39 km north-east	Assessment	400	50	2023 to 2026	2027 to 2057					✓	✓
Orana BESS	50 km south-west	Approved	150	6	2023 to 2025	2025 to 2065					✓	✓
Wellington South BESS	50 km south-west	Approved	100	30	2023 to 2024	2024 to 2044					✓	✓
Wellington Town BESS	53 km west	EIS preparation	50	3	2024 to 2025	2025 to 2055					✓	✓
Aquila Wind Farm	56 km south-west	EIS preparation	300	15	2026 to 2028	2028 to 2058					✓	
Apsley BESS	57 km south-west	Approved	50	4	2024 to 2025	2025 to 2055					✓	✓
Kerrs Creek Wind Farm	72 km south-west	EIS preparation	340	10	2026 to 2028	2028 to 2058					✓	
Dubbo Firming Power Station	80 km west	Approved	150	6	2025 to 2026	2026 to 2066					✓	✓
Goulburn River Solar Farm	85 km east	Assessment	350	10	2023 to 2025	2026 to 2061					✓	✓
Forest Glen Solar Farm	91 km west	Approved	200	10	2024 to 2026	2026 to 2061					✓	✓

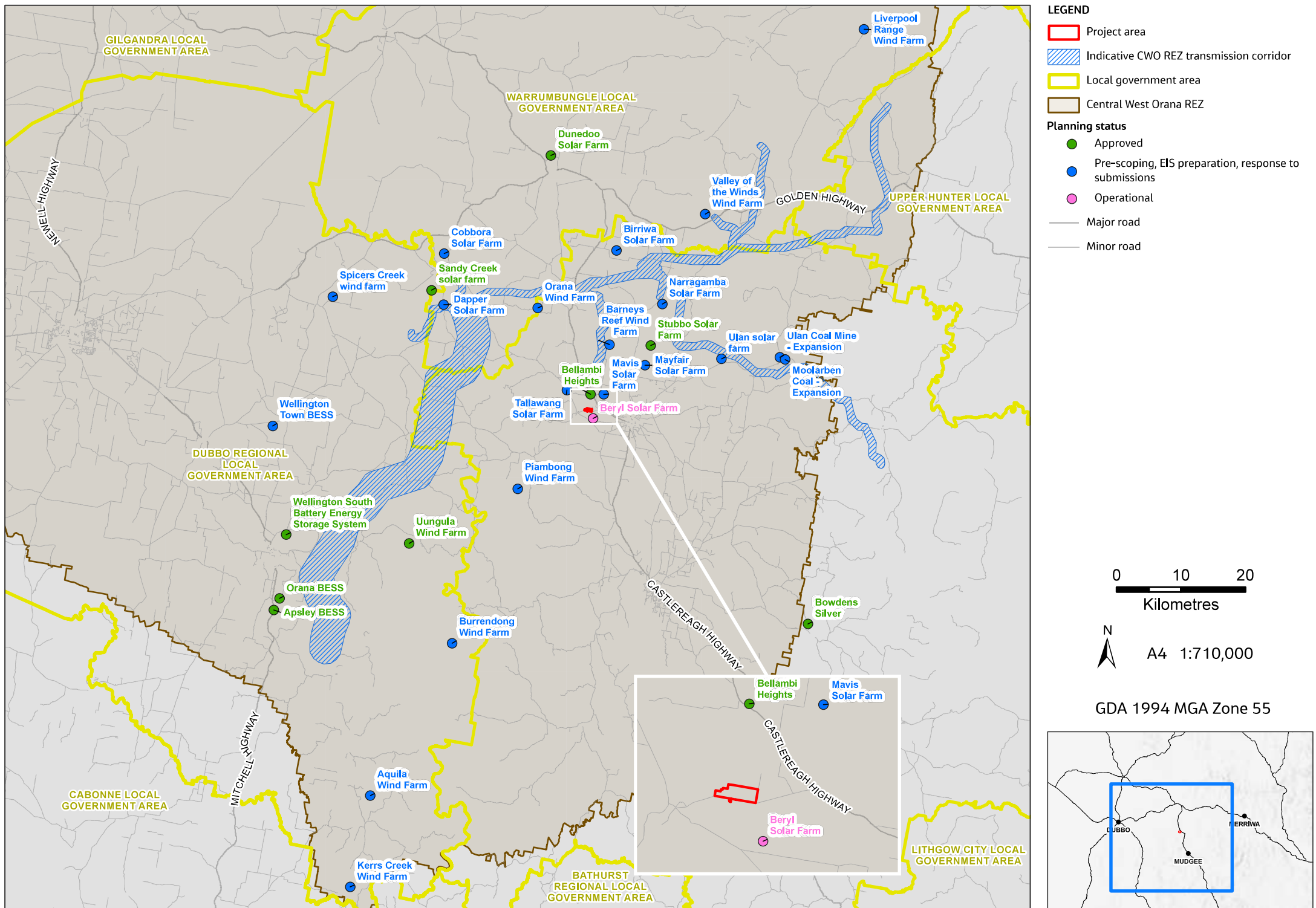


Figure 7-16: Relevant future development

Data Sources: NSW Department of Planning and Environment (2023); Imagery: ESRI Online Imagery Services; Geoscience Australia (2006); JACOBS (2023); Australian Bureau of Statistics (2021); EnergyCo (2023) \\ausyd0vs01\GISProj\NSW_IS461300_Beryl\BESS\Apps\EIS\IS461300_EIS_v2.aprx | Date: 3/05/2024

7.13.2 Biodiversity

Historical agricultural clearing has transformed the landscape into open pastures, with remnant vegetation confined to specific areas, leading to a loss of biodiversity and significant weed invasions.

