Environmental Impact Assessment

Orana Battery Energy Storage System

April 2023

Project Number: 22-277

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Document verification

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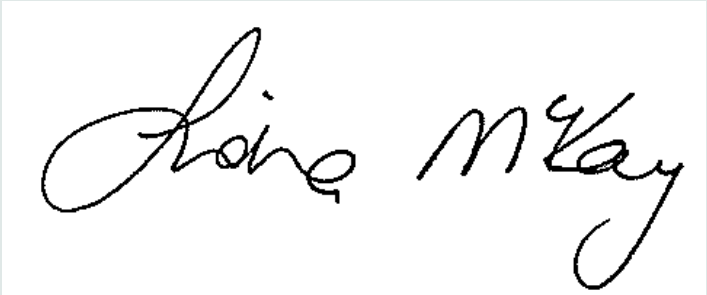
Declaration

EIS declaration	Details	Response
Project details	Project name	Orana Battery Energy Storage System
	Application number	SSD-45242780
	Address of the land in respect of which the development application is made	6945 Goolma Road, Montefiores NSW 2080
Applicant details	Applicant name	Akaysha Pty Ltd (Akaysha) Applicant ABN: 49 649 223 987
	Applicant address	10-12 Gwynne Street Cremorne, VIC, 3121
Details of the person by whom the EIS was prepared	Name	Brooke Marshall
	Address	Suite 11, 89-91 Auckland St, Bega NSW 2550
	Professional qualifications	Principal Renewable Energy Impact Assessment Certified Environmental Practitioner (CEnvP), Ba Natural Resources (Hons 1)
Declaration by registered environmental assessment practitioner	Name	Fiona McKay
	Registration number	REAP #R80021
	Organisation registered with	EIANZ
	Declaration: The undersigned declares that this EIS: • Has been prepared in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000,	

<table>
<tr><th>EIS declaration</th><th colspan="2">Details</th><th>Response</th></tr>
<tr><td rowspan="3"></td><td colspan="3">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,
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, and
Contains an accurate summary of the detailed technical assessment of the impacts of the Project as a whole.</td></tr>
<tr><td>Signature:</td><td colspan="2">  </td></tr>
<tr><td>Date:</td><td colspan="2">29 March 2023</td></tr>
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Acronyms and abbreviations

ACHA	Aboriginal Cultural Heritage Assessment
ACHCRP	*Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*
AEP	Annual Exceedance Probability
AES	Accommodation and Employment Strategy
AEMO	Australian Energy Market Operator
AHIMS	Aboriginal Heritage Information Management System
APZ	Asset protection zone
BAL	Basic Left Turn
BC Act	(NSW) *Biodiversity Conservation Act 2016*
BCS	NSW Biodiversity Conservation Service
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BFEMOP	Bush Fire Emergency Management and Operations Plan
BSAL	Biophysical Strategic Agricultural Land.
CEEC	Critically Endangered Ecological Community
CHR	Channelised Right Turn
CIA	Cumulative Impact Assessment
CIV	Capital Investment Value
CMT	Culturally Modified Tree
CSES	Community and Stakeholder Strategy
CWO	Central West Orana
Cwth	Commonwealth
DAWE	(Cwth) Department of Agriculture, Water and Environment, now DCCEEW
DCCEEW	(Cwth) Department of Climate Change, Energy, the Environment and Water
DPE	(NSW) Department of Planning and Environment (formerly DPIE)
DPI	Department of Primary Industries
DPIE	(NSW) Department of Planning, Industry and Environment (now DPE)
EMFs	Electric and Magnetic Fields
EP&A Act	(NSW) *Environmental Planning and Assessment Act 1979*
EP&A Reg	(NSW) Environmental Planning and Assessment Regulation 2021

EPBC Act	(Cwth) *Environment Protection and Biodiversity Conservation Act 1999*
FRNSW	Fire and Rescue NSW
GDE	Groundwater Dependent Ecosystems
ICNG	NSW Interim Construction Noise Guideline
IPP	Industry Participation Plan
LALC	Local Aboriginal Lands Council
LCZ	Landscape Character Zone
LEP	Local Environmental Plan
LFP	Lithium Iron Phosphate
LGA	Local Government Area
LLSA Act`	(NSW) *Local Land Services Amendment Act 2016*
LSPS	Local Strategic Planning Statement
LRS	NSW Land Registry Services
LSC	Land and Soil Capability
LUCRA	Land Use Conflict Risk Assessment
LVIA	Land and Visual Impact Assessment
NEM	National Energy Market
NMP	Noise Management Plan
NPfI	NSW 'Noise Policy for Industry'
NPW Act	(NSW) *National Parks and Wildlife Act 1974*
NSW	New South Wales
NVA	Noise and Vibration Assessment
O&M	Operations and Management
PCS	Power Conversion System
PCT	Plant Community Tye
PBP	RFS Planning for Bush Fire Protection 2019
POEO Act	(NSW) *Protection of the Environment Operations Act 1997*
PHA	Preliminary Hazard Analysis
PMST	Protected Matters Search Tool
RAP	Registered Aboriginal Parties
RBL	Rated Background Level
REZ	Renewable Energy Zone
RFFE	Regional Flood Frequency Estimation Model
RFS	Rural Fire Service

RMU	Ring Main Unit
RNP	Road Noise Policy
Roads Act	(NSW) *Roads Act 1993*
SAII	Serious And Irreversible Impact
SAT	Spot Assessment Technique
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TEC	Threatened Ecological Community
TIA	Traffic Impact Assessment
TISEPP	(NSW) State Environmental Panning Policy (Transport and Infrastructure) 2021
VI	Vegetation Integrity
VIA	Visual Impact Assessment
VPA	Voluntary Planning Agreement
VRE	Utility-Scale Variable Renewable Energy (i.e Wind and Solar)
VRWG	Voluntary Regional Waste Group
WAL	Water Access Licence
WSP	Water Sharing Plan
WVWAC	Wellington Valley Wiradjuri Aboriginal Corporation
WM Act	(NSW) *Water Management Act 2000*
ZVI	Zone of Visual Influence

Terms used in this report

Term	Description
Orana Battery Energy Storage System (Orana BESS) Project	The construction, operation and eventual decommissioning of an 400MW/1600MWh BESS, generally comprising battery storage modules, access road, on-site switching station, underground and above ground cables, connection to the existing Transgrid 330kV zone substation, associated operational facilities.
Applicant	Akaysha Energy Pty Ltd
Location	6945 Goolma Road, Montefiores NSW 2080
Subject Land	All lots directly impacted by this development: Total area of 333.3 ha including: • Lot 2 DP1226751 • Lot 2 DP1136578 • Lot 2 DP534034.
Infrastructure Layout (Indicative only)	The likely location of key infrastructure components and ancillary areas. The layout is currently indicative. It would be finalised only after competitive tender procurement processes including detailed design (pending Project approval).
Development Footprint	All areas that may be disturbed by the Project during construction, operation and decommissioning (including all activities, including temporary and permanent impact areas). This totals approximately 14.8 hectares.
Development Site	The broader area studied to assess potential impacts.
Associated Receivers	These receivers are considered to be associated with the Project and therefore are accepting of impacts. R9 is the only Associated Receiver.
Non-associated Receivers	These receivers are not associated with the Project. All relevant Project impacts have been assessed in accordance with best practice guidelines.

Summary

The purpose of this Environmental Impact Statement is to assess the economic, environmental and social impacts of the Orana BESS Project. This report is structured to help the community, local council, government agencies and the consent authority to get a better understanding of the Project and its impacts, so they can make informed submissions and decisions on the merits of the Project.

Proposed location and values

The Subject Land is located at 6945 Goolma Road, Montefiores NSW 2080, approximately 2km north-east of Wellington and within the Dubbo Local Government Area (LGA), NSW. It is located within the Central-West Orana Renewable Energy Zone (REZ); there are several renewable projects proposed or operating already within the REZ. The site is grazed by livestock but not considered suitable for sustained cropping.

This location has features optimal for the development of a battery storage facility including:

- Zoning for Infrastructure (SP2 Infrastructure). The exception is a small section zoned for rural use (RU1 Primary Production); affected by the proposed site access only
- Generally low relief terrain compatible to construction
- Short distance (200m) to connect to the existing substation to the north.

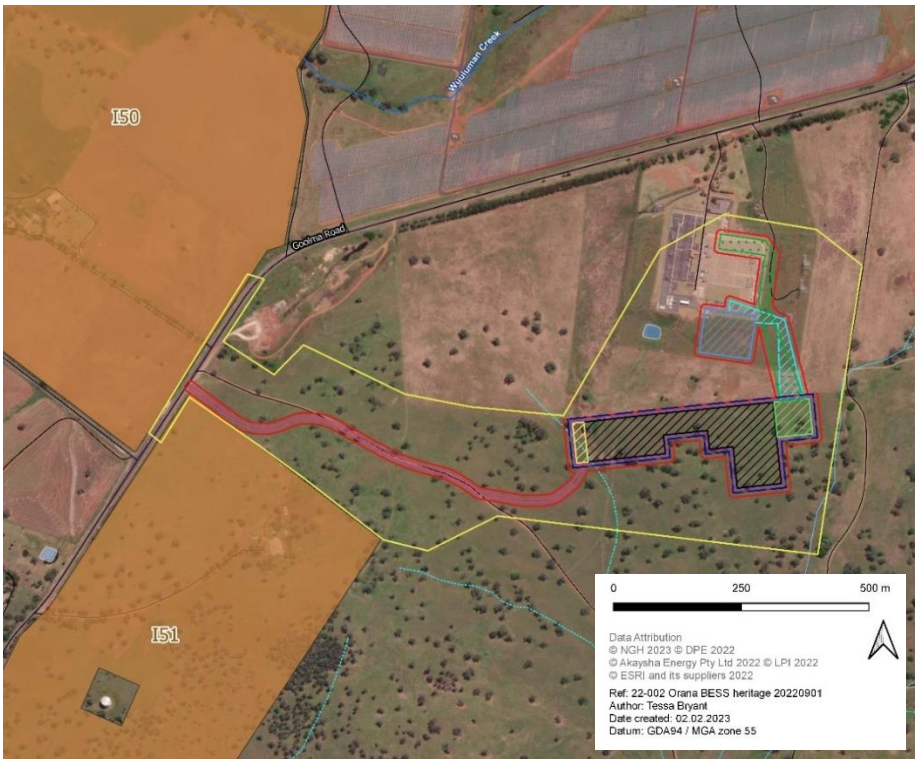
In terms of its key environmental values:

- The Subject Land vegetation includes NSW listed Critically Endangered Box Gum Woodland, in poor and moderate condition classes
- The Subject Land contains confirmed habitat for the Pink-tailed Legless Lizard *Aprasia parapulchella* (listed under both NSW and Commonwealth legislation)
- While it is located with few residences with views toward the site, two nearby sites are listed on the Register of the National Estate (a non-statutory archive):
    - Nanima Homestead; to the immediate south-west of the Subject Land (the closest Non-associated Receiver (R1).
    - Keston Homestead; to the north-west of the Subject Land (containing a group of Non-Associated receivers (R4, 5 and 8).

E1 *LEFT*; Higher biodiversity value areas to the south of the site; RIGHT Stable but low diversity pastures looking north to existing substation

E2 *View* of adjacent Wellington solar farm, north of Goolma Road (Source: Moir LA drone photograph, 2022)

E3 Existing 330kV substation (Wellington Substation) (looking to the north at the southern boundary of the substation from the Development footprint



E4 Register of the National Estate listings; Nanima Homestead I51 and Keston Homestead I50

Project summary

The key Project features are summarised below.

Table E1 Summary of key features of the Orana BESS Project

Feature	Description
Site details and land tenure	
Subject Land	Lot 2 DP1226751 Lot 2 DP1136578 Lot 2 DP534034 Total area of 333.3 ha.
Infrastructure components	
Battery Energy Storage System (BESS)	Lithium-ion storage technology. Associated operations and maintenance building, site office, switch room and control room. Water tanks, security lighting, CCTV and fencing.
Nominal capacity	400MW, configured as either: • 4 hours of 1600MWh energy storage or • 8 hours of 1600MWh of energy storage, to be built in two stages.
Substation and switch yard	Up to two 330kV/33kV power transformers connecting the BESS to the existing Transgrid substation.
Transmission line connections	A new overhead or underground transmission line from the Orana substation to the existing Wellington Substation, rated at 330kV and approximately 300m in length.
Site access and intersection upgrades	Upgrade existing private access intersection with Goolma Road (administered by TfNSW): • Basic Left Turn (BAL) • Channelised Right Turn (CHRs) Upgrade and extend existing farm track within the site.
Temporary works areas: Construction compound and construction parking and laydown areas	Entirely within the Development Footprint.
Development Footprint (all areas that may be disturbed by the Project)	Approximately 14.8 hectares. The actual operational footprint would be less than this area.
Capital investment value	$879 million AUD

Project objectives

As a utility scale battery storage facility, the Orana BESS Project would improve energy reliability within the National Energy Market (NEM). The NEM spans Australia's eastern and south-eastern coasts, around 5,000km, across New South Wales, Australian Capital Territory, Queensland, Victoria, South Australia and Tasmania.

Specifically, the objectives of the Orana BESS Project are to store and discharge energy economically in the wholesale energy market that would facilitate increased renewable penetration in NSW and improve network stability. In doing so the Project would:

- Provide new industries and opportunities to the Wellington township and broader region
- Minimise environmental impacts
- Maximise social license to operate.

Project benefits

The Orana BESS Project would:

- ✓ Build on the aims of the Central-West Orana REZ by being strategically located to maximise the benefits of and smooth the transition to greater renewable energy development.
- ✓ Build on the aims of the NSW Electricity Infrastructure Roadmap to transition away from coalfired energy, towards greater levels of renewable energy.
- ✓ Stabilise and secure the supply of electricity for residents, business owners and service providers.
- ✓ Assist to drive down the wholesale electricity prices for energy consumers.
- ✓ Generate local employment, economic stimulus and other local economic benefits.

The Orana BESS Project has been developed to be responsive to its social context and as such the following benefits are built into the Project, by way of Project commitments:

- ✓ **Community and Stakeholder Engagement Strategy**
- ✓ **Industry Participation Plan**
- ✓ **Community Enhancement Fund**.

Responsiveness to site values and community expectations

Detailed environmental investigations and community consultation was undertaken to understand the site's values. Key actions taken early in the Project's planning stages in response to environmental constraints included:

- The nearest Non-associated Receiver (R1) was consulted directly early in the planning phase to discuss potential visual amenity impacts on their property. Consideration was given to siting the facility to take advantage of local terrain and thereby minimise impacts on views from the south and south-west.
- A viewshed analysis was completed to understand the likely impacts on the more densely populated areas of Wellington township.

- Existing field surveys of relevance to the site were sourced to understand the extent and condition of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (WBGW) Threatened Ecological Community (TEC) nearby. Early biodiversity surveys and consultation with Biodiversity Conservation Division (BCD) were undertaken to verify:
    - The condition and habitat values onsite
    - The potential for Serious and Irreversible Impacts (SAII) in relation to this vegetation
    - Institute avoidance measures to the highest degree possible for the Project through Project design.
- Consultation regarding the potential to use existing access ways (thereby minimising new areas of disturbance required for the Project). Four access points were evaluated, with landowners and in consideration of existing land uses and ability to achieve required safety criteria (detailed in Section 2.3.3). A new access point was identified that would provide appropriate safe sight distances for traffic entering and exiting Goolma Road and then follow the existing access track as much as practicable to avoid additional vegetation impacts.

Key community Project issues and opportunities were identified throughout the Project's engagement activities and informed the development of social impact and engagement strategies to be implemented as part of the Project, pending approval, including:

1.	Employment, training and procurement opportunities	The development of a Local Participation Plan is proposed to enhance positive impacts.
2.	Impacts on the local economy	The development of a Local Participation Plan and a Local Procurement Policy is proposed to provide tangible outcomes for local business, even over the short term.
3.	The ability to share benefits	The Applicant has committed to developing a community benefit sharing program that is tailored to the local context, to maximise local benefits and be designed to have a positive and lasting impact on the Wellington community.
4.	Impacts on local housing and accommodation	The Applicant has committed to hiring locally (where possible) to reduce accommodation burdens and is recommended to work closely with Dubbo Regional Council and other key stakeholders in Wellington and Dubbo to develop an Accommodation and Employment strategy to minimise negative impacts on the rental market and other users of short-term accommodation, such as tourists.
5.	Amenity impacts for near neighbours	The nearest neighbours were consulted early in the planning phase to discuss visual amenity impact on their property. Within the Project planning phase, consideration was given to siting the facility to take advantage of local terrain and vegetation and thereby minimise views. Consideration was also given to ensuring that the colours of the buildings within the site blend into the landscape as much as possible. The Applicant has committed to working closely with impacted near neighbours to develop appropriate and acceptable mitigation measures specifically to manage noise impacts.

Assessment requirements

The Project is considered a State Significant Development because it is an electricity generating (as defined under the Local instrument) with a capital investment value that would exceed $30 million. The State Environmental Planning Policy (Planning Systems) 2021 (SEPP Planning Systems) dictates the environmental assessment must be undertaken in accordance with:

- Part 4 of the NSW *Environmental Planning and Assessment Act 1979.*
- Schedule 2 of the NSW Environmental Planning and Assessment Regulation 2021.
- The Project-specific Secretary's Environmental Assessment Requirements (SEARs).

Key environmental matters

The environmental issues of the Orana BESS have been investigated through specialist investigations and the resulting mitigation strategies are considered feasible to address the low-level impacts identified. Key uncertainties of the assessment are acknowledged. Overall, the results obtained in this EIS can be considered moderate-high confidence, given the existing detailed investigations on the Subject Land and adjacent large-scale developments that have also been subject to detailed environmental assessments in recent years. It is noted that, to ensure flexibility in the final consent, where required, upper limit quantities and power level estimates are provided and assessed, providing a conservative approach to the impact assessment.

The Project demonstrates responsiveness to the findings of the specialist assessments. Table E2 summarises the Project outcomes in terms of impacts on key environmental values of the site.

Table E2 Project outcomes in terms of impacts on key values

Matter	Significance of impact	Mitigation strategy
Biodiversity	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Plant Community Type 266) impacts: • Removal of 3.66 ha in low to good condition categories • Removal of 6.96 ha in poor condition. This includes 37 hollow bearing trees and confirmed habitat for the threatened: • *Aprasia parapulchella* Pink-tailed Legless Lizard (10.34 ha) • *Tyto novaehollandiae* Masked Owl (5.1 ha). The remaining vegetation within the Development Footprint is considered exotic. The impacts are not considered serious and irreversible. They can be offset and the Project has applied the NSW Biodiversity Assessment Method to demonstrate 'avoid and minimise' as required.	Avoid and minimise principles are well evidenced in the linear north-located site layout, which prioritises the better quality structural woodland. Preparation of a Biodiversity Management Plan (BMP) for the site will protect adjacent areas during construction and operation and contains site specific protocols. A NSW biodiversity offset obligation is generated for the threatened species but not the vegetation; its vegetation integrity is considered too low to generate offsets. A Commonwealth referral is underway and may generate additional obligations.
Aboriginal heritage	One previously recorded culturally modified tree is located is approximately 150 m from proposed Development Footprint.	The previously recorded site can be protected by delineating it as an 'avoidance area'.

Matter	Significance of impact	Mitigation strategy
	The surveys and assessment concluded there is low potential for surface or subsurface stone artefacts to be present or to be harmed by the Project. No known specific values (scientific, social or cultural, aesthetic or historic) would be impacted by the Project.	Aboriginal heritage will be included within the Construction Environment Management Plan (CEMP) or equivalent for the Project. This will include an unexpected finds protocol and will include an onsite induction and be developed in consultation with the Registered Aboriginal Parties for the Project.
Access and traffic	A site access off Goolma Road is required for the Project. Its location has been selected to ensure safe sight lines and turning movements. Impacts on local traffic would be concentrated in the construction phase where there is the potential for a number of projects to overlap, particularly from other renewable projects, generating cumulative traffic impacts. Modelling shows the road network can accommodate the additional traffic generated during peak phases, in consideration of what is known of other local projects. The project is expected to generate approximately six (6) Oversize Overmass vehicle movements during construction. During operation the BESS is expected to generate a minimal level of traffic.	The site access off Goolma Road would require a Basic Left Turn (BAL) and a short Channelised Right Turn (CHRs) treatment. The design for the intersection meets the intent of the Austroads Guideline and forms a commitment of the Project. No further road upgrades are required to manage impacts on the road assets or road safety. The vehicles are subject to specific road permits such as OSOM vehicles that will be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known.
Hazards - Preliminary Hazards Assessment	Preliminary risk screening found that the Project is not considered as 'potentially hazardous industry': • The storage and transport of hazardous materials for the Project will not exceed the relevant risk screening threshold. • There are no other risk factors identified that could result in significant off-site impacts. • The Project is not considered as 'potentially hazardous' with respect to storage and transportation and does not require a Preliminary Hazard Assessment. Of the 12 hazardous events identified by Hazard Identification (HAZID), none were assessed to have a significant off-site impact due to their consequences and controls. Electric and Magnetic Fields created from the Project will not exceed the International Commission on Non-Ionizing Radiation	Mitigation centres on design with reference to: • Powin's Battery Emergency Response Guide • Energy Safe Victoria: Statement of Technical Findings on fire at the Victorian Big Battery • Fisher Engineering and Energy Safety Response Group: Report of Technical Findings on Victorian Big Battery Fire as well as consultation with Fire and Rescue NSW (FRNSW) to ensure that relevant aspects of fire protection measures have been included in the design.

Matter	Significance of impact	Mitigation strategy
	Protection (ICNIRP) Guidelines reference level. The designated land area can accommodate the BESS units to meet the proposed capacity, as verified by detailed general arrangement drawings. No off-site impact is expected as the BESS would be situated in a rural area and there is a large separation distance to the nearest sensitive receptor.	
Bushfire	Asset Protection Zones are included in the Development Footprint to ensure a defendable space is provided and to manage heat intensities at the infrastructure interface. This is considered reasonable given the site is not within bushfire prone land and is typical of a utility solar farm which includes a BESS	Mitigation centres on: • Adequate set backs, access and firefighting facilities maintained onsite. • Control of grass fuels levels. • Proper design and maintenance of equipment. • Application of best practice and technical standards.
Visual amenity	Two private and eleven public view points were evaluated as having a low to very low visual impact without mitigation. With mitigation this reduces to very low in all cases. Nine Non-associated Receivers were evaluated as having a low (R1) to very low (R2, 3, 4, 5, 6, 7, 8,10) visual impact without mitigation. With mitigation this reduces to very low / negligible in all cases.	Screen planting will further reduce low visual impacts to very low. This is considered particularly important given the cumulative impact of additional industrial infrastructure on existing residential and motorist views.
Noise amenity	For Receiver R1, it is expected that a noise exceedance of 3 dB during construction would likely occur when the construction works are conducted within 700m of the dwelling / building (expected duration would two to three days). No exceedances are relevant to operation. No vibration or road traffic noise impacts warrant mitigation.	A Noise Management Plan will be developed as part of the construction environmental management plan. This will include Feasible and reasonable noise strategies, ensuring low risk of noise exceedances in construction.
Non-Aboriginal heritage	The view to Nanima Homestead (I51; R1) from the Subject Land is largely occluded by mature plantings surrounding this item. The Keston Homestead (I50) is located even further from the Subject Land (more than 1 kilometre away). Potential impacts to the heritage values of the locally listed heritage items (I50 and I51) would	No further assessment is warranted. Mitigation centres on visual impact screening for R1, as above.

Matter	Significance of impact	Mitigation strategy
	be negligible and may involve a minor visual impact (the Subject Land being visible from the curtilage of Nanima Homestead).	
Cumulative impacts	The main cumulative impacts relevant to this Project are: • Traffic impacts, where construction timing may overlap other large scale developments • Biodiversity impacts, where incremental losses of Box Gum Woodland and threatened species habitat may cross a threshold or lead to fragmentation significance to local persistence • Visual impacts, where the overall local amenity is further impacted by a change in local character from rural views to a more industrial character.	Biodiversity and visual impacts are best mitigated on a project by project basis and in this way the Project's mitigation measures would reduce cumulative impacts appropriately. Traffic impacts may be more significant and are more uncertain. While the chance of overlap cannot be known with certainty at this time, the period of overlap of peak construction traffic is not considered significant in terms of the ability of the local road network to handle this overlap. The Applicants best understanding of timing is presented in this EIS as well as the stated timing of nearby projects which may coincide. Cumulative traffic impacts would require more accurate data, closer to construction with regard to managing overlapping construction schedules.

Project commitments

The consolidated set of mitigation commitments is provided in Appendix D of the EIS, and together with the Project as outlined in Section 3, constitute the Project's commitment to developing a best practice BESS Project.

All commitments and mitigation measures would be managed through the implementation of a Project Environmental Management Strategy (EMS). The EMS would comprise a Construction Environmental Management Plan (CEMP), an Operation Environmental Management Plan (OEMP) and a Decommissioning Environmental Management Plan (DEMP). These plans would be prepared sequentially, prior to each stage of works by the contractor (CEMP, DEMP) and Applicant (OEMP).

The Project as presented in this EIS meets all relevant planning provisions and guidelines and is considered justifiable and acceptable.

Where to from here

During the public exhibition of this EIS, the community, local council and government agencies are invited to make informed submissions in relation to the Project. The consent authority would consider any formal submissions made during the exhibition period. The Applicant's response to all matters raised in submissions would also be exhibited as the Department of Planning and Environment commence preparation of their own assessment of the Project's impacts and its merits and make a recommendation regarding its ability to be approved.

1. Introduction

1.1 Format of this Environmental Impact Statement (EIS)

The purpose of this Environmental Impact Statement (EIS) is to assess the economic, environmental and social impacts of the Orana BESS Project, proposed to be located at 6945 Goolma Road, Montefiores NSW 2080.

This EIS is structured to help the community, local council, government agencies and the consent authority understand of the Project and its impacts so they can make informed submissions or decisions on the merits of the Project.

It has been prepared in two parts:

1. The main report describes the Project, summarises the findings of consultation activities and the detailed environmental assessment of impacts. It includes all mitigation measures proposed to manage the impacts on the community and the environment.
2. The supporting appendices include more detail in relation to:
    a. The Project specific Secretary's Environmental Assessment Requirements (SEARs) which prescribe the structure and content of the EIS, including a cross reference to where each requirement is addressed in the EIS.
    b. Statutory compliance of the Project.
    c. Engagement activities and outcomes, with the community and agencies.
    d. Detailed specialist assessments (each provided in full).

The appendices also include a consolidated table of all proposed mitigation measures to manage the impacts on the community and the environment. These form part of the Project description, and would be required to be implemented, pending Project approval.

1.2 Project objectives

The Orana BESS Project would improve energy reliability within the National Energy Market (NEM). The NEM spans Australia's eastern and south-eastern coasts, around 5,000km, across New South Wales, Australian Capital Territory, Queensland, Victoria, South Australia and Tasmania.

Specifically, the objectives of the Orana BESS Project are to store and discharge energy economically in the wholesale energy market that would facilitate increased renewable penetration in NSW and improve network stability. In doing so the Project would:

- Provide new industries and opportunities to the Wellington township and broader region.
- Minimise environmental impacts.
- Maximise social license to operate.

Key to achieving these objectives, the Project would:

- Be a contributor to minimising greenhouse gases as more coal-fired power stations are retired across NSW.
- Contribute to New South Wales's objective of achieving net-zero emissions by 2050 and support the declared Central West Orana Renewable Energy Zone.

- Be located to take advantage of existing grid infrastructure and capacity.
- Develop, construct and operate an economically efficient facility.
- Include broader community benefits, including but not limited to employment and training opportunities and economic stimulus.
- Clearly identify and mitigate impacts that cannot be avoided, in consultation with the community and other relevant stakeholders.

1.3 Applicant details

Company Name	Akaysha Pty Ltd
ABN	49 649 223 987
Address	10-12 Gwynne Street Cremorne, VIC, 3121

Akaysha brings together a diverse and market leading set of skills and experience for end-to-end development of BESS projects, with ready access to the capital necessary to finance these complex projects. Akaysha's team is made up of long-standing energy sector professionals, proven in the development and deployment of large-scale batteries in Australia, and they also work with tier-one suppliers and partners to ensure sustainable and high-quality outcomes. Akaysha is mindful of its footprint in the communities in which it operates and is committed to engaging with local stakeholders to ensure mutually beneficial and lasting legacies.

1.4 Site overview

1.4.1 The locality

The Subject Land is located at 6945 Goolma Road, Montefiores NSW 2080, approximately 2km north-east of Wellington and within the Dubbo Local Government Area (LGA), NSW. The LGA covers a total land area of 7,536ha. The Project is within the Central-West Orana Renewable Energy Zone (REZ). The Project is located within the Macquarie River catchment area.

The main highway into the Wellington township is the Mitchell Highway that runs north south and connects the locality with Dubbo. Wuuluman is the suburb immediately surrounding the Development Footprint and is a predominantly rural locality dominated by farming land but also including larger and small lot residential development. Wuuluman is connected to Wellington via Goolma Road. Refer to Figure 1-1.

The Central-West Orana REZ is strategically located to maximise the benefits of and smooth the transition to greater renewable energy development. There are several renewable projects proposed or operating already within the REZ, including Wellington South Solar Farm (constructed), on the northern side of Goolma Road. The approved Wellington North Solar Farm is also located in the area and is anticipated to commence construction in July 2022. The assessment for the Wellington South Battery Energy Storage System, proposed 300m east of the Subject Land, is currently underway.

Renewable projects in the locality:

- **Battery only**
    - Wellington South Battery Energy Storage System
- **Solar farms**
    - Wellington Solar Farm
    - Wellington North Solar Farm
    - Mumbil Solar Farm
    - Suntop Solar Farm
    - Suntop Stage 2 Solar Farm
    - Maryvale Solar Farm
    - South Keswick Solar Farm (Dubbo Solar Hub)
    - 47R Wellington Road Solar Farm.
- **Wind farms**
    - Uungula Wind Farm
    - Burrendong Wind Farm.

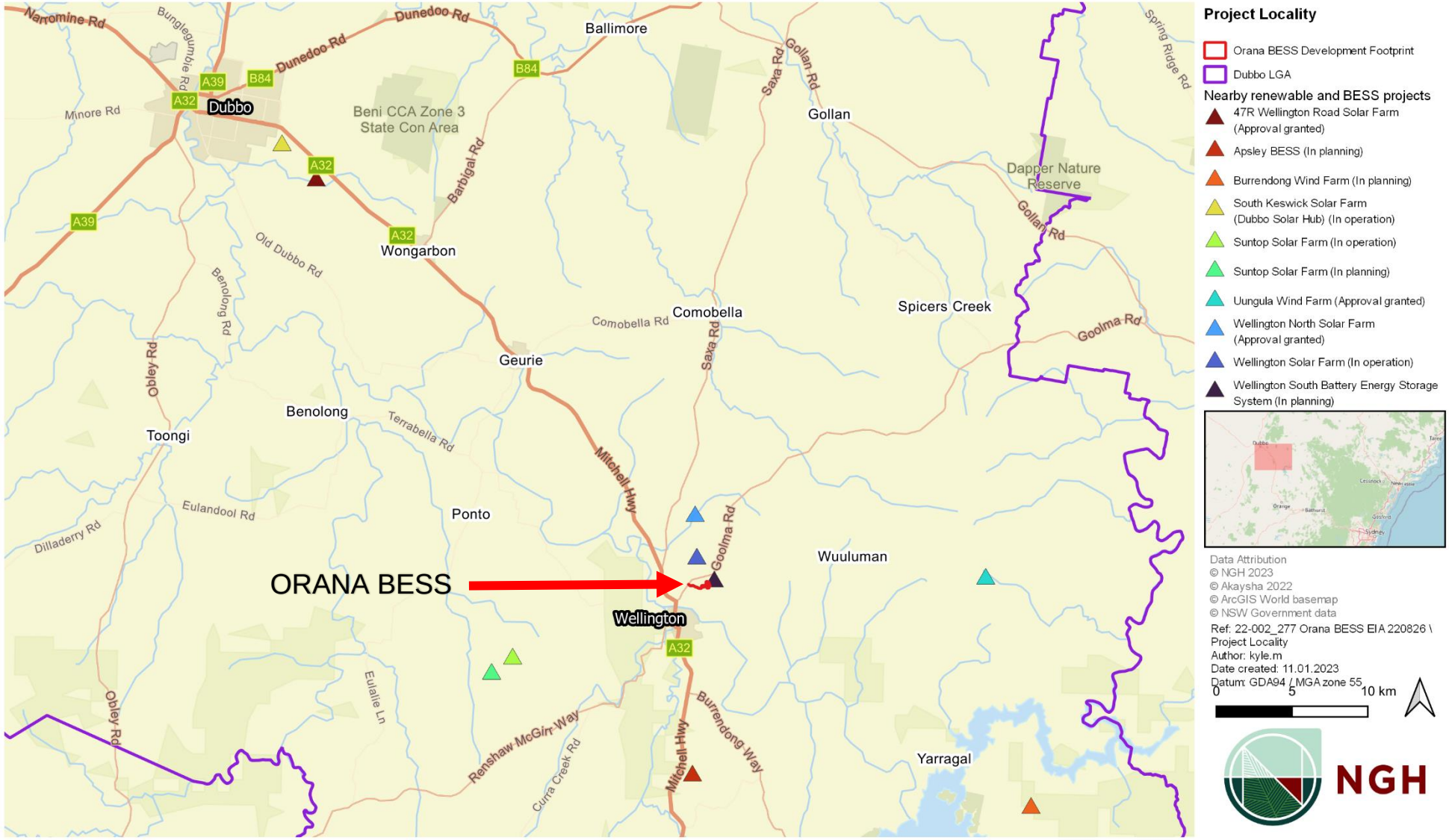


Figure 1-1 Location of Subject Land and proximity to closest towns and other projects

1.4.2 Subject Land tenure

The Subject Land primarily consists of Lot 2 DP1226751. Part of the access road includes Lot 2 DP1136578. The network connection assets occupy Lot 1 DP1226751.