The Project would remove 4.07 ha of derived native grassland, contributing to a cumulative reduction in biodiversity, particularly affecting the PCT 281 community already diminished by about 67% since European settlement.

Potential future developments within the same LGA that are expected to impact upon the same PCT 281 community include the proposed Birriwa Solar Farm and BESS (291.91 ha), Burrendong Wind Farm (3.40 ha), and Tallawang Solar Farm (10.96 ha). This list is not comprehensive, but indicates the scale of ongoing impacts to this community. Beryl Solar Farm has resulted in the reduction of around 130.06 ha of PCT 281, of which 17.13 ha of the PCT forms part of the *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* Critically Endangered Ecological Community.

While the immediate impact of the Project on biodiversity is deemed negligible, the cumulative effects of this and similar developments pose a threat to state-wide biodiversity values, highlighting the importance of considering these broader impacts in development planning and environmental assessments.

Considered individually, the 4.07 ha of impacts to PCT 281 associated with the Project are highly unlikely to result in significant adverse impacts to biodiversity at either local or state level. Cumulatively, however, the impacts of this and other local development activities contribute to the ongoing decline in biodiversity values across the state. The Project, by itself, makes only a negligible contribution to this decline, owing to the small size of the disturbance footprint and poor condition of the vegetation.

As described in **Section 7.1.4**, the Project has actively reduced the disturbance footprint to reduce impacts to PCT 281.

7.13.3 Visual amenity

Potential landscape character and visual impacts of the relevant future developments, and existing developments are likely to overlap with the potential landscape character and visual impacts of this Project at a local scale. To minimise visual impacts, including cumulative impacts, the Project has included screening vegetation around the perimeter of the operational infrastructure to minimise visual impacts.

The assessment of cumulative impacts to landscape character and visual amenity during construction and operation are presented in **Table 7-59**.

Table 7-59. Cumulative visual assessment

Relevant future development	Potential cumulative construction impacts	Potential cumulative operational impacts
Beryl Solar Farm	N/A this project is operational.	Landscape character - The Project would increase the presence of energy infrastructure in the area - Given the scale of the Project as a BESS, the contribution to cumulative landscape character impacts would be minor, in comparison to existing infrastructure already in the area. Visual - The Project would be seen together with the Beryl Solar Farm from Beryl Road, and some nearby private dwellings - The solar farm is not visually prominent from those private dwellings which would

Relevant future development	Potential cumulative construction impacts	Potential cumulative operational impacts
		have a view to the Project, so the effect would be small and localised When viewed together, the solar farm and BESS would be seen within an area with existing energy infrastructure, including the existing substation and several converging transmission lines.
Mavis Solar Farm	Landscape character - This development would be over 1 km from the Project, on the east of the Castlereagh Highway, with intervening vegetation and landform separating these landscape character areas - Given the distance and its position north of the Wialdra Creek on more undulating landform, it is associated with a different landscape character zone than the Project - There is the potential for construction vehicle activity on multiple local roads and the Castlereagh Highway that may temporarily alter the rural landscape character of the areas to the north and south of Wialdra Creek - The Project would make a small contribution to any cumulative effect during construction. Visual - The visibility of the Mavis Solar Farm is not yet known (the project EIS is under preparation); however, it is likely to be visible from local roads and areas of Gulgong that do not have a view to the Beryl BESS - It is expected that there would not be any locations where the projects would be visible together or sequentially - There would not be a cumulative visual impact caused by these Projects together during construction.	Landscape character - The landscape character surrounding this proposed solar farm and the Project would result in a landscape character impact in their respective localities - The Beryl BESS would only make a small contribution to this effect, with a greater potential for landscape character change from the proposed Mavis Solar Farm. Visual - Unlikely to be visible together with the Beryl BESS from any public viewing location - The Beryl BESS is unlikely to be prominent in views from any private dwelling in the study area, during operation.
Bellambi Heights BESS	Landscape Character - This development would be located two km from the Project with vegetation associated with Wialdra Creek and landform separating these areas - Given the distance and the more undulating landform of the areas north of Wialdra Creek, this development is located within a	Landscape Character - There would be a small effect on landscape character of the respective localities of this development and the Project. - Together these projects contribute to the transformation of the rural landscapes of this area transitioning to accommodate additional energy infrastructure.

Relevant future development	Potential cumulative construction impacts	Potential cumulative operational impacts
	different landscape character zone than the Project - There would be a small effect on landscape character of the respective localities of this development and the Project - There is the potential for construction vehicle activity on multiple local roads and the Castlereagh Highway that may temporarily alter the rural landscape character of the areas to the north and south of Wialdra Creek - The Project would make a small contribution to any cumulative effect during construction.	Each project would make a small contribution to this cumulative effect.
	Visual - This development will be located two km from the Project with intervening vegetation and landform restricting views to the project. - There would not be a cumulative effect on views during construction.	Visual - Would not be visible together with the Beryl BESS from any public viewing location. - The Beryl BESS is unlikely to be prominent in views from any private dwelling in the study area, during operation.

7.13.4 Noise

During construction, potential cumulative noise with other relevant future development would only occur if the construction periods overlapped with this Project, and would likely occur at each development site as well as along construction traffic routes.