The Subject Land slopes down from west to east. Elevation ranges from 360m to 320m Australian Height Datum (AHD). The lowest elevation area on site is associated with the first order waterway in the centre of the site (refer to Figure 1-2). The site consists of derived grasslands in the north and native woodlands remnants in the south, condition ranges from poor to moderate and the associated with Plant Community Type (PCT) is 266 – White Box Grassy Woodland.

The primary landholder lots of Lot 2 DP1226751 and Lot 2 DP1136578 are currently used for livestock grazing. Except for the westernmost extent of the road access track, these lots are not classified as Biophysical Strategic Agricultural Land (BSAL) in accordance with NSW government land classification (see Figure 1-2). BSAL does occur within the Wellington Substation lot however grazing and agricultural activity is limited in this lot.

The site is immediately south of the existing Transgrid 330kV zone substation. There is one dam within the Wellington Substation lot.

Nine Non-associated Receivers within 1.5km of the proposed BESS area and suburban residential areas of Wellington are located to the south-west. Refer to Table 1-1 and Figure 1-2, Figure 1-3 and Figure 1-4.

Table 1-1 Lot/DPs in the Development Footprint

Lot/DP	Zoning (Dubbo Regional LEP)	Current ownership	Proposed infrastructure components	Lot area (ha)
Lot 2 DP1226751	SP2 Infrastructure	Freehold (Associated Receiver; R9)	BESS, indicative access track, onsite substation, O&M buildings	40.5
Lot 2 DP1136578	RU1 Primary Production	Freehold (Associated Receiver; R9)	Access track only	235.5
Lot 1 DP1226751	SP2 Infrastructure	Transgrid	Transmission line, grid connection	56.9
Road corridor (Goolma Road)	SP2 Infrastructure	Transport for NSW (TfNSW)	Intersection upgrades / Access track	-

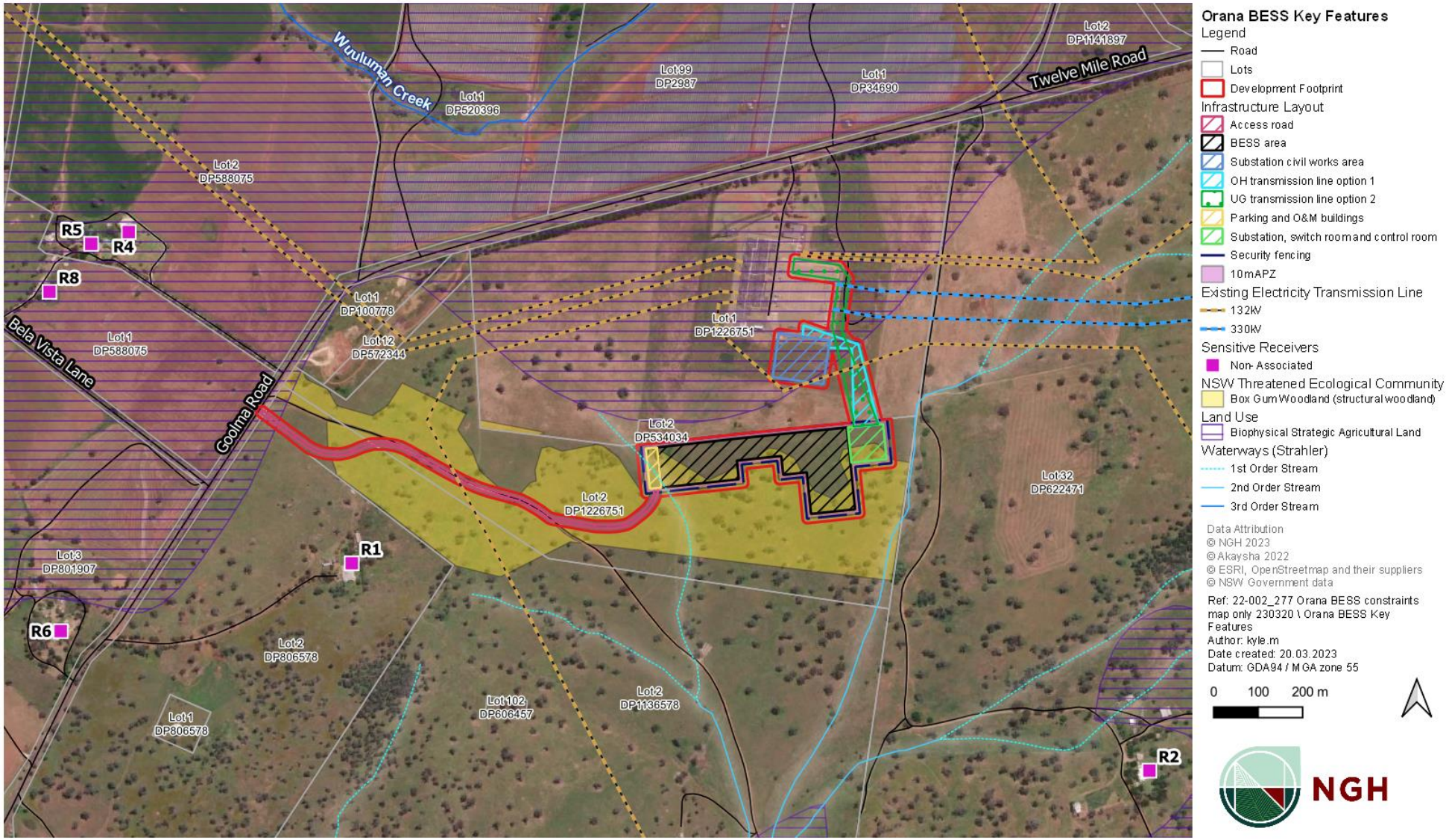


Figure 1-2 Development Footprint proposed in relation to key site features

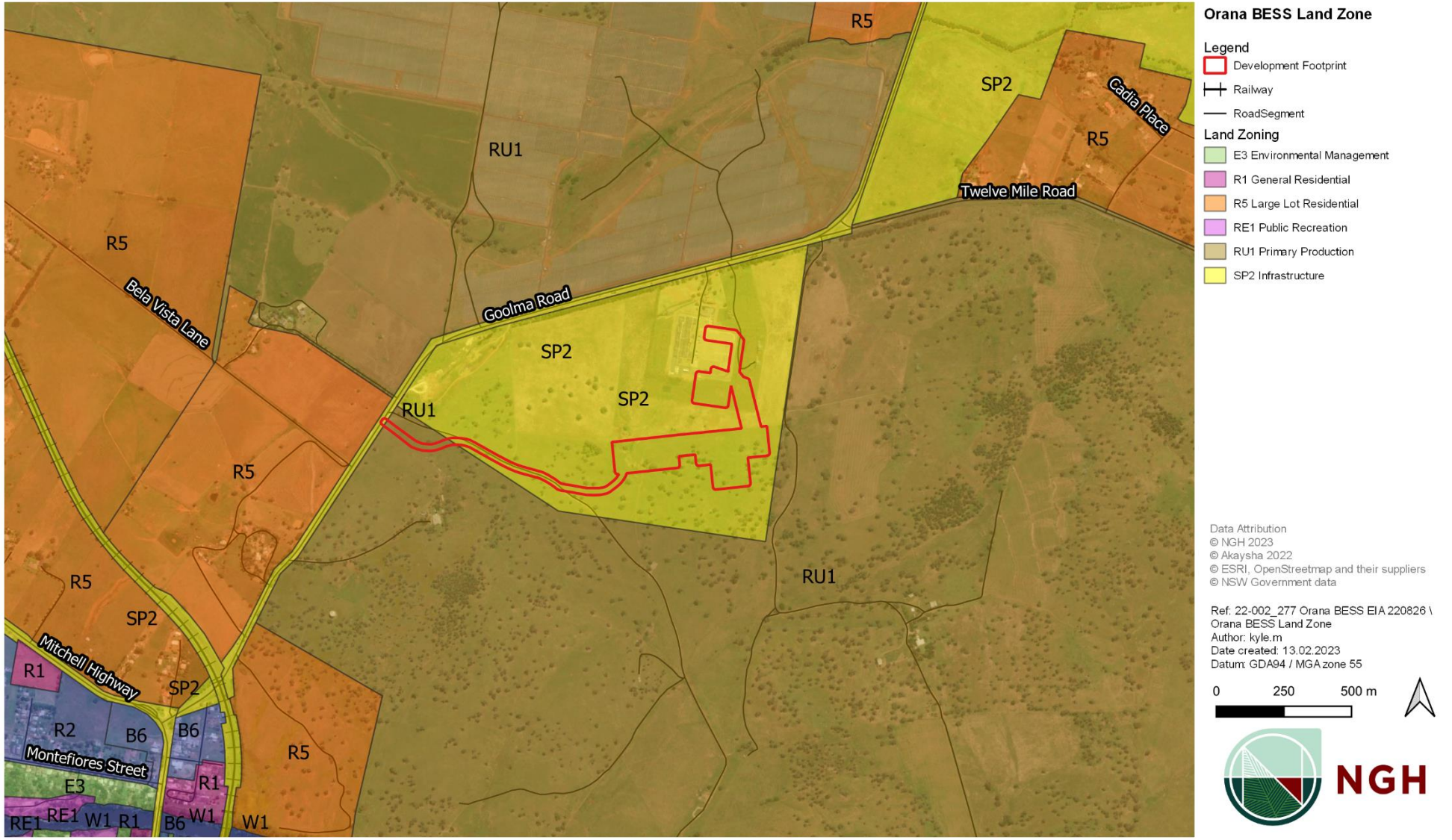


Figure 1-3 Local land zoning

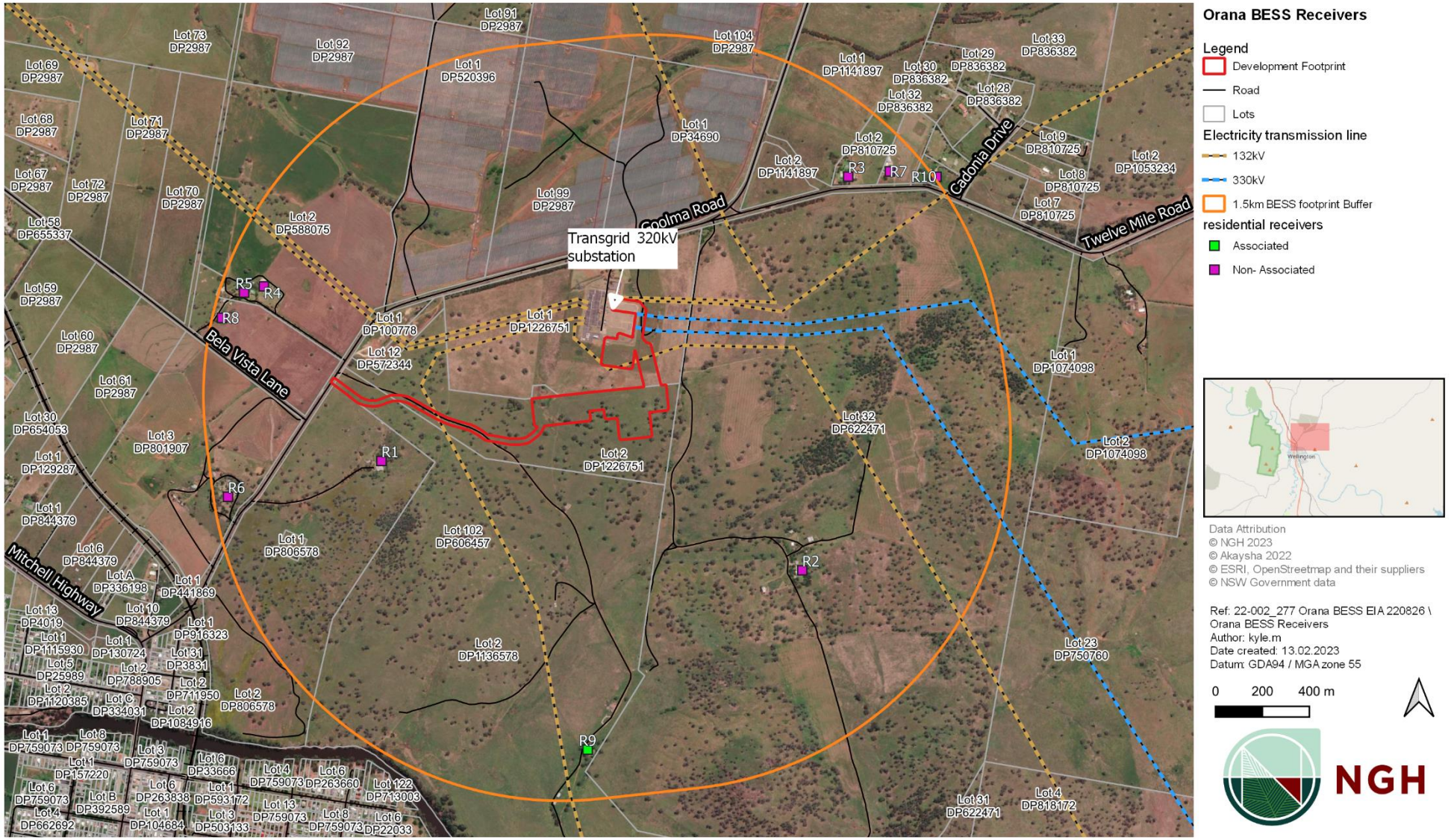


Figure 1-4 Nearby receivers (R9 is an Associated Receiver)

1.5 Background to site selection and Project design

The location proposed for the Orana BESS was initially selected following a detailed desktop analysis of the region which considered:

- Grid capacity
- Proximity to grid connection
- Existing land use
- Environmental constraints.

Several site visits were undertaken and interest from the landowner was confirmed. More detailed consideration was then given to areas suitable for development of a BESS with the Subject Land. The key issues considered included:

- How to connect to the existing Wellington substation, as the area is already somewhat congested with overhead and underground transmission and communications infrastructure
- Existing land zoning and residential subdivision potential of the Subject Land
- Views to the site from nearby residences
- Biodiversity values
- Cultural heritage values.

Key actions taken early in the Project's planning stages in response to environmental constraints included:

- The nearest Non-associated Receiver (R1) was consulted directly early in the planning phase to discuss potential visual amenity impacts on their property. Consideration was given to siting the facility to take advantage of local terrain and thereby minimise views to the south and south-west.
- A viewshed analysis was completed to understand the likely impacts on the more densely populated areas of Wellington township.
- Existing field surveys of relevance to the site were sourced to understand the extent and condition of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (WBGW) Threatened Ecological Community (TEC) nearby. Early biodiversity surveys and consultation with Biodiversity Conservation Division (BCD) were undertaken to verify:
    - The condition and habitat values onsite
    - The potential for Serious and Irreversible Impacts (SAII) in relation to this vegetation
    - The potential for avoiding and minimising biodiversity impacts through Project design.
- Consultation regarding the potential to use existing access ways (thereby minimising new areas of disturbance required for the Project). Four access points were evaluated, with landowners and in consideration of existing land uses and ability to achieve required safety criteria (detailed in Section 2.3.3). A new access point was identified that would provide appropriate safe sight distances for traffic entering and exiting Goolma Road for both the Orana BESS Project and the future subdivision, should it be further progressed. From the

access point, the existing access track would be used as much as practicable to avoid additional vegetation impacts.

1.6 Related developments

1.6.1 Withdrawn approval; Wellington Gas Power Station

A gas power station was approved in 2009, by the NSW Minister for Planning (NSW Government , 2009). This Project was withdrawn in 2015 by the developer ERM Power (now part of Shell Energy). The Wellington gas power station site was forecast to comprise 45ha of land with an operation area of 6ha. The power station was to be supplied by a 100km long pipeline connecting to an existing gas pipeline near Alectown. A copy of the indicative operation layout is included below; it is no longer proposed.

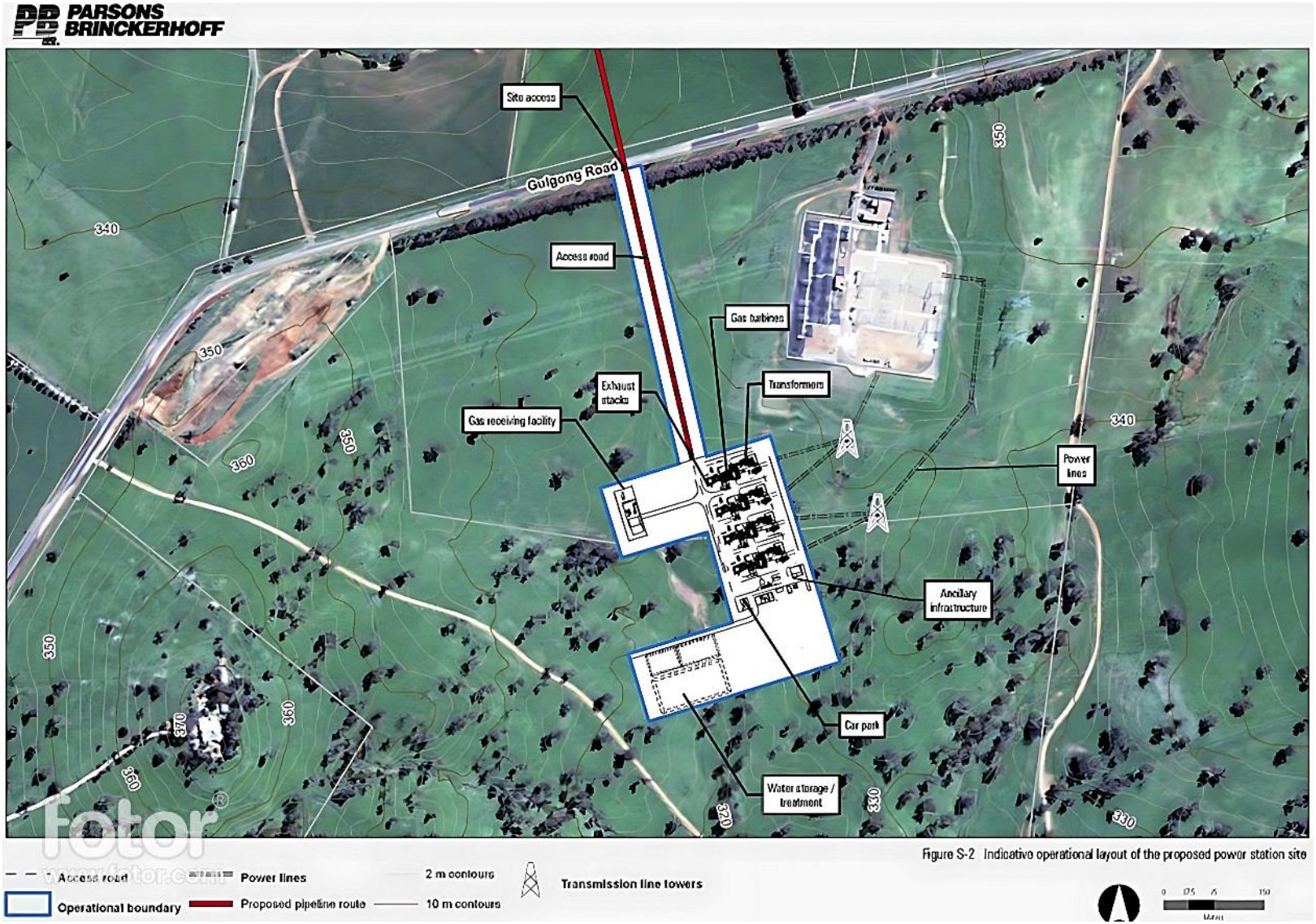


Figure 1-5 Withdrawn Wellington Power Station (Parsons Brinckerhoff, 2009)

1.6.2 Transgrid ancillary works

Connection works to the existing TransGrid substation would be required. This ancillary work is required for the Project but would be subject to a separate assessment under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). However, the intention of Part 4 of the Act is to consider all impacts generated by the Project, commensurate with risk and inclusive of cumulative impacts. As such, this EIS includes the areas required to be impacted by these connection works within this assessment.

1.6.3 Pre-existing approval for two-lot residential subdivision

The landowner of Lot 2 DP1226751 and Lot 2 DP1136578 has received planning approval for a two-lot subdivision and access road at Lot 2 DP1136578 (refer to Figure 1-6 showing the indicative area of the landowners subdivision approval area). The subdivision approval was granted by Wellington Council in 2011 and is understood to be considered to have 'commenced'. No services, fencing or other subdivision infrastructure has yet been developed. No further subdivision construction is expected in the short term.

While the new access point identified for the Orana BESS Project would also be used for the future subdivision, if progressed, rerouting the BESS's *operational* access track would be required for a short section where it crosses the south-eastern subdivision lot. The Orana BESS would develop a short alternate section of track for operational access should the subdivision be progressed. A Modification Application would be required to facilitate approval of this change. No change to the Goolma Road access would be required in this event.

Figure 1-6 Landowner subdivision

1.7 Restrictions applicable to the site

No restrictions for the site have been identified.

2. Strategic context

The strategic context of this Project is set out below. It is an important background to the Project as it demonstrates how well the Orana BESS:

1. Aligns with federal and state regional renewable energy policies
2. Aligns with regional and local land use plans
3. Responds to the site's unique environmental and social context.

In consideration of these matters, alternatives to the Project are examined and the Project benefits are set out at the end of this section.

2.1 Alignment with federal and state regional energy policies

2.1.1 National Electricity Market (NEM)

The Australian Energy Markey Operator (AEMO) released the 2022 Integrated System Plan (ISP) in June 2022 (AEMO, 2022). The NEM services five regions – Queensland, NSW, Victoria, South Australia, and Tasmania. The plan is released every two years and aims to guide industry and government in the investments needed for an affordable, secure and reliable energy future, while meeting prescribed emissions trajectories. The 2022 ISP acknowledges that Australia's traditional energy supply system has been based on large-scale power stations with large-scale transmission systems and centralised asset hubs. In recent years energy generation has diversified, with greater interest in consumer-led distributed energy resources (DER) and utility-scale variable renewable energy (VRE), and emergent technologies. Significantly, as large-scale coal fired generation is undergoing a grid phase out.

The AEMO states that currently the NEM relies on 23GW of dispatchable energy from coal-fired generation and that without coal the NEM would require 46GW of dispatchable energy by 2050. Utility scale battery storage such as the Orana BESS is expected to contribute 16GW of this dispatchable alongside hydrogen storage. The ISP is aligned with the need identified by the Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future (the Finkel Review) , that the NEM requires stable, dispatchable generation to balance network requirements as renewable generation fluctuates depending on the predominate solar and wind resources available at the time (Finkel, Moses, Munro, Effeney, & O'Kane, 2017).

Battery energy storage systems such as the Orana BESS would play a major role in maintaining energy system security and stability identified in the ISP. BESS installations are anticipated to play a vital role in NSW according to the NSW transmission Infrastructure Strategy outlined below.

Renewable Energy Zones (REZ's)

To strategically maximise benefits and smooth the transition to greater renewable energy development, the ISP identified potential REZ locations that can connect to the existing transmission network. Specifically, these REZs can:

- Reduce the need to build transmission lines into new areas.
- Reduce Project connection costs and risks.
- Optimise the mix of generation, storage and transmission line investment across multiple connecting parties.

- Co-locate and optimise the otherwise ‘lumpy’ investments in network and system support infrastructure.
- Co-locate and optimise weather observation stations to improve real-time forecasting.
- Realise benefits of capital scale in all those investments.
- Promote regional expertise and employment at scale.

The ISP has identified 41 potential REZ after assessing resource, technical and economic parameters during scenario and assumptions consultation. The Project is within the Central-West Orana REZ (Figure 2-1) and strategically well placed next to an existing substation (Transgrid’s Wellington 330kV substation). The Project is also located nearby the Wellington and Wellington North Solar Farms, which have a combined capacity of 470MW. The Central-West Orana REZ is forecasted to install 2.1 GW of VRE by 2026-27, increasing to 4.6 GW by 2030 and 7.7 GW by 2040.

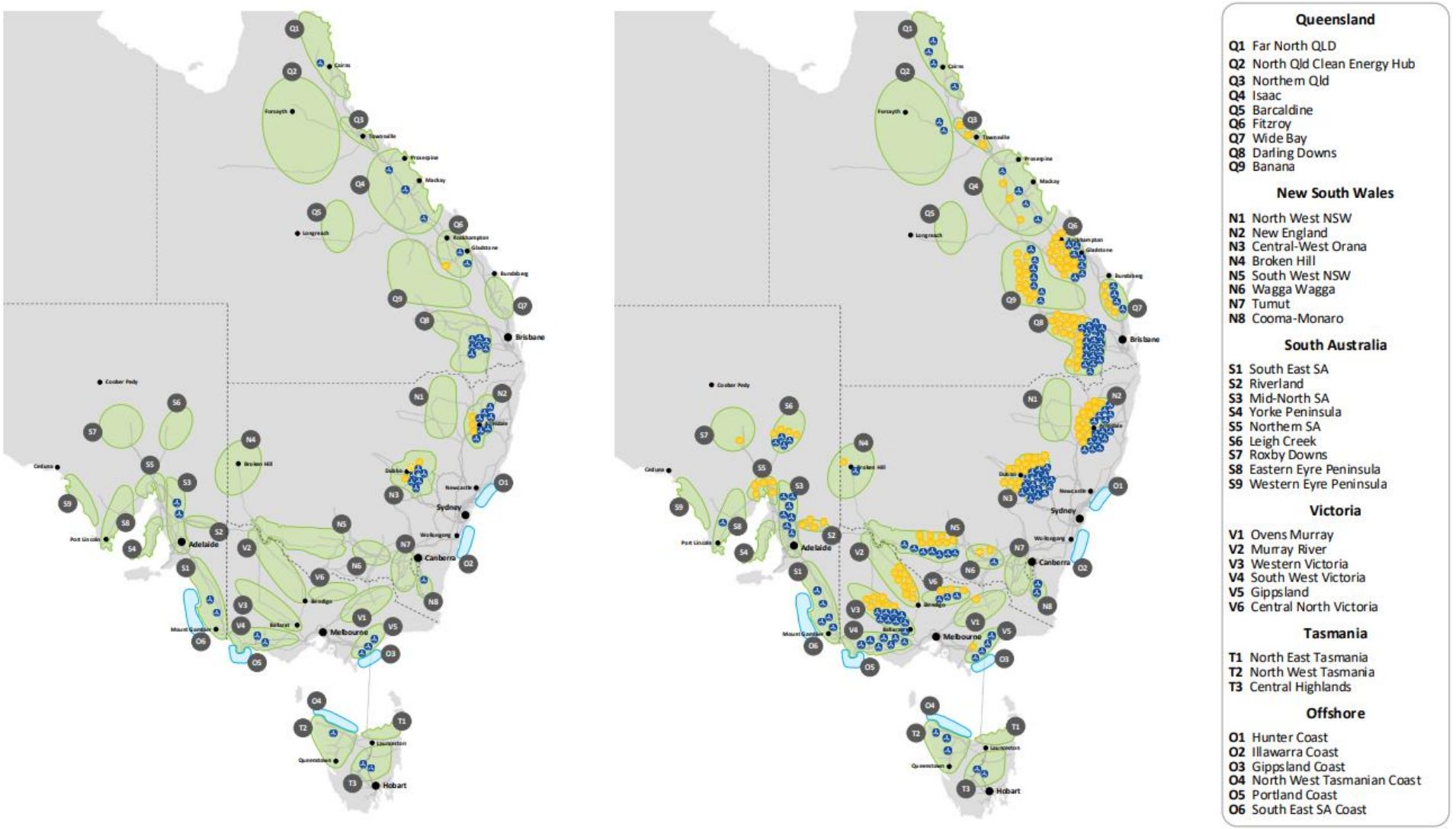


Figure 2-1 Identified candidate REZs for assessment in developing the Step Change path in the NEM 2029-30 (left) and 2049-50 (right)

NSW Electricity infrastructure roadmap

The NSW Electricity Infrastructure Roadmap ('The Roadmap') aims to redefine NSW as a modern, global energy superpower by delivering the electricity infrastructure needed to support a modern prosperous economy (NSW DPIE, 2020). The roadmap sets out a plan to transition the electricity sector from the existing power sources that are coming to the end of their lives, to cleaner, cheaper and more reliable energy sources including wind, solar, batteries and pumped hydro.

The electricity sector in NSW would be underpinned by five foundational pillars outlined in The Roadmap:

1. Driving investment in regional NSW: supporting our regions as the State's economic and energy powerhouse.
2. Delivering energy storage infrastructure: supporting stable, long-term energy storage in NSW.
3. Delivering Renewable Energy Zones (REZs): coordinating regional transmission and renewable generation in the right places for local communities.
4. Keeping the grid secure and reliable: backing the system with gas, batteries or other reliable sources as needed.
5. Harnessing opportunities for industry: empowering new and revitalised industries with cheap, reliable and low emissions electricity.

The Roadmap reiterates the need to act now given four of the five coal fired power stations in NSW are anticipated to close within 15 years, starting with the Liddell power station in 2022-23. These power stations provide, as of 2020 power mix generation, around three quarters of NSW's electricity supply and two thirds of the firm capacity needed during summer heat waves, and as they age, tend to fail more frequently resulting in reliability problems. The infrastructure needed to replace coal fired power stations has long lead times, further justifying the need for action to coordinate and unlock investment before they close.

The key benefits of The Roadmap are shown in Figure 2-2.

Figure 2-2 Benefits of The Roadmap (Source: NSW Electricity Infrastructure Roadmap)

The Orana BESS would contribute directly to four of the five pillars:

1. Driving investment in regional NSW by increasing economic activity during construction and through benefit sharing programs. The Project has a Capital Investment Value (CIV) of $879 million.
2. Contributing an installed capacity of up to 1600MWh of stored dispatchable energy to the grid network, to support stabilising the supply of electricity to the NEM, especially during times of low supply and high demand during the transition away from coal-fired power plants.
3. The Project is located within the Central-West Orana REZ.
4. The Project is a battery, as above it would be in use to ensure the grid is kept stable by providing dispatchable energy to the grid.

2.1.2 NSW Transmission Infrastructure Strategy 2018

The NSW Transmission Infrastructure Strategy is the NSW Government's plan to unlock private sector investment in priority energy infrastructure projects, which can deliver least-cost energy to customers to 2040 and beyond (NSW Department of Planning and Envrionment, 2018). The strategy states that for every 20 projects looking to connect to the grid, only one can. This comes despite the fact that in October 2018 more than 20,000 megawatts of large-scale projects were progressing through the planning system, representing more than $27 billion in potential investment, mostly in regional NSW. The NSW Transmission Infrastructure Strategy sets a plan to facilitate private sector investment in projects such as the Orana BESS. The NSW Transmission Infrastructure Strategy sets out the following guiding principles:

- Supporting projects that may contribute to lowering energy bills
- Taking a technology neutral approach to energy generation projects
- Private sector led investment
- Regional economic growth and increased job opportunities
- Ongoing secure and reliable energy to power the NSW economy.

The strategy also outlines the aim to boost NSW connectivity through large-scale transmission connections with surrounding states and regional areas. This would be primarily spearheaded by upgrades and infrastructure in defined energy zones.

2.1.3 NSW Electricity Strategy 2019

The three objectives of the NSW Government for the state's electricity system, as stated in the NSW Electricity Strategy (NSW DPIE, 2019), are; reliability, affordability and sustainability.

The NSW Government's Electricity Strategy would:

- Improve the efficiency and competitiveness of the NSW electricity market by reducing risk, cost, Government caused delays and by encouraging investment in new price-reducing generation and energy saving technology.
- Prompt Government to act if there is a forecast breach of the Energy Security Target which private sector projects are unlikely to address. This should be done in a way that minimises costs to consumers and taxpayers and does not give rise to moral hazard risk.
- Ensure that there are appropriate powers available for Government to analyse and respond to electricity supply emergencies if they arise.