A cumulative construction and operational noise impact assessment is provided in **Table 7-60**. Management measures to minimise potential for cumulative noise impacts are provided in **Section 7.6.6**

Table 7-60. Cumulative noise assessment

Relevant future development	Potential cumulative constructive noise impacts	Potential cumulative operational noise impacts	Summary
Beryl Solar Farm	N/A the Project is operational	The NVIA (Appendix I) includes a comparison of noise levels and potential cumulative noise levels associated with operation of the Project and Beryl Solar Farm is included in NVIA (Appendix I). The extent to which a cumulative noise impact may occur is based on the operational schedules of both operational premises. The Beryl Solar Farm Construction & Operational Noise & Vibration Assessment (Renzo Tonin, 2017) notes that the majority of operations will occur during the day, though operations may begin and end with sunrise and sunset, and hence may begin prior to 7 am and end after 6 pm, within the adjacent night and evening periods, respectively. Based on available information, cumulative operational noise impacts are not predicted to exceed the applicable criteria, which are defined as the Amenity Noise Levels for Rural receivers as provided in the NPI Table 2.2.	No cumulative impacts anticipated
Mavis Solar Farm	The Mavis Solar Farm Scoping Report (Urban Perspectives Environmental Solutions, 2024) did not detail any specific noise impacts associated with the Project. However, a number of receivers, such as R-05, R-06, R-07, R-10, R-11, R-12, R-13, R-14, R-15, R-16, R-17 and R-24 are located within approximately 1 km of the boundary of the solar farm. At these distances, cumulative construction noise impacts could be possible.	The Mavis Solar Farm Scoping Report (Urban Perspectives Environmental Solutions, 2024) did not detail any specific noise impacts associated with the Project. If the Beryl Solar Farm noise levels are used as an indication of the noise from Mavis Solar Farm, it could be expected that the noise levels at the receivers within 1 km of Mavis Solar Farm would be ≤ 32 dB(A). Given that the receivers within this range (R-05, R-06, R-07, R-10, R-11, R-12, R-13, R-14, R-15, R-16, R-17 and R-24) all experience noise levels from 35 – 20 dB(A) (with the greatest noise at the receivers furthest from the solar farm and vice-versa), it is unlikely that any cumulative noise impact would be greater than the Amenity Noise Levels. Cumulative impacts are even less likely when considering that the majority of the noise from the solar farm would occur during the day, when the Amenity Noise Levels are least sensitive.	Potential for cumulative construction impacts

Relevant future development	Potential cumulative constructive noise impacts	Potential cumulative operational noise impacts	Summary
Bellambi Heights BESS	The Bellambi Heights Battery Energy Storage System Noise and Vibration Impact Assessment (EMM, 2023) detailed the construction noise impacts from the proposed Bellambi Heights BESS. Noise levels predicted at receivers R-24 range from 40 – 45 dB(A), while noise levels predicted at R-04 to R-07, alongside R-13 to R-14, range from 30 dB(A) to 40 dB(A). Nearer receivers to the Project receive noise levels in the range of less than 35 dB(A). A cumulative impact of 0 – 2 dB(A) is possible, while receivers nearer to the Project would not experience noise from the Bellambi Heights BESS loud enough to pose a cumulative noise risk. A cumulative risk may also occur to receivers between the study areas of both Projects, however these are generally receiving noise <45 dB(A) from the Project.	The Bellambi Heights Battery Energy Storage System Noise and Vibration Impact Assessment (EMM, 2023) indicates that noise from the Bellambi Heights BESS would be 36 dB(A) at R-24 (noting that R-24 is an associated receiver of the Bellambi Heights BESS). As the Project's noise contribution at R-24 is 20 – 23 dB(A), a cumulative noise impact is not anticipated. For all other receivers in the Project study area, noise from the Bellambi Heights BESS is less than 30 dB(A). As such, cumulative operational impacts are predicted to be negligible.	Potential for cumulative construction impacts
Mayfair Solar Farm	The Mayfair Solar Farm Scoping Report (Pitt & Sherry, 2023) did not detail any specific noise impacts associated with the Project. However, as the solar farm, at it's nearest extent, is approximately 4 km from R-24, it remains possible that noise impacts may extend to the Project study area and the receivers located between the two Projects. As such, as the Mayfair Solar Farm noise assessment develops, the potential for cumulative noise impacts with the Project should be explored.	The Mayfair Solar Farm Scoping Report (Pitt & Sherry, 2023) did not detail any specific noise impacts associated with the Project. However, as the solar farm, at it's nearest extent, is approximately 4 km from R-24, it is unlikely that the noise typical for a solar farm would be loud enough at this distance to pose a cumulative noise impact.	Potential for cumulative construction impacts
Tallawang Solar Farm	The Tallawang Solar Farm Noise and Vibration Impact Assessment (Umwelt, 2022) found that receiver R193, approximately 600 m northwest of Project receiver R-24, would experience noise levels lower than 45 dB(A) during all construction phases of the solar farm. As such noise levels of around 40 dB(A) are possible at R-24. This may lead to a cumulative impact of 0 – 2 dB(A)	The Tallawang Solar Farm Noise and Vibration Impact Assessment (Umwelt, 2022) found that receiver R193 sits well outside of the 35 dB(A) noise contour during solar farm noise levels. Based on this, it is highly unlikely that any noise from the solar farm entering the Project study area would be loud enough to pose a cumulative noise risk.	Potential for cumulative construction impacts