Renewables are now the most economic form of new generation, with a mix of wind and solar firmed with gas, batteries and pumped hydro expected to be the most economic form of reliable electricity and battery storage is an important part of this transition. Wind and solar are cheaper than new coal and gas electricity generation projects, based on a levelized cost of electricity generated, and are also competitive when complemented with firm generation (Figure 2-3).

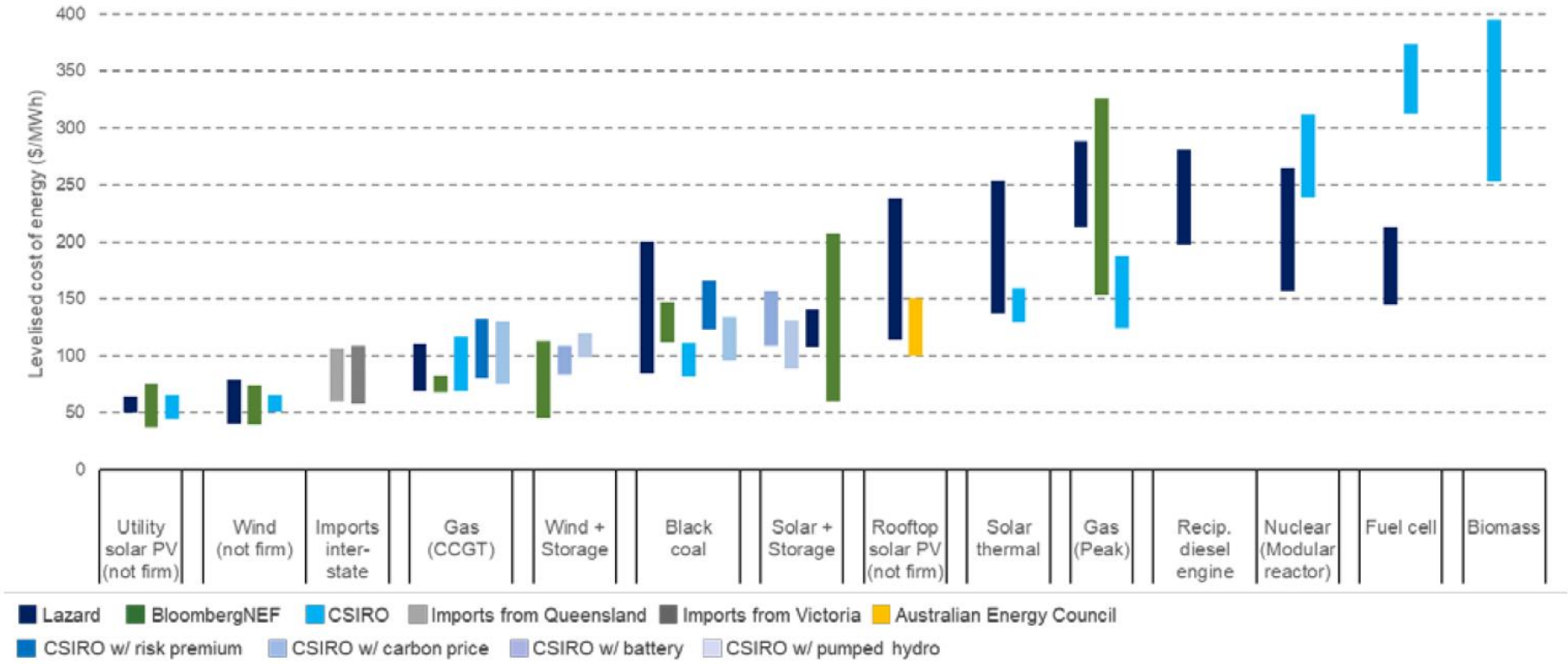


Figure 2-3 Levelised cost of electricity by type (DPIE, 2019)

Part 6 of the NSW Electricity strategy outlines that Energy Security Target (EST) was approximately 188MW short of the states targeted capacity during the year of 2019-20. Furthermore, in the 2020's the NSW EST would experience its tightest reserve conditions following the Liddell Power Station closure forecasted for April 2023. The projected outlook of the NSW EST is shown in Figure 2-4.

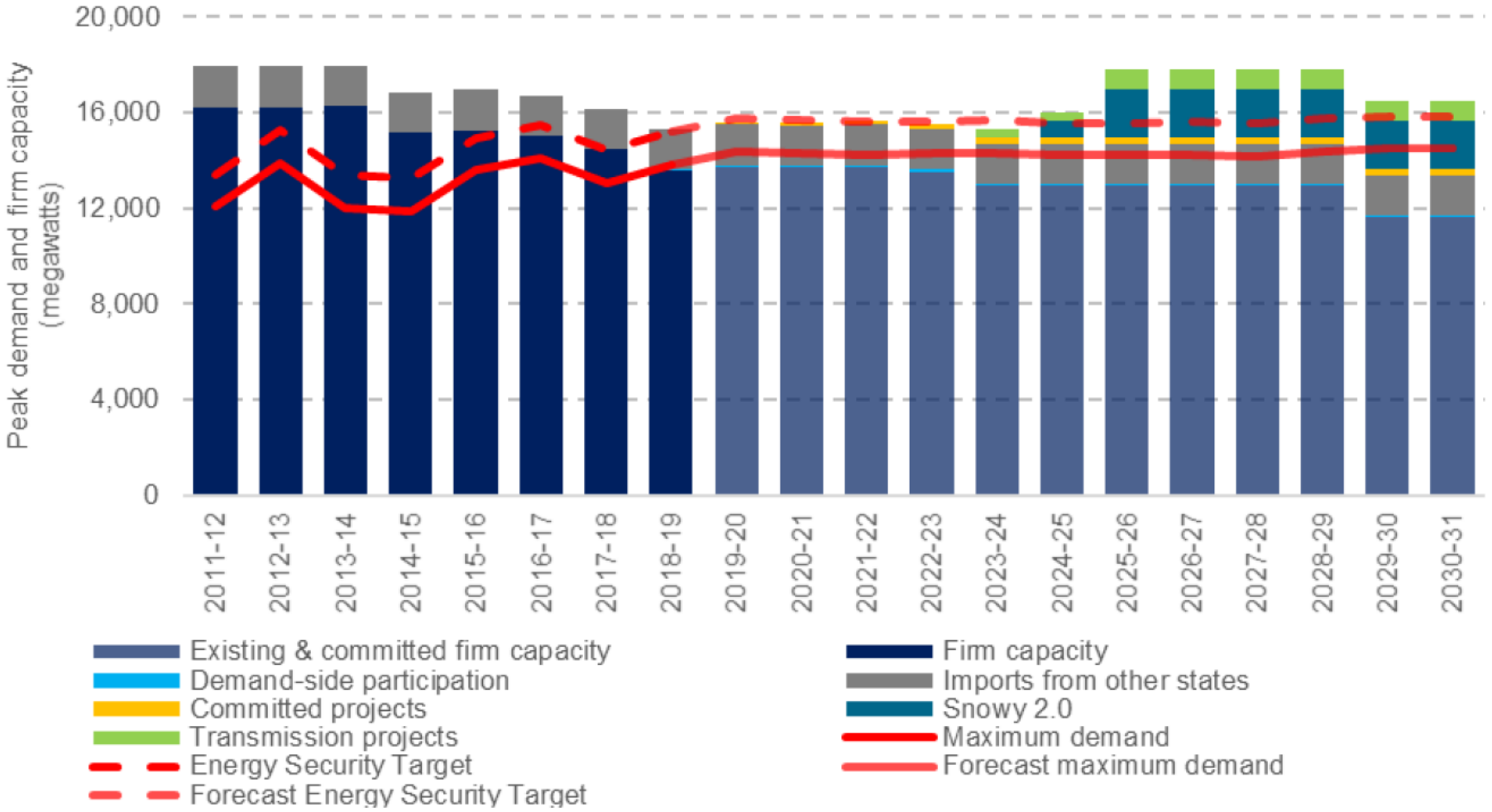


Figure 2-4 Outlook for the Energy Security Target (DPIE, 2019)

Without further investment NSW runs the risk of breached the EST in the summer of 2023-24. There are more than enough firm generation[1] projects proposed to meet the EST, but they still require approval to be operational by 2023-24. The Orana BESS therefore would directly contribute to the NSW government's plan to achieve the objectives for the electricity system which include reliability, affordability and economic growth and sustainability.

2.2 Alignment with regional and local land use plans

2.2.1 Draft Central West and Orana Regional Plan 2041

The Central West and Orana Regional Plan is a 20-year land-use blueprint to support a prosperous future for the region and is undergoing its first 5-year review to reset its priorities and extend its reach to 2041. The draft plan builds on the existing regional plan with a key updated being 'the region's role in supporting the State's transition to net zero carbon emissions by 2050 through a broad range of actions' (DPIE, 2021). The Regional Plan cites "There may also be opportunities to leverage the Central– West Orana REZ and renewable energy investment elsewhere in the region to attract regional energy intensive industries such as minerals processing, IT and data centres, high value agriculture, manufacturing and food processing to maximise the benefits of low-cost energy in the region" (DPIE, 2021). This Project would support the region in the achievement of these goals.

2.2.2 Dubbo Regional Council Local Strategic Planning Statement

The Dubbo Regional Council Local Strategic Planning Statement (Dubbo LSPS) (Dubbo Regional Council , 2020) outlines the Dubbo regions economic, social and environmental land use needs over the 20 years from 2020 as the Region grows and changes. The Dubbo LSPS has identified the regions key stake in the renewable energy transition due to its strategic location within the Central-West Orana REZ. The Dubbo LSPS planning priority 3 is to promote renewable energy generation and to do so while minimising impacts on local amenity including agricultural land. This Project aims to do by utilising land not considered to be highly productive and creating an energy storage system that would support the forecasted growth in Dubbo's renewable energy sources.

2.3 Consideration of alternatives

2.3.1 The 'do nothing' option

The 'do nothing' option represents the status quo situation; avoiding all development impacts but similarly not realising a proposal's potential benefits. The direct consequence of not proceeding with the Project would be to forgo the benefits (detailed in Section 2.4), most importantly, the Project's contribution to:

- Electricity reliability and security benefits
- Direct or indirect socio-economic benefits.

[1] On demand energy projects that can be tapped into when energy demand is high, but supply is low. Examples of firm generation sources include gas and batteries.

The environmental impacts associated with the development and operation of the proposed BESS would be avoided if the 'do nothing' option was selected. In this case, key impacts (detailed in Section 5 and Section 6) relate to:

- Biodiversity
- Traffic
- Visual and other amenity impacts

None of these were concluded to be substantive or lead to long term negative impacts to the environment and community. In this case, the potential benefits are considered to outweigh the impacts and as such the 'do nothing' option is not the preferred option.

2.3.2 Alternatives site locations

There are few optimal sites that provide suitable:

- Grid capacity
- Proximity to grid connection
- Compatible existing land use
- Manageable environmental constraints
- Interested land owners.

Having identified such a site, the Applicant has entered an exclusive, irrevocable and exercisable option to purchase the land required for the BESS.

2.3.3 Alternative site access points

Four alternative access options were considered for the Project. The most obvious locations were ruled out early on:

- Access through the existing Wellington substation facility was discussed with Transgrid but considered to have high safety risks, given its operational status.
- Upgrading the existing private access was considered sub-optimal in terms of traffic safety and impacts on biodiversity values.

The evaluation of these and two additional access options, their merits and suitability, is summarised in Table 2-1 and mapped in Figure 2-5. The preferred option is option 4. This option is suitable from a traffic perspective, as the sight distances from traffic south along Goolma Road are much safer than option 1 (refer to Section 6.3 and Appendix E.3 for further traffic discussion). While there is competing land use in the form of the landowner's proposed subdivision for option 4, this is not as restrictive as option 2 or 3 where easement for construction would be uncertain under an easement agreement with Transgrid.

Table 2-1 Access option summary table

Option	Pros	Cons	Decision
1. Site access from Lot 2 DP1226751 (scoping report access)	This option was originally considered in the scoping report as it streamlined the easement access requirements to on lot only. This was the main benefit of the access point where landowner consent to utilise the land was easiest to obtain if feasible.	After initial discussions for the Traffic Impact Assessment (TIA) it was determined that the location of this access point was too close to the bend and dip of Goolma Road to the north. Constructing the access point here breached safe sight distances for vehicles existing and entering the site. This option also would have required more impacts to trees than option 4.	Not the preferred option at the EIS phase.
2. Access from Goolma Road and easement through the Transgrid owned lot west of the substation	This option is located on a straight section of Goolma Road with minimal traffic constraints due to good sight distances from both turning directions.	The Applicant engaged with Transgrid to discuss the feasibility of this access option through their land. While they did not object to allowing easement through the lot, they cannot guarantee ongoing easement if transmission works are required that would take precedence over the Applicants access track.	The uncertainty of the Transgrid easement resulted in this option not being feasible.
3. Use of the existing track to the east in Lot 32 DP622471	This option included an existing farm access track from the intersection of Goolma Road and Twelve Mile Road.	The adjacent lot is under assessment for the Wellington South BESS by AMPYR Australia Pty Ltd. The landowner of this lot is not involved with the Orana BESS Project. Initial understanding of site access safety may require extensive intersection upgrade.	The uncertainty of the regarding safety and upgrade extent resulted in this option not being preferred.
4. Access from Lot 2 DP1136578	This access option is owned by the involved landowner and as such easement rights are feasible. The TIA has assessed the access point can concluded that it is safe for traffic access, which is a significant improvement from option 1. The Access point moves through lower quality vegetation and impacts fewer existing trees than access option 1.	There is a subdivision Development Application (DA) present that the option would be intersecting the access road; this DA is held by the landowner. While consent for easement is achievable, decommissioning of the access track may be required during the operation phase of the Project in consultation with the landowner under the requirements of the subdivision DA (this is discussed in further detail in Section 3.4)	This is the preferred access option for the Project.

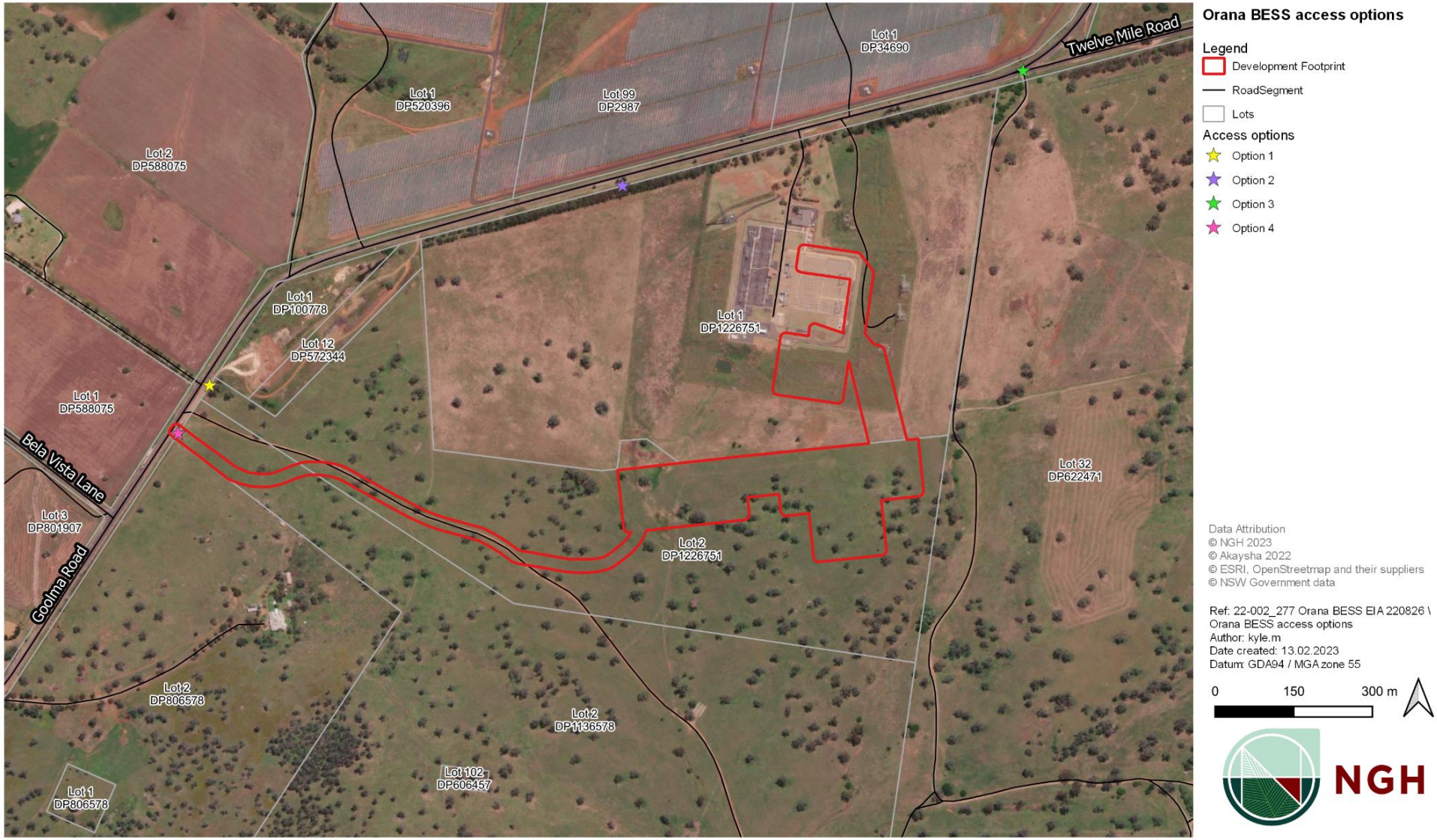


Figure 2-5 Alternative access points considered

2.3.4 Alternative technologies

Lithium-ion BESS technology is not the only viable BESS technology however, it is established in the marketplace and can be developed to comply with a range of Australian and international standards. The hazards associated with each type of battery chemistry technologies available are similar as they are all Lithium Iron Phosphate (LFP) based technology. The proposed temperature control, voltage control, monitoring systems and fire management systems are best practice.