Relevant future development	Potential cumulative constructive noise impacts	Potential cumulative operational noise impacts	Summary
	greater than the predicted Project construction noise levels during the construction. During quieter months (months 9 – 12, Project construction noise levels may be mostly masked by the Tallawang Solar Farm construction noise. A cumulative impact may also occur to receivers between the study areas of both Projects, however these are generally receiving noise <45 dB(A) from the Project.		
CWO REZ Transmission Project	The Central-West Orana Renewable Energy Zone Transmission Project Technical paper 9 – Noise and vibration (WSP, 2023) details construction noise impacts of the construction of the transmission line and associated infrastructure. The nearest transmission Project infrastructure nearest to the Project was approximately R-24 was approximately five km away, with the transmission Project study area terminating approximately two km north of R-24. No noise exceedances were identified in the southern section of the study area, and hence it is unlikely that construction noise from the transmission Project reaching any Project receiver would be loud enough to result in a cumulative noise impact.	The Central-West Orana Renewable Energy Zone Transmission Project Technical paper 9 – Noise and vibration (WSP, 2023) (WSP, 2023) did not identify any noise impacts resulting from the transmission Project in the areas located nearby to the Project. As such, given the distance to the Project from the transmission Project, it is unlikely any cumulative noise impacts would occur.	No cumulative impacts anticipated
Barneys Reef Wind Farm	The Barneys Reef Wind Farm Preliminary Noise Impact Assessment (Sonus, 2021) did not detail the construction noise impacts of the wind farm. However, given the distance between the Projects. It is highly unlikely either Project's construction noise could extend far enough to lead to a cumulative noise impact.	Based on the predictions within the Barneys Reef Wind Farm Preliminary Noise Impact Assessment (Sonus, 2021), R-24, the nearest receiver to the wind farm, sits 8.5 km outside of the predicted extent of wind farm noise greater than 35 dB(A). At these distances, a cumulative noise impact is highly unlikely.	No cumulative impacts anticipated

7.13.5 Traffic and transport

Based on publicly available planning documents, the construction routes for the following developments would potentially coincide with the Beryl BESS construction haulage route along sections of Castlereagh Highway:

- Bellambi Heights BESS
- Tallawang Solar Farm
- Birriwa Solar Farm
- CWO REZ Transmission Project.

The conservative cumulative impact assessment involved:

- A mid-block road capacity assessment of Castlereagh Highway assuming a worst-case scenario where all forecasted construction traffic volumes (generated by above mentioned projects) would overlap during the same construction peak hour
- A turn warrant assessment undertaken at the Castlereagh Highway / Beryl Road intersection assuming the same as above (worst-case)
- Background traffic has been based on the traffic survey undertaken on Castlereagh Highway during week of 9th to 16th of November 2023
- No cumulative impact assessment was undertaken for Beryl Road as no cumulative impact was expected at the time of writing.

Other projects are considered to have negligible cumulative traffic and transport impacts in combination with this Project as they would utilise construction routes not utilised by this Project or would not be expected to have overlapping construction timeframe, or details on proposed traffic movements are not publicly available.

As indicated in **Table 7-61**, the mid-block capacity assessment results show that Castlereagh Highway is expected operation at LoS A, indicating the road would have sufficient capacity to accommodate the cumulative traffic from all assessed future developments during the peak construction period of the Project.

Table 7-61. Cumulative traffic mid-block capacity assessment

Road	Direction	Capacity ¹ (veh/h)	Cumulative impact with all other projects			
			Volume (veh/h)		V/C Ratio (LoS)	
			AM peak	PM peak	AM peak	PM peak
Castlereagh Highway	Northbound	1478	158	169	0.11 (A)	0.11 (A)
	Southbound	1478	166	156	0.11 (A)	0.11 (A)

A turn warrant assessment was conducted using worst-case vehicle volumes to determine whether a higher-order turn treatment would be required at the Castlereagh Highway/Beryl Road intersection with the additional construction traffic from the relevant future developments. CWO REZ Transmission Project is not included in the turn warrant assessment as this intersection is not part of that development's construction traffic route.

The assessment found that a basic right turn treatment and basic left turn treatment would be sufficient on Castlereagh Highway/Beryl Road intersection to accommodate any cumulative traffic volumes. As such, no new works or upgrades for right turns and left turns would be required based on a conservative cumulative impact assessment for traffic.

It is worth noting that public road works are currently being proposed by EnergyCo which would involve road upgrades along sections of roads between the Port of Newcastle and the CWO REZ. As the details for the upgrade program are not yet publicly available, construction for the public road works has not been included in the cumulative assessment. It is likely that when complete, the public road works would mitigate some cumulative traffic impacts for developments in the CWO REZ.

Traffic movements associated with operation of the Project are anticipated to be readily accommodated on the existing road network.

7.13.6 Social impacts

The potential cumulative social impacts are assessed in **Table 7-62**, with an evaluation of significance for the identified impacts and proposed management measures to minimise these impacts.

Table 7-62. Summary of cumulative social impacts and significance evaluation

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation and environmental management measures	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
Changing local character due to visual, community and land use change caused by the CWO REZ	Way of life, community, surrounding, livelihoods	A change in visual landscape character, and change in community composition across the CWO REZ caused by cumulative development and land use change can lead to a loss or change in connection to place for residents and visitors. Change in community composition can disrupt community networks and undermine sense of community	Negative	Almost certain	Moderate	High	- Vegetation screening has been included in the Project design - Landscape and visual amenity EMMs (Section 7.5.6) to reduce visual impacts in the locality - The Project comprises one small project amongst the wider context of renewable energy development across the CWO REZ. Project-level mitigations cannot significantly affect wider cumulative impacts.	Almost certain	Moderate	High
Perceived inability for people to influence what is happening in their community	Decision making systems	Potential change in perception of ability to participate in decision making processes across the local and wider community. For development across the CWO REZ this can be experienced as disempowerment and lacking the ability to determine land use outcomes and landscape character.	Negative	Likely	Major	High	- Implementing a CSEP (S01) to engage with nearby sensitive receivers and the broader community throughout the construction period to provide information and address concerns - The Project comprises one small project amongst the wider context of the CWO REZ. Project-level mitigations cannot significantly affect wider cumulative impacts.	Likely	Major	High

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation and environmental management measures	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
Workforce impacts on housing availability and social infrastructure and services in the CWO REZ	Way of life, surrounding, accessibility	Reduction in rental housing availability associated with cumulative influx of non-local FTE construction workers. This may reduce availability, or increase rental costs for residents and cause stress for those seeking housing, and can disproportionately affect people on lower incomes. The influx of non-local workers can also increase pressure and demand on social infrastructure and services in Gulgong and the REZ.	Negative	Likely	Moderate	High	- Implementing a Construction Workforce Accommodation Strategy (S02) to mitigate workforce impacts on housing availability and rental stress - The Project comprises one small project amongst the wider context of the CWO REZ. Project-level mitigations cannot significantly affect wider cumulative impacts.	Likely	Moderate	High
Construction fatigue	Way of life, health and wellbeing	Potential construction fatigue for local communities including disruption, and cumulative impacts associated with multiple concurrent developments in the CWO REZ, which can disproportionately affect vulnerable people or those with long term health conditions	Negative	Likely	Minor	Medium	Implementing a CSEP (S01) to engage with nearby sensitive receivers and the broader community throughout the construction period to provide information and address concerns	Likely	Minimal	Low
Strain on regional public infrastructure and services	Way of life, community	Potential strain on regional public infrastructure and services as a result of the influx of construction workforce, which can be compounded by multiple concurrent developments in	Negative	Likely	Minor	Medium	- Cumulative traffic assessment identified existing road network has the capacity to accommodate the Project - The CTMP would include a coordination strategy with other major developments to	Unlikely	Minimal	Low

Impact	Category	Description	Nature	Without mitigation			Relevant mitigation and environmental management measures	With mitigation		
				Likelihood	Magnitude	Significance		Likelihood	Magnitude	Significance
		the same period in the CWO REZ					minimise cumulative construction impacts (TT01)			
Operational traffic	Way of life, accessibility	Potential operational traffic impact on people's daily living and routine or causing inconvenience. This would also be considered as a cumulative impact combined with Beryl Solar Farm and other nearby developments	Negative	Likely	Minimal	Low	- Traffic movements would be minimal with light vehicles occasionally needing to access the site for maintenance activities - Heavy vehicle movements to and from the Project area will be scheduled to minimise traffic disruption to the surrounding road network	Unlikely	Minimal	Low
Changes to agricultural land use	Surrounding, way of life	Potential impact of a change from agricultural land use to other land uses and resulting in a reduction in available agricultural land.	Negative	Unlikely	Minimal	Low	- Project area would continue to be utilised for agricultural use - Implementing a CSEP (S01) to engage with nearby sensitive receivers and the broader community throughout the construction period to provide information and address concerns	Unlikely	Minimal	Low

7.13.7 Economic impacts

For the Project, the indicative timing for the construction is spread across 12 months, with the construction phase expected to commence in Q1 2025. The cumulative assessment identified 28 medium impact rated developments (identified in **Table 7-58**) that have an overlapping construction period.

The Project will likely compete for labour, accommodation, and other resources with major infrastructure projects being constructed concurrently in the economic study area (principally renewable energy and energy storage projects being driven by investment in the CWO REZ). Additionally impacts on key industry sectors and demand from population growth needs to be factored on Identified projects located within a 60-minute drive time of the Project area and an assessment of their potential impact to the Project from an economic perspective.

If appropriate management and planning initiatives are not put in place with regard to sourcing project labour and services and in accommodating construction workers there may be negative economic impacts. Potential economic impacts can include effects on agricultural land availability, property devaluation, and reduction in the supply chain of local services and materials needed for other local construction projects

With the implementation of mitigation and management measures for each individual development, this Project in combination with the relevant future developments, are not expected to result in material cumulative impacts during construction.

Overall, the cumulative economic impacts are like to be reflected in a boost to economic activity within the CWO REZ during construction and operation, due to increased expenditure and flow-on effects from construction, and would result in positive cumulative economic impacts.

7.13.8 Environmental management measures

The approach taken to the assessment of cumulative impacts acknowledges that each project would be required to mitigate its own impacts to acceptable levels, minimising the overall contribution to cumulative impacts. However, it is also recognised that not all REZ related cumulative impacts can be addressed through a project-level approach alone, requiring a more strategic and collaborative approach between EnergyCo as the Infrastructure Planner, renewable energy proponents, councils, and government agencies.

Further consultation would be carried out with MWRC regarding potential cumulative impact management. The environmental management measures for key issues outlined throughout **Chapter 7** and collated in **Appendix C** will be implemented to minimise the potential for cumulative impacts associated with the Project.

8. Project justification

8.1 Justification of the Project

The Project is necessary to provide flexible dispatchable electricity supply to firm up the variable output from renewable sources and provide storage of surplus generation to be discharged in times of higher demand. The Project as described in **Chapter 3** is considered to best meet the Project objectives when compared to all other alternatives and options (refer to **Section 1.3**).

Section 192(1)(f) of the EP&A Regulation require an EIS to provide

‘the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in Section 193’.