LFP BESS is the only economically and environmental appropriate technology that can be located safely in a rural environment within a relatively small footprint, which is appropriate to the site's biodiversity constraints. While other battery technology exists, LFP battery technology was selected as the preferred option based on the following criteria:

- Minimal risk of thermal runaway
- Safety, fire management and containment
- Ability to support the network to increase renewable energy penetration
- Ability to provide energy during periods of peak demands
- Minimal environmental impact
- Safety and ease of integration
- Demonstration and maturity of technology
- Value for money.

2.3.5 Scale of the Project

The scale of the Project has been determined after considering the following factors:

- A desire to provide more secure energy for times of need and supporting Commonwealth and State level efforts to mitigate the effect of climate change
- A need to ensure that the Project is commercially viable
- The capacity of the electricity grid to absorb the energy generated by the Project
- The opinions expressed by land owners and the local community
- The constraints identified during the preparation of this EIS.

The ability to connect to the BESS almost directly to the grid via the Wellington 330kV substation brings significant benefits as the network has the capacity to absorb the energy stored within the BESS and deliver it anywhere in the network. A relatively short transmission line, about 220m in length, also reduces the costs of the development and the need for additional environmental impacts that may be associated with a site further from a connection point.

2.3.6 Project layout

The Indicative Infrastructure Layout has been developed to be responsive to the site's environmental features; primarily the structural Box Gum Woodland and better condition derived grasslands that occur onsite. It is as linear (short north-south width and elongated east-west length) and located at the extreme northern boundary to avoid and minimise impacts on biodiversity as much as possible. This is not the most efficient or cost-effective BESS layout but it is one that balances the Project's key objective to store and discharge energy economically with the site's key environmental values.

2.4 Project benefits

In consideration of the alternatives examined above, the Orana BESS Project:

- ✓ Builds on the aims of the Central-West Orana REZ by being strategically located to maximise the benefits of and smooth the transition to greater renewable energy development.
- ✓ Builds on the aims of the NSW Electricity Infrastructure Roadmap to transition away from coalfired energy, towards greater levels of renewable energy.
- ✓ Stabilises and secures the supply of electricity for residents, business owners and service providers.
- ✓ Assists to drive down the wholesale electricity prices for energy consumers.
- ✓ Generates local employment, economic stimulus and other local economic benefits

The Orana BESS Project has been developed iteratively, with a specialist energy development and environmental assessment team. It reflects the opportunities identified early in the Project to maximise the environmental sustainability of the Project. The Project assessed in this EIS is also one that responds appropriately to the site's context and community values.

2.4.1 Strategically located smooth the transition of the grid to greater renewable energy development

The Project is located within the Central-West Orana REZ and well placed nearby the Wellington 330kV substation and other renewable and storage projects which are active in the region. The Wellington and Wellington North Solar Farms, which have a combined capacity of 470MW and are immediately north of the Orana BESS. In the adjacent lot the planned 500MW / 1000MWh Wellington South Battery is also proposed. With the Central-West Orana REZ is forecasted to install 2.1 GW of VRE by 2026-27, increasing to 4.6 GW by 2030 and 7.7 GW by 2040 firming power projects such as the Orana BESS and the Wellington South BESS would be vital to energy stability in the state.

2.4.2 Suitable technology to complement the cleaner energy transition

Utility battery storage is recognised by NSW Government policies (NSW Electricity Infrastructure Roadmap and Renewable Energy Zones) as an important part of NSW's transition away from coalfired energy, towards renewable energy. They have a proven ability to complement and support the network and to allow storage of renewable energy during periods of abundant generation / low energy demand and then for export into the grid during periods of high demand. Figure 2-6 provides a representation of this process where the morning and evening peak demand periods can be filled by energy storage system exports such as the Orana BESS.

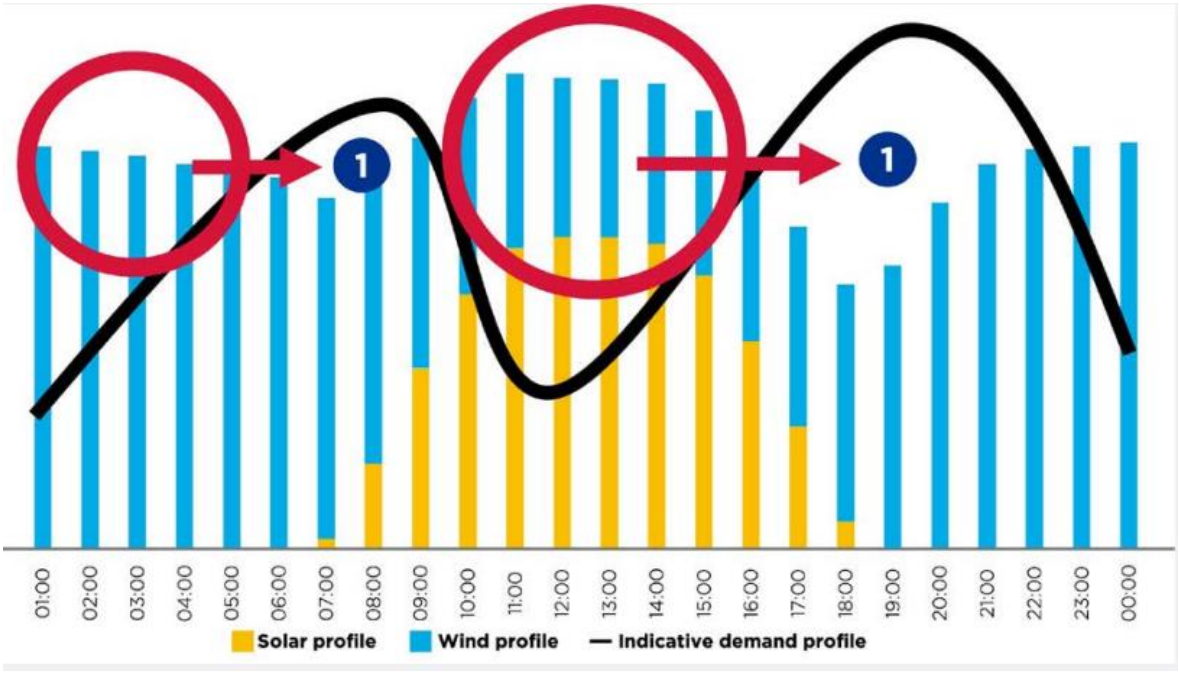


Figure 2-6 Hypothetical energy firming (DPIE, 2020)

2.4.3 Electricity reliability and security benefits

While most of Australia's electricity is currently provided by coal-fired power stations, as many as three-quarters of these plants are operating beyond their original design life (Department of Industry and Science, 2015). The reduction in energy supply from coal-fired power stations requires the development of reliable and sustainable energy supply.

Electricity consumption in Australia is exceptionally high, resulting in costly electricity bills and frequent disruptions to electricity supply during peak times. The renewable energy sector has responded to this high demand and to the need for viable alternative options for electricity generation contributing to 27.7% of Australia's overall electricity in 2020 (Clean Energy Council, 2021). The Australian Energy Market Operator (AEMO) has projected that NSW would need nearly 2.3 gigawatts (GW) of energy storage to maintain system security and reliability in addition to Snowy 2.0 (NSW DPIE, 2020). As such the NSW government has indicated that investment into large-scale storage capacity projects would be required to support the states transition to renewable energy sources (NSW DPIE, 2020).

The Project would benefit the electricity grid by balancing the network through the addition of energy storage. This stored energy would be utilised during periods of low renewable output into the energy grid. This is especially important during the states transition from centralised to decentralised power generation as coal fired plants are decommissioned. Greater utilisation of large-scale battery storage in conjunction with other dispatchable[2] energy resources may decrease peak wholesale prices. This is due to the ability of battery storage to buffer the energy market during tightened supply times when demand is high (Finkel, Moses, Munro, Effeney, & O'Kane, 2017). The market price effect of dispatchable energy resources such as battery storage is modelled in Figure 2-7.

[2] Energy resources that can be accessed when needed. Definition is similar to firm generation used in the NSW Electricity strategy.

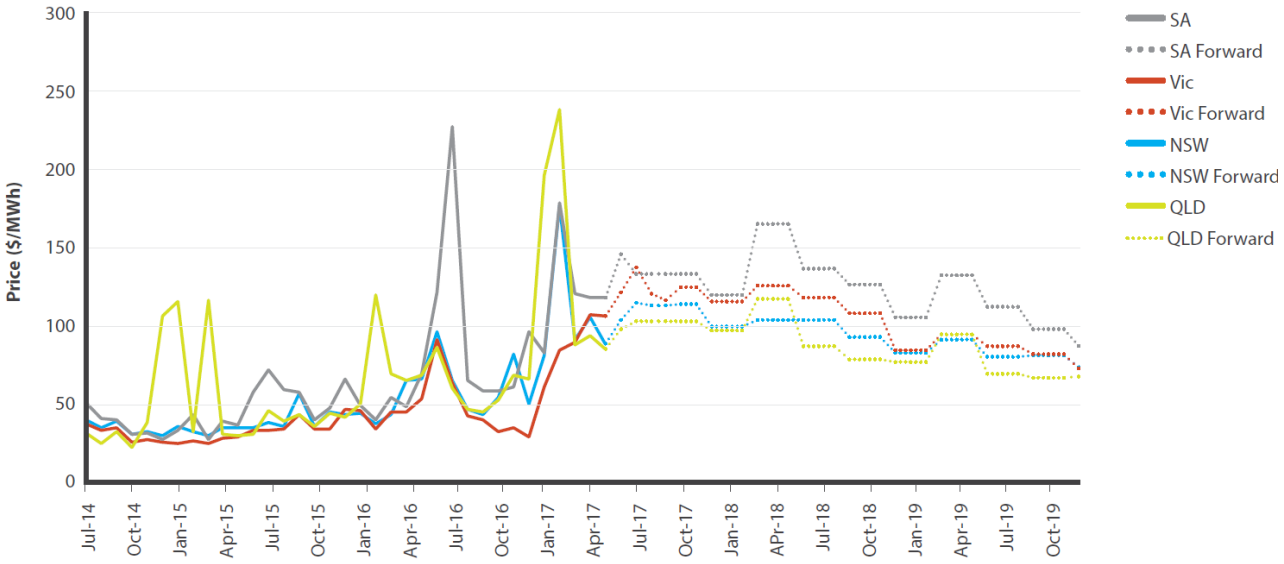


Figure 2-7 Monthly average wholesale prices and base load future prices (Figure 3.3 of The Finkel Review (Finkel, Moses, Munro, Effeney, & O'Kane, 2017))

In 2020, almost 2GW of renewable energy made up of 32 projects were constructed and began generating electricity (Clean Energy Council, 2021). The equivalent number of households powered annually through all renewable energy generation sources totals 13,689,560 households. As discussed in Section 2.1.3, NSW runs the risk of breaching the EST in the summer of 2023-24. Projects such as the Orana BESS would be important to maintain the functioning of the NSW energy system for the state's residents, business owners and service providers.

2.4.4 Drive down electricity prices

In 2022 the cost of electricity is a matter that requires urgent attention, and this is noted by the AEMO. Prices in 2022 have been affected heavily due to higher international fuel prices, domestic coal-plant outages and a lack of transmission capacity. These are primarily due to external factors that control global markets. Investment in low-cost renewable energy and essential transmission (and this includes storage along transmission) is the best strategy to protect against higher prices (AEMO, 2022).

Variable renewable energy generation such as solar energy which is growing in the Dubbo region operates with no ongoing fuel costs after construction and can, with the right policy framework and technological development to manage variability, be used to reduce overall wholesale prices of electricity (Finkel, Moses, Munro, Effeney, & O'Kane, Independent Review into the Future Security of the National Electricity Market - Blueprint for the Future, 2017). Several studies on the impacts of increased large-scale renewable energy generation under the Renewable Energy Target have indicated that this is likely to put downward pressure on electricity prices (Australia Institute, 2015). To the extent that competition amongst retailers is limited, and to the extent that the RET creates greater contestability through the creation of economically sustainable new entrant retailers, there would be further downward pressure on the retail margins (Sinclair Knight Merz , 2013).

2.4.5 Employment and local economic benefits

In 2021, over 35,000 Australians were employed in the renewable energy sector and this figure could rise to 44,000 by 2025 (Clean Energy Council , 2022). This number is expected to continue growing with the Federal Labour party's climate policy released in December 2021 claiming

604,000 new jobs (ALP, 2021). These new jobs are in large part from upgrading the electricity grid with the inclusion of battery storage.

While job creation for the Orana BESS peaks during the 6-12 month construction phase, construction and operation would have employment benefits extended through the local supply chains to fuel supply, vehicle servicing, uniform suppliers, hotels/motels, B&B's, cafés, pubs, catering and cleaning companies, tradespersons, tool and equipment suppliers and many other local businesses.

2.5 Project agreements

In principal agreement to focus the Voluntary Planning Agreement on the Wellington township (as opposed to the broader Dubbo community) has been achieved in discussions with the Applicant and the Dubbo Regional Council.

The Applicant has committed to developing a community benefit sharing program that is tailored to the local context, to maximise local benefits and designed to have a positive and lasting impact on the Wellington community.

2.6 Cumulative impact consideration

Cumulative impacts associated with the Project have been given consideration in Section 7.3 of this report and assessed in alignment with the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE, 2022b). Cumulative impacts can be split into two broad groupings as below:

Strategic-level Cumulative Impact Assessment (CIA) - important beneficial cumulative impacts

- Alignment with federal and state regional renewable energy policies
- Alignment with regional and local land use plans
- Responds to the site's unique environmental and social context.
- Reduction of energy costs.

Project-level CIA – risks of exacerbating adverse impacts

Being located in the declared Central-West Orana Renewable Energy Zone, local cumulative impacts anticipated from several nearby utility scale renewable facilities include:

- Biodiversity impacts
- Visual and landscape character impacts
- Traffic impacts
- Pressure on local facilities, goods and services.

This report considers that Strategic-level CIA outweighs the Project-level CIA, resulting in a highly supportable Project that aligns with strategic planning goals as outlined in this chapter (Chapter 2) without accumulating significant negative cumulative impacts. All environmental and social impact factors are assessed in Chapter 6 and Chapter 7 of this report.

3. The Project description

3.1 Project overview

The Orana BESS Project involves the construction and operation of a grid-scale battery. The Project is forecasted to use lithium-ion batteries and with a generation capacity of 400MW / 1600MWh. Table 3-1 provides an overview of the Project including the basic site details, its key components, the Project timing and site context. The indicative site layout of all infrastructure features is shown in Figure 3-1 and the indicative layout of the battery components are shown in Figure 3-2.