The principles of Ecologically Sustainable Development (ESD) are discussed in **Section 8.3** and the biophysical, economic and social considerations are as following:

- Biophysical costs and benefits: The Project would result in the direct removal of up to 4.07 ha of derived grassland vegetation, avoiding impacts to remnant trees and nearby habitat features including wetland habitat. No TECs will be impacted by the Project. No significant impacts to threatened flora and fauna species are anticipated due to the Project. During operation, impacts would be minor indirect impacts associated with maintenance and operation.
- Social considerations: The majority of Project-specific social impacts are considered medium or low risk following the implementation of management measures. The Project is minor in scale compared to other SSD renewable projects in the CWO REZ. The Project has sought to minimise cumulative impacts with the preparation of a Construction Workers Accommodation Strategy and Waste Management Plan.
- Economic considerations: The Project would deliver local and regional benefits including lease payment to Associated Landowner, community payments under a VPA with Council and operation stimulus of about \$20 million dollars over the next 30 years of operation. At a state-level the Project would provide \$55 million of capital investment, 45 FTE during construction and 6 FTE jobs during operation.
- During operation, the Project would deliver safe and reliable energy storage to enhance energy reliability and security in the NEM.
- The Project would provide network stability and grid forming capabilities and benefit communities, businesses and industries by increasing the reliability of electricity and supporting the *NSW Electricity Infrastructure Investment Act 2020* objectives.
- The Project is considered to be in the public interest. The Project represents a significant and cost-efficient private investment in electricity infrastructure. Overall, it would result in strong net public benefits by delivering essential energy storage and firming capacity as part of the energy transition.
- In addition, the Project is consistent with the ISP 2022 (AEMO, 2022), Draft ISP 2024 (AEMO, 2023) and the NSW Net Zero Plan Stage 1: 2020-2030 (NSW Government, 2020).

While some environmental impacts cannot be avoided, in all cases they would be minimised to the extent reasonable and feasible through the design process and implementation of environmental management measures. Overall, the nature and associated benefits of the Project are considered to outweigh the identified residual adverse impacts.

8.2 Suitability of the Project

The site selection, layout and size of the Project have been developed in consideration of several alternatives to ensure the Project would result in maximum benefits for the locality and region in the long term, whilst minimising impacts to the environment.

As detailed in **Section 2.4**, the location of the Project is suitable for the following reasons:

- Location within the CWO REZ
- Energy generation including storage is a permissible land use within the land use zone and facilitates SSD application and planning approval for a BESS
- Availability of existing access to the Project area via an established road network
- Immediate proximity to the existing Beryl Substation and transmission lines to minimise impacts of easements and land fragmentation
- The Project would be a continuation of the existing electricity generation infrastructure within the area, demonstrated by the existing Beryl Substation and transmission lines, and would not conflict with the existing or proposed land use, or ongoing operations
- Sufficient size of land within the Project area to avoid and/or minimise impacts to biodiversity, Aboriginal cultural heritage and visual amenity impacts
- Sufficient buffers to minimise impacts to surrounding privately or publicly owned land and properties.

8.3 Ecologically Sustainable Development

ESD involves the effective integration of social, economic and environmental considerations in decision-making processes. In NSW, the principles of ESD have been incorporated into legislation including the EP&A Act and the EP&A Regulation. **Table 8-1** outlines how the Project and the environmental impact assessment process have considered each ESD principle.

Table 8-1. ESD principles and how they are considered in this Project

Principle	Considerations
Precautionary principle a) The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by: i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and ii) an assessment of the risk-weighted consequences of various options.	The precautionary principle has been adopted in the assessment of environmental and social impacts in this EIS (Chapter 7). The EIS has been undertaken on the basis of the best available scientific information and best practice industry guidelines relevant to the Project, and has been informed by site inspection and surveys, monitoring, modelling and desktop analysis. As described in Section 1.3, RAC has considered a range of options, alternatives and strategies to avoid or minimise impacts. Due to the nature of the Project, specific project details will be subject to detailed design and will be influenced by the technology applicable at the time. However, any uncertainty in the data used for the assessment has been appropriately identified, an appropriate assumption has been applied to represent a conservative worst-case analysis. Potential environmental and social impacts have been assessed which considered the conservative worst-case scenarios, and the implementation of management and management measures are also proposed to prevent and minimise environmental risks where possible. These environmental management measures are summarised in Appendix C.
Inter-generational equity principle b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	The Project would contribute the NSW shift away from coal fired power generation and supporting local communities in this transition towards clean and renewable sources of energy. The Project would also provide a source of affordable, reliable energy generation to the NEM. The Project may have very minor impacts on inter-generational equity through the consumption of resources during construction and operation, including fuel and raw materials. Nevertheless,

Principle	Considerations
	the Project would help facilitate the transition to a low carbon energy generation future necessary to achieve NSW and Australia's greenhouse gas reduction targets recognised at a global level as essential for avoiding or reducing climate change implications for future generations.
Biodiversity principle c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.	The impact of the Project on biodiversity values are discussed in Section 7.1. Biodiversity values were considered in the development of the concept design of the Project. Site selection has targeted areas of prior disturbance and avoided areas of higher biodiversity value. The assessment and ongoing design of the Project has been carried out with the aim of identifying, avoiding, minimising and mitigating impacts. The Project would require minimal native vegetation removal, with direct impacts limited to the clearing of up to 4.07 ha of derived native grasslands. Although this vegetation is largely native it also includes a significant proportion of non-native species. No TECs would be impacted by the Project and no significant impacts to threatened flora and fauna species are anticipated due to the Project. Environmental management measures were identified to reduce the severity of direct and indirect impacts of the Project on biodiversity and are provided in Section 7.1.8.
Valuation principle d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as: i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste, iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	The Project would provide local, regional and state-wide economic benefits through direct and indirect investment and employment. A VPA will also be established with MWRC and annual contributions will be made to a community benefit fund focussed on the Gulgong region for community projects. The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things. Environmental factors were considered throughout the development of the design and in planning for construction and operation of the Project. As a consequence, environmental impacts were avoided or minimised where practical during the concept design development for the Project. Environmental management measures outlined in this EIS will be implemented during construction and operation of the Project. The cost of these management measures is incorporated into the Project cost, as well as the extent of environmental investigations carried out to inform this EIS.

8.4 Objects of the EP&A Act

The objects of the EP&A Act, and how these are addressed in relation to the Project, are presented in **Table 8-2**.

Table 8-2. Consideration of the objects of the EP&A Act

Object	Response
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.	The Project would result in the loss of 4.07 ha of non-intensive agricultural land use within an existing farming property. This activity would be restricted during construction, operation and decommissioning however in the meantime, the farming property around the Project area can be used for grazing agriculture, and the Project area would be returned to pre-existing condition upon decommissioning of the Project. The Project would not result in the sterilisation of natural resources including mineral resources. The Project has been designed and located to avoid remnant vegetation, areas of archaeological potential and sensitive environments (i.e. waterways). The Project is minor in scale compared to other SSD renewable projects in the CWO REZ. The Project has sought to minimise cumulative social and economic impacts with the preparation of a Construction Workers Accommodation Strategy and Waste Management Plan.
To facilitate ESD by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development is considered in Section 8.3 .
To promote the orderly and economic use and development of land.	The Project aims to promote the orderly and economic use of the land by enhancing renewable energy integration and grid stability, optimising land use, and stimulating economic development particularly through diversifying sources of income for agricultural sector. This form of energy infrastructure is critical for transitioning to a sustainable energy future.
To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	The Project's planning and design process, including site selection (refer to Section 7.1.4) has taken into account all potential biodiversity impacts and incorporates measures to avoid and minimise impacts.
To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The Project's planning and design process has sought to avoid areas of higher heritage potential and incorporates measures to avoid and minimise impacts. The Project would not impact upon any areas of Aboriginal or historical heritage. However, an Unexpected (heritage) Finds protocol would be developed prior to construction.
To provide increased opportunity for community participation in environmental planning and assessment.	Engagement activities undertaken during the development of the EIS are outlined in Chapter 5 . RAC would continue to consult with the local community and key stakeholders during the Project's development.

8.5 Section 4.15 of the EP&A Act

When assessing a development application for SSD, the consent authority is required to take into consideration the matters outlined in Section 4.15 of the EP&A Act. The matters and where these are addressed in the EIS are provided in **Table 8-3**.

Table 8-3. Matters for consideration under Section 4.15 of the EP&A Act

Matters	Where addressed in the EIS
Any environmental planning instrument	Section 4.3
Any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved)	There are no draft instruments relevant to the Project
Any development control plan	Section 2.10 of the Planning Systems SEPP state that development control plans do not apply to SSD
Any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4	A VPA would be formalised with MWRC (refer to Section 2.5)
the regulations (to the extent that they prescribe matters for the purposes of this paragraph),	Chapter 4 and Appendix B
the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	Section 7.1 to Section 7.13
the suitability of the site for the development	Section 2.4 and Section 8.2
any submissions made in accordance with this Act or the regulations	Chapter 5
the public interest	Chapter 8

9. Conclusion

The Project would provide long-term, strategic benefits to the State, as well as provide direct local and regional environmental, social and economic benefits. The Project would have the key benefits:

- Strategic:
 - Aligning with Commonwealth and NSW climate change commitments
 - Contributing to the targeted energy storage needs of the CWO REZ and the NEM, by providing energy storage, frequency control, system stability or other Frequency Control Ancillary Services
 - Support the realisation of regional plans, which includes goals to diversify the local economy, provide direct and indirect economic benefits to local communities in the region through employment opportunities and increased investment in local communities
 - Provide both voltage and reactive power support for the Beryl area, which was identified as having voltage constraints (Transgrid, 2022).
- Social/economic:
 - Associated Landowner would receive annual lease payments to host the Project allowing them to diversify and expand income streams
 - The Project would contribute community payments to the MWRC under a VPA
 - Annual contributions to a community benefit fund focussed on the Gulgong region, that would be spent on community projects
 - During construction, generating up to 105 FTE (direct and indirect)
 - During operation, generating up to 7 FTE (direct and indirect)
 - The total operational economic stimulus over 30 years of operation would be approximately \$20 million (2023 dollars, Consumer Price Index adjusted). This would include operational wages, Associated Landowner payments, VPA arrangements with MWRC.
 - Provide opportunities for local and regional investment, opportunities for local contractors, suppliers and businesses and increased employment opportunities
 - Use of local suppliers and businesses where possible leading to improved business income and livelihoods for business owners and employees, and opportunities for business growth and development
 - Increased participation in recreation, sporting and community clubs due to influx of construction workers.
- Environmental:
 - Suitability of the site, in particular, compatible land use and existing road network to support facilitate access
 - Immediate proximity to the existing Beryl Substation and transmission lines to minimise impacts of easements and land fragmentation
 - Sufficient size of land within the Project area to avoid and/or minimise impacts to biodiversity, Aboriginal cultural heritage and visual amenity impacts
 - Sufficient buffers to minimise impacts to surrounding privately or publicly owned land and properties.
 - **Appendix C** outlines the proposed environmental management measures to mitigate any residual environmental and social impacts associated with the Project.

Overall, the Project is consistent with the principles of ESD, and the objectives of legislation including the EP&A Act.

In the absence of the Project, the needs of NSW for generation capacity or the Commonwealth and State climate change commitments to transition to renewable energy generation and greenhouse gas emission

reductions would not be supported. Further, the future security and reliability of electricity supply in NSW would be weakened as a result of planned closures of coal power stations by 2030. In addition, not proceeding with the Project would result in the loss of significant financial benefit to the region.

Based on the above, and the Project's ability to contribute the meeting national and State commitments to transition to renewable energy generation and greenhouse gas emission reductions, the Project should be approved under the EP&A Act.