Table 3-1 Summary of key features of the Orana BESS Project

Feature	Description
Site details and land tenure	
Street address	6945 Goolma Road, Montefiores NSW 2080.
Subject Land	Lot 2 DP1226751 Lot 2 DP1136578 Lot 2 DP534034 Total area of 333.3 ha.
Renewable Energy Zone (REZ)	Central-West Orana (CWO) REZ.
Local Government Area (LGA) and zoning	Dubbo Regional SP2 Infrastructure (BESS facility and transmission line connection works) RU1 Primary Production (access track only)
Catchment	Macquarie River
Subdivisions and easements	Land containing the key Project assets would be subdivided and purchased by the Applicant. Easements would be established for the access road and network connection infrastructure.
Infrastructure components	
Battery Energy Storage System (BESS)	Lithium-ion storage technology Associated operations and maintenance building, site office, switch room and control room. Water tanks, security lighting, CCTV and fencing.
Nominal capacity	400MW, configured as either: • 4 hours of 1600MWh energy storage, or • 8 hours of 1600MWh of energy storage, to be built in two stages.
Substation and switch yard	Up to two 330kV/33kV power transformers connecting the BESS to the existing Transgrid substation.
Transmission line connections	A new overhead or underground transmission line from the Orana substation to the existing Wellington Substation, rated at 330kV and approximately 300m in length.

Feature	Description
Site access and intersection upgrades	Upgrade existing private access intersection with Goolma Road (administered by TfNSW): • Basic Left Turn (BAL) • Channelised Right Turn (CHRs) Upgrade and extend existing farm track within the site.
Temporary works areas: Construction compound and construction parking and laydown areas	Entirely within the Development Footprint.
Development Footprint (all areas that may be disturbed by the Project)	Approximately 14.8 hectares. The actual operational footprint would be less than this area.
Timing	
Staging	May be constructed in to two stages; each notionally 200MW / 800MWh.

Construction timing and hours	• 12-18 months in total (peaking at around 6 months).
	  ○ Monday to Friday 7am to 6pm, and Saturday 8am to 1pm.
	  ○ No work on Sundays and Public Holidays.

Operational life and hours	Nominally 40 year Project life with BESS refurbishment required at 20 years. The Project would operate continuously.
Decommissioning and rehabilitation	At the end of the Project life, all above ground infrastructure, would be removed and decommissioning and rehabilitation of the site would commence. The objective of decommissioning is to maximise recycling options and return the disturbed area to a safe, non-polluting and stable state. The broader area would remain suitable for continued agricultural or other land use options
Site context	
Existing land use	Grazing cattle and sheep. Two lot subdivision approved on Lot 2 DP1136578 (physically commenced).
Receivers	1 Associated Receiver (R9). 9 Non-associated Receivers (residential) within 1.5km of the BESS area.
Employment	Approximately 100-150 full-time jobs during peak construction. Approximately 6 full-time equivalent jobs during operation.
Capital investment value	$879 million AUD

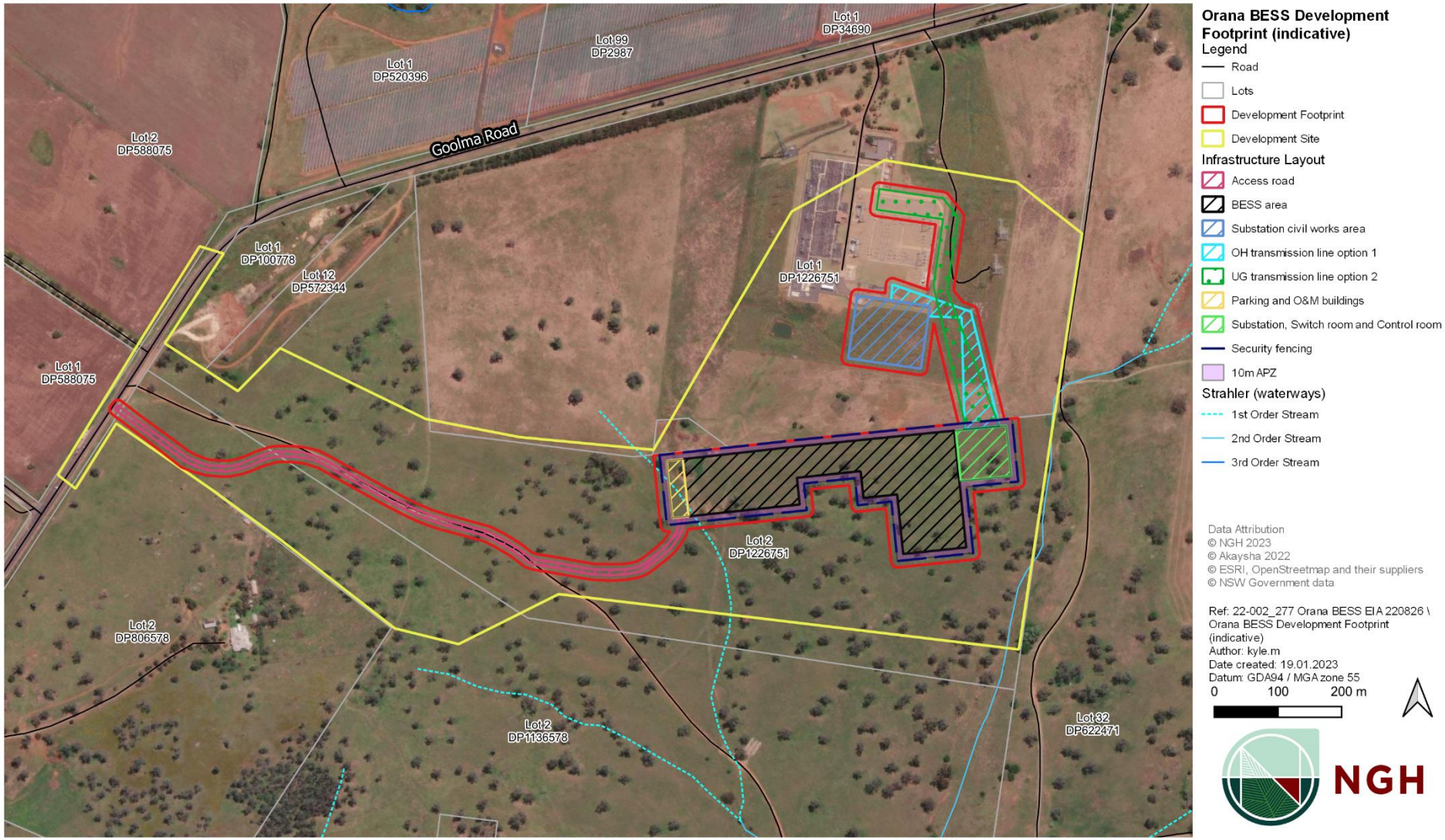


Figure 3-1 Orana BESS Development Footprint and indicative Infrastructure Layout

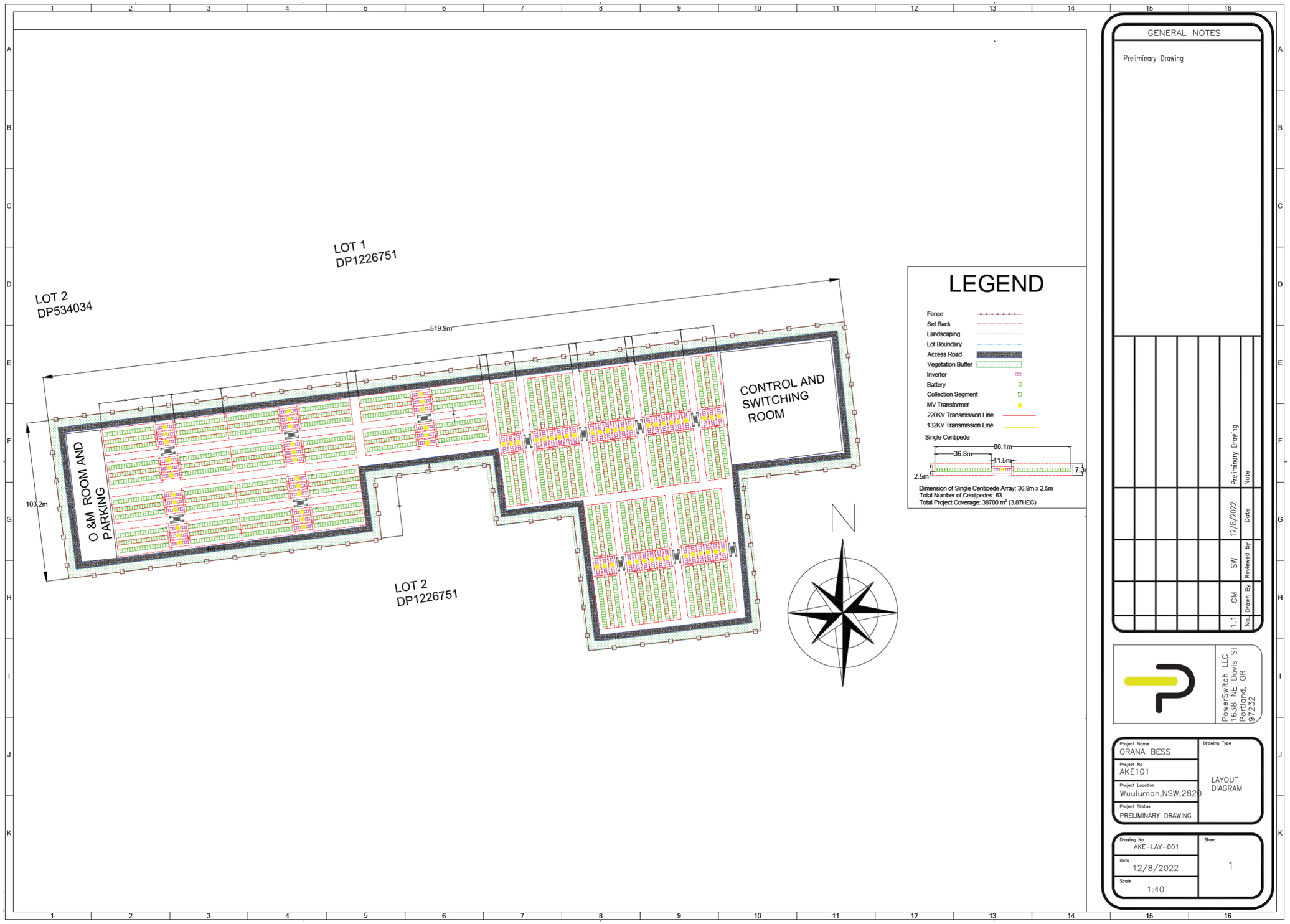


Figure 3-2 Indicative BESS site plan

3.2 Permanent infrastructure

3.2.1 Layout and specification of components

An indicative Infrastructure Layout is provided in Figure 3-1 and Figure 3-2. It would be subject to commercial tendering and procurement processes and would ensure the Project is optimised in terms of yield and efficiency, within the parameters of the approval. Submission of the final detailed design to DPE *prior to construction* is a standard feature of approved State Significant Development consent conditions. This provides the final check that the detailed design is consistent with the EIS's assumptions.

As the final specifications and location of infrastructure are subject to change during detailed design, where required in this section, upper limit quantities and power level estimates are provided below to ensure the assessment and any subsequent approval maintains the flexibility required in the detailed design stage, post approval.

Similarly, while an indicative Infrastructure Layout is provided to provide a clearer understanding of what would be constructed, the delineation of a broader Development Footprint at this stage provides the assessment and approval some resilience to minor layout changes in the final design. Together this 'upper limit' or 'worst case' approach ensures that all impacts of construction, as well as operation and decommissioning are captured in the environmental assessment section of this EIS and that any recommendations and mitigation strategies would be appropriate to the final detailed design.

This approach is intended to over-estimate impacts and over-scope mitigation strategies and is therefore considered conservative. It is underpinned by the Project's commitment to capture this higher level of Project-specific detail in consultation with affected stakeholders, within environmental management plans, developed in tandem with the final detailed design.

This approach is consistent with the State significant development guidelines – preparing an environmental impact statement (DPIE December 2021) which state:

> *… with some large, complex projects this flexibility is often essential as it is difficult, if not impossible, to deal with all aspects of the design of these projects at the EIS stage.*

The key features of the Project are summarised in Section 3.1 and detailed below.

3.2.2 Batteries

The BESS component of the Project would consist of multiple modular segment units (nominally 750kWh each) arranged in a rows. Each row would consist of:

- BESS DC segment; each container would be 1.6m wide, 2.5m deep and 3.4m high with up to 18 segments per row.
- Rows of DC segments connect to a DC collection segment of similar dimensions to the segments that is joined to the start of the row.
- Row of DC segments are connected to a single PCS with multiple inverter modules. The PCS would be 5.3m wide, 1.7m deep and 2.5m high.

- Two PCS's are connected to each 7.3MVA medium voltage (MV) transformer with a double low-voltage windings stepping up to 33kV.
- MV transformers are grouped via ring main units (RMU), from which 33kV cables connect to the 33kV switch room. The main transformer structure would be circa 5m high and the isolators and oil tank extend this to 7-8m high.

In total there would be circa 2,660 BESS segments, approximately 140 DC collectors and inverters, 70 MV transformers, and up to 35 RMUs.

Lithium-ion batteries would be installed on the containerised modules as shown schematically in Figure 3-3. The modules would be approximately 15.5m in length, 2.7m wide and up to 3m high (including the skid and foundations). Each container would be 1.6m wide, 2.5m deep and 3.4m high with up to 18 segments per row.

It is envisaged that a battery unit comprising 18 battery racks (two back-to-back rows of nine) would be placed at each end of the module (totalling 36 battery racks per container). Each battery would have a capacity of 6MWh. A Ring Main Unit (RMU) would be positioned in the middle of the module, with a Power conversion system (PCS) located either side between the RMU and the battery unit. In total there would be up to 35 RMUs on site.

A specific battery manufacturer and model has not yet been determined; however, it is anticipated each battery module within the implemented battery solution would have its temperature and voltage monitored.

A fire suppression system within the Energy Storage System would comprise the storage and release of inert gas within each battery container using either electrical detectors/ionisers, or a mechanical system in which the heat destroys a seal to release the gas. There would be spare air-conditioning units in storage on site for replacement. In the event of failure of one of the units, the system would be able to maintain safe operating temperatures. If all air-conditioning units fail, the auto shutdown of the batteries would prevent overheating.

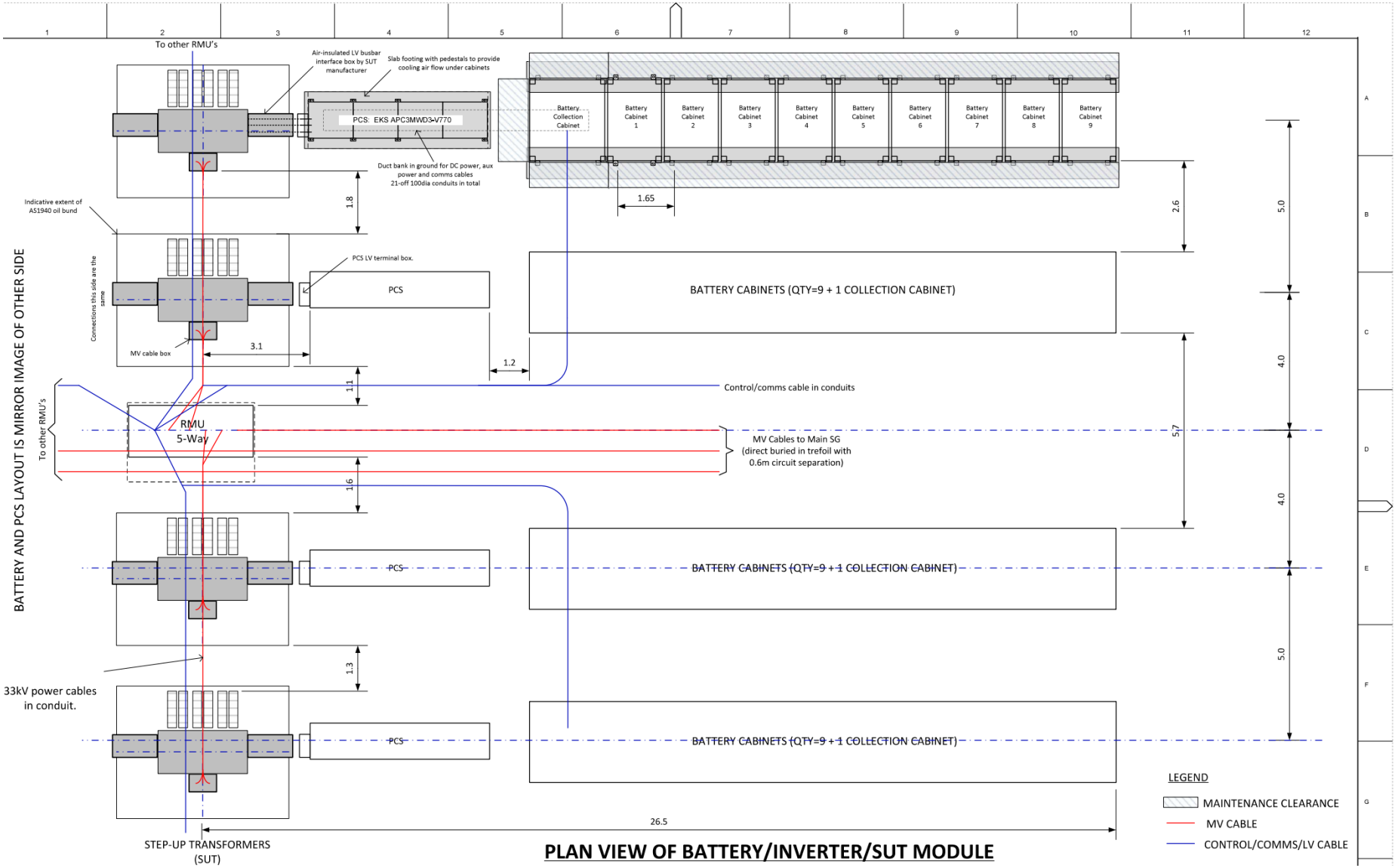


Figure 3-3 Skid-based module schematic for the Orana BESS (indicative)

The battery technology provider would be identified in the procurement phase along with the technology provider of other components of the modules. The battery units may be either containerised and internally accessed, or modular and externally accessed. The selected battery would have undergone the required hazard assessment to ensure the product meets Australian Standards and legislated safety requirements.