References

- ABS (2021). 2021 ABS Census of Population and Housing, Australian Bureau of Statistics.
- ADB (2020). *William Cox (1764–1837)*, Australian Dictionary of Biography, accessed 1 June 2023 at <http://adb.anu.edu.au/biography/cox-william-193>
- AEMO (2022). Integrated System Plan 2022, Australian Energy Market Operator.
- AEMO (2023a). Draft Integrated System Plan 2024, Australian Energy Market Operator.
- AEMO (2023b). 2023 Electricity Statement of Opportunities, Australian Energy Market Operator.
- BOM (2023). *Climate statistics for Australian locations: Summary statistics Gulgong Post Office*. Available at http://www.bom.gov.au/climate/averages/tables/cw_062013.shtml, Bureau of Meteorology
- BOM (2024). Australian Groundwater Explorer, Bureau of Meteorology.
- CSIRO (2023). CSIRO Renewable Energy Storage Roadmap 2023, Commonwealth Scientific and Industrial Research Organisation.
- DECC (2009). Interim Construction Noise Guideline, Department of Environment and Climate Change
- DECCW (2011). Road Noise Policy, Department of Environment, Climate Change and Water.
- DoP (2011a). Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning, Department of Planning
- DoP (2011b). Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis, Department of Planning.
- DoP (2011c). Multi-level Risk Assessment, Department of Planning
- DPIE (2021). Australian Soil Classification (ASC) Soil Type Map of NSW, version 4.5, Department of Planning, Industry and Environment.
- DPE (2019). Community Participation Plan, NSW Government.
- DPE (2022a). Central West and Orana Regional Plan 2041, Department of Planning and Environment.
- DPE (2022b). Controlled activities – Guidelines for riparian corridors on waterfront land fact sheet, Department of Planning and Environment.
- DPE (2022c). Controlled activities – Guidelines for watercourse crossings on waterfront land fact sheet, Department of Planning and Environment.
- DPE (2022d). Cumulative Impact Assessment Guidelines for State Significant Projects, Department of Planning and Environment.
- DPE (2022e). State Significant Development Guidelines – Preparing an Environmental Impact Statement, Department of Planning and Environment
- DPE (2022f). Undertaking Engagement Guidelines for State Significant Projects, Department of Planning and Environment
- DPE (2022g). Wambuul / Macquarie-Castlereagh Valley Annual Surface Water Quality Report 2021-2022, Department of Planning and Environment
- DPE (2023). Social Impact Assessment Guideline for State Significant Projects, Department of Planning and Environment.
- DPI (2011). Land Use Conflict Risk Assessment Guide, Department of Primary Industries

DUAP (1996). *Regional Histories of NSW*, NSW Heritage Office and the Department of Urban Affairs and Planning.

EMM (2023). *Bellambi Heights BESS EIS*, EMM, prepared for Vena Energy Australia

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

GSNSW (2024). MinView, online mapping tool accessed 1 February 2024 at <https://minview.geoscience.nsw.gov.au>, Mining, Exploration and Geoscience - Geological Survey of NSW.

Haglund, L (1985). *Assessment of the Prehistoric Heritage in the Mudgee Shire*, unpublished report to Mudgee Shire Council.

ICNIRP (2010). *Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields*, International Commission on Non-Ionizing Radiation Protection

Jacobs (2023). *Beryl BESS Scoping Report*, Jacobs, prepared for RAC.

Macquarie Geotech (2024). *Beryl BESS Soil Sampling Geotechnical Investigation*, prepared for Jacobs and RAC, Macquarie Geotech.

NSW DCCEEW (2023). *NSW Landuse 2017 v1.5*, viewed on SEED mapping, NSW Department of Climate Change, Energy, the Environment and Water.

NSW DCCEEW (2024). *NPWS Fire History – Wildfires and Prescribed Burns*, viewed on SEED mapping, NSW Department of Climate Change, Energy, the Environment and Water.

NSW Government (2019). *NSW Electricity Strategy*, NSW Government.

NSW Government (2020a). *NSW Electricity Infrastructure Investment Roadmap 2020*, NSW Government.

NSW Government (2020b). *NSW Net Zero Plan Stage 1: 2020-2030*, NSW Government.

NSW Government (2023). *NSW Network Infrastructure Strategy 2023*, NSW Government.

MWRC (2020). *Local Strategic Planning Statement*, Mid-Western Regional Council.

MWRC (2022). *Mid-Western Region Towards 2040 Community Plan 2022*, Mid-Western Regional Council.

MWRC (2024). *About the Region*, accessed 1 February 2024 at <https://www.midwestern.nsw.gov.au/Business/About-the-Region>, Mid-Western Regional Council

Murphy, BW & Lawrie, JW (1998). *Home Rule – Soil Landscapes of the Dubbo 1:250 000 Sheet*, Department of Land and Water Conservation.

Navin Officer (2005). *Wilpinjong Coal Project*, report prepared for Wilpinjong Coal Pty Ltd, Navin Officer Heritage Consultants

Open NEM (2024). *An open platform for National Electricity Market Data*, accessed 24 April 2024 at <https://opennem.org.au/energy/nem/?range=1d&interval=30m&view=discrete-time>, Open NEM

Pearson, M (1981). *Seen through Different Eyes: Changing Land Use and Settlement Patterns in the Upper Macquarie River Region of NSW from Prehistoric Times to 1860*, PhD thesis submitted to the Department of Prehistory and Anthropology, The Australian National University.

State of NSW and DPIE (2024). *Soil Landscape Mapping from espade.environment.nsw.gov.au*, State of NSW and Department of Planning, Industry and Environment.

Tindale (1974). *Aboriginal Tribes of Australia*, ANU Press.

Transgrid (2022). *Maintain Voltage in Beryl Area Demand Forecast Independent Verification and Assessment*, Transgrid.



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