The module configuration is conceptual and could change based on technology selection. An example of a battery unit is shown in Figure 3-4 and an example of a PCS, RMU and associated equipment (transformer and switchboard) is shown in Figure 3-5.

Figure 3-4 Example of a typical battery unit (Powin Centipede Platform with Stack750E)

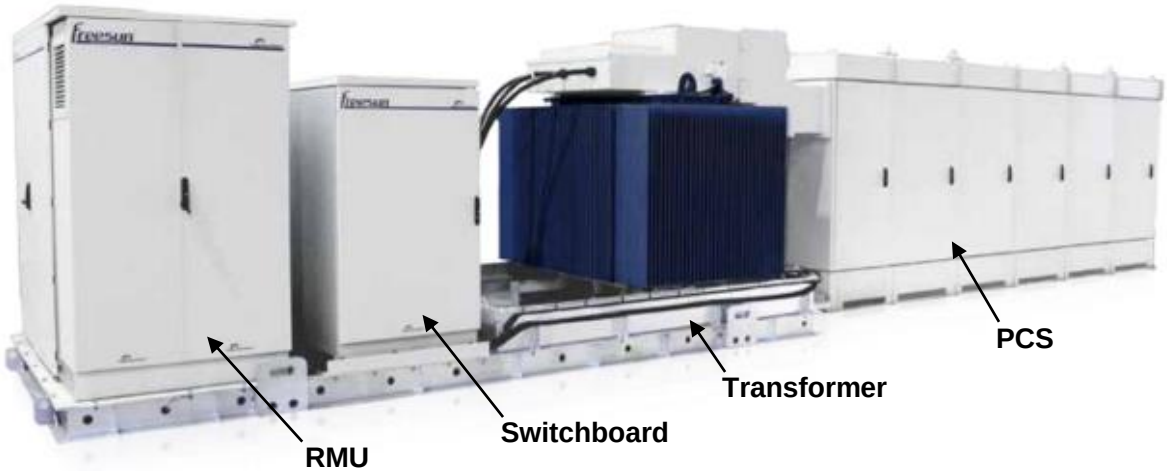


Figure 3-5 Typical PCS and RMU design

3.2.3 Power Conversion Systems (PCSs)

The PCS units are bi-directional inverter that converts DC electricity from the batteries back and forth to the AC electricity used by the grid. The PCS units are rated at 7.3MVA. The associated transformers step the voltage up to a medium voltage level of 33kV.

The 33KV lines from the 140 PCUs would be gathered and fed into a single underground cable connecting to the on-site substation. The cable would be installed underground at a depth of approximately 1m. Each PCS would be approximately 4m high. The containers would be mounted on concrete footings or piles to raise them above potential flood levels.

3.2.4 Transmission lines and connections

Connection to substation

An overhead transmission line connection between the BESS 33/330 kV switchyard on the Subject Land and the nearby Transgrid Wellington 330kV Substation would be provided as part of the development (Figure 3-6 shows the existing Transgrid Wellington 330kV Substation).

The connection would be around 300 metres long and would be across Wellington Battery ProjectCo and Transgrid owned land only. The connection would include a transmission corridor of 60 metres width, in accordance with Transgrid requirements for 330 kV lines (Transgrid , Date not specified). The indicative location of the overhead transmission line connection is shown on Figure 3-1.

The conductors would be above ground and the line would be strung from lattice steel transmission towers, with gantry structures at each end. The line would be a double circuit configuration (i.e. strung on both sides of the towers) with one circuit for each 200MW/800MWh stage of the Project.

Construction of foundations for the new towers would generally involve boring or excavating a hole for each of the four footings of the tower. It is expected that each borehole would be approximately one metre wide and up to 10 metres deep and stabilised with concrete. Alternatively, steel reinforcements would be placed into the hole and backfilled with concrete. Each tower would be craned (in sections) into position onto the footing and secured with holding down bolts. Some structures may require additional strengthening through the use of guy wires. The guy wire would be connected to metal rods which would be embedded in a concrete foundation block (approximately $1m^2$) installed below ground.

There is an existing overhead 132kV transmission line that connects Wellington 132kV bus to the Burrendong Tee which crosses the overhead transmission line route between the proposed BESS facility and the Transgrid substation. The Orana BESS 330kV connection would likely span over this existing line.

There are also two 330kV transmission lines Wellington to Wollar and Wellington to Mt Piper that exit the Wellington 330kV substation Eastwards that may require reconfiguration pending Transgrid's preferred connection location on the Wellington 330kV bus. The Orana BESS connection would be designed to avoid conflicts with the existing lines where possible and in accordance with Australian Standards and Transgrid's Design Guidelines.

The new BESS connection would likely connect to the southern end of the Transgrid Wellington 330 kV Substation. It is expected the Substation bench and 330kV busbar would be expanded to establish two new 330kV line bays to connect Orana BESS. The proposed Development Footprint includes sufficient area within the Transgrid property to accommodate the necessary augmentation to the Substation.

Figure 3-6 Existing 330kV substation (Wellington Substation) (looking to the north at the southern boundary of the substation from the Development Footprint)

Underground cabling

Underground cabling would be required throughout the Development Footprint and would be located within the Development Footprint, leading to the onsite substation. The cables would be installed in trenches approximately 900mm deep and the cables may be protected by conduits. A marking tape would be provided to reduce the possibility of accidental damage and ground markers would be provided to identify the cable routes.

Underground cabling on the site would be designed in accordance with Australian and International standards and the cable routes would be designed to minimise ground disturbance. Underground cabling would be required for:

- Connection of batteries via a DC cable to a PCS
- Connection of 2 PCSs to one battery storage container
- Connection of PCSs to the 33kV switchboard via a single 33kV feeder cable
- Provision of auxiliary power, data services and communication facilities.

Copper conductors would be used wherever necessary to electrically bond the metal structures to earth to protect personnel and equipment in the event of lightning strikes and electrical faults.

3.2.5 Security measures

Fencing

The onsite substation area would be enclosed by a security fence in accordance with TransGrid's (or other empowered entity's) requirements. This is expected to be a steel security fence approximately 1.8m high chain link fence topped with three rows of barbed wire.

CCTV

CCTV cameras would be installed at the access road/gate, the control room and transformer/switchyard. A security company would be contracted for monitoring outside of business hours. The CCTV cameras would be solar/battery powered with a wireless communication connection and would be mounted on up to 4.5m poles complete with sensors or infrared security lighting.

Lighting

There would be no permanently lit night lighting within the BESS area. Lighting would be included in each PCS for night-time maintenance or emergency purposes only. Lighting would be installed around the substation, battery storage facility and O&M facilities to be used in case of night works or an emergency only.

Motion sensor or infrared security lighting (and CCTV cameras) would be installed at sensitive boundary locations and around the substation, battery storage facility, O&M facilities, and office areas.

All external operational lighting would be designed to reduce disturbance to neighbouring properties, as such it would be low intensity lighting (except where required for safety or emergency purposes) and would not shine above the horizontal. The external operational lighting would be used only when there are staff on site, as part of night works (where required), site security or during emergency situations including through remote operation to allow improved camera visibility.

External lighting would be installed to comply with Australian/New Zealand Standard *AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting*, or its latest version.

3.2.6 Site access and tracks

The site would be accessed from the west of the BESS from Goolma Road. The existing gravel access would be closed and a new access point would be constructed in accordance with safe sight distance guidelines undertaken in the Traffic Impact Assessment (TIA) (Refer to Appendix E.3 and Section 6.3).

The Project proposes a Basic Left Turn (BAL) and a short Channelised Right Turn (CHRs) treatment onto Goolma Road.

While the new access point identified for the Orana BESS Project could also be used for the future subdivision, it is noted that if the subdivision is further progressed, rerouting the BESS's operational access track would be required. No change to the Goolma Road access would be required in this event.

An internal access track would be established to access batteries and ancillary infrastructure. The Internal access road would be between 4m and 6m wide and comprise of a gravel surface. It would be constructed in accordance with the AustRoad Guideline requirements and include suitable drainage features to minimise the risk of polluted water leaving the site or entering the waterways. Based on the indicative Infrastructure Layout, approximately 200m of track is to be constructed.

The site access road and all internal track sections would be maintained throughout the construction and operation of the BESS. If required, water trucks would be used to suppress dust on unsealed access roads and track during construction. Additional stabilising techniques and/or environmentally acceptable dust control would also be applied if required to suppress dust.

3.2.7 Temporary facilities

Temporary facilities would be located within the Development Footprint during the construction phase only and would include:

- Material laydown areas
- Temporary construction site offices
- Temporary parking for construction worker's transportation. When the construction work is completed, a small car park would be retained for maintenance staff and occasional visitors
- Temporary staff amenities.

Laydown requirements are limited as most bulk equipment deliveries would be unloaded into place rather than into designated laydown areas. Some small laydowns would be required for cable drums and other auxiliary equipment, to be wholly contained within the Development Footprint.

The staff amenities would be designed to cater for the peak number of construction staff expected to be onsite and would include:

- Sanitary modules with water flush systems connected to holding tanks. The tanks would be fitted with high level alarms, and they would be pumped out regularly
- Water tanks
- Changing rooms
- Lunch rooms
- Administrative offices
- Covered walkways
- Emergency muster point
- Generator – if required
- Electrical, data and water reticulation.

3.3 Staging and timing of the Project

3.3.1 Staging

The Project would be implemented in four phases, as described below:

1. **Preconstruction works**
2. **Construction**

3. **Operation**
4. **Decommissioning and rehabilitation.**

The Project may be *constructed* in two stages; each notionally 200MW / 800MWh.

Key works and their timing and resource requirements are set out in the following sections.

Table 3-2 Indicative construction timeline

Phase	Approximate commencement	Approximate duration
Project Approval	Q3 2023	N/A
Financial Close	Q4 2023	N/A
Construction	Stage 1 Q4 2023	6-9 months
	Stage 2 Q2 2024	6-9 months
Commissioning	Q3 2024	3-6 months
Operation	Q1 2025	Approximately 20 years
Decommissioning	Q1 2045 (if BESS life not extended)	TBC

3.3.2 Preconstruction (including subdivision)

The proposed Orana BESS may include physical works ahead of the main construction phase including site access and track upgrades, installation of fencing, artefact salvage, geotechnical drilling and/or surveying and preparation of construction compounds and site facilities.

In addition, administration of subdivision requirements would occur at this time. The Applicant intends to purchase up to 10ha of Lot 2 DP 1226751. This would require a subdivision to affect the purchase of a ‘part-Lot’.

The subdivision would comprise the BESS island only, as depicted by the shaded area in **Error! R eference source not found.**. Access to the new Lot would be maintained in perpetuity via a registered easement across the remainder of Lot 2 DP1226751 and part of Lot 2 DP1136578, substantially in accordance with the access road alignment shown in Figure 1-6.

Pending Project approval, an accurate surveyed plan of the subdivision and remnant Lot would be prepared and to pre-register new Lot and DP numbers with NSW Land Registry Services (LRS) such that Akaysha can secure the necessary certification from Dubbo Regional Council and register the revised Lots with LRS to allow the sale and purchase of the not subdivided area to occur commensurate with Financial Close.

3.3.3 Construction

Construction hours

During the construction phase of the BESS, work would be undertaken during the following hours:

- Monday – Friday: 7am – 6pm
- Saturday: 8am – 1pm.

Certain light construction & assembly activities would be completed outside of standard construction hours, subject to these activities having no amenity impacts on surrounding residences. Example activities include cable termination, system assembly and testing, script testing (on computer), Supervisory Control and Data Acquisition (SCADA) testing. The performance of the BESS would be monitored through this SCADA system that would report to staff both on- and offsite. The system would be capable of notifying staff of system issues and failures.

Any construction outside of these standard construction hours, if required, would be minimised and would only be undertaken with prior approval from relevant authorities.

Activities

The construction period would last for approximately 12-18 months in total (peaking at around 6 months). Construction sequencing is set out below.

Table 3-3 Construction sequencing

Stage	Delivery	Duration
Construction and Infrastructure delivery–- about 12 months and consisting of 2 stages delivering 200MW/800MWh of the Project each.	• Site establishment and access road and road upgrades, including installation of environmental controls, earthworks and any drainage requirements, construction of concrete hardstands, and civil works. Summarised as follows: ▪ Earth works (cut and fill, grading and compacting) ▪ Establishment of external access road ▪ Decommissioning of dams currently within the Development Footprint which would involve filling the dams with soil excavated from other parts of the site ▪ Removal of existing fences ▪ Cleaning and levelling the ground for buildings and structures ▪ Excavating cable trenches.	1 months (X2)
	• Delivery of BESS infrastructure	2 months (X2)
	• Installation of BESS infrastructure (containerised units, transformer, switch room, control room and O&M) and electrical works	3 months (X2)
Testing (about 3 months)	• BESS testing works	About 3 months

Resource requirements

Earthworks

Earthworks would also include grading and compacting to form a suitable substate for the installation of the BESS. The earthworks and excavations associated with the access tracks, buildings and cabling trenches would require removal of vegetation cover and soil disturbance in some areas. Accurate topographic and cadastre surveys would be undertaken as detailed design commences. This would provide accurate cut and fill quantities.

The installation of security fencing would have a small discrete footprint and is unlikely to result in substantial soil disturbance.

Ground cover would be maintained where possible during the pre-construction and construction stages of the Project and would be rehabilitated upon decommissioning.

Construction materials

The main construction materials would include:

- Aggregates, road base and concrete

- LFP batteries
- Fencing materials
- Cables, conduits, junction boxes
- Steel framing and Colourbond sheeting for permanent buildings
- Timber and fixtures for building fit-out.

Water requirements

Non-potable water requirements are anticipated to total approximately 2ML (5kL per day assuming a 12 month construction period) for the construction phase in its entirety to be used primarily for dust suppression. A 20kL fire water tank would also be located onsite, which would be filled from the above sources and retained for emergency use only. Potable water requirements are anticipated to be approximately 0.5ML during the construction phase. Water would ultimately be sourced by the Engineering, Procurement and Construction (EPC) contractor; however the following sources have been investigated to supply the unpotable 2ML of construction water required:

- A 400ML/y extraction licence from the Macquarie River for Lots 2 DP1226751 (Orana BESS Site) (Water Access Licence (WAL) 41638) and Lot 2 DP1136578 (access track site) (WAL 10939), held by the associated landholder.
- 400ML/y bore licence on nearby Lot 1 DP1103197 – reference WAL 35105. This water supply was used during the construction of the Wellington Solar Farm. This is also held by the associated landholder.

The water sources above may be suitable for use as potable water, however, if this is not the case, drinking water would be sourced from Dubbo Regional Council's filling station at Charles Street in Wellington. This has availability of about 18,800ML/y against a current allocation of about 11,500ML/y.

Labour, machinery and equipment

It is anticipated that an average of 100-150 construction staff comprising of supervisors, tradesmen and labourers would be engaged to complete the work during the peak construction phase (12 months). Up to 150 workers is a maximum estimation; the number of workers required for Project would likely be less. Every effort would be made to hire staff locally.

Staff would be accommodated in Wellington, Dubbo or nearby surrounding areas.

Plant to be used during construction would include:

- Crane
- Drum roller
- Padfoot roller
- Wheeled loader
- Dump truck
- 30t excavator
- Grader
- Chain trencher
- Water truck
- Telehandler

- Forklift.

Traffic movements

Expected construction traffic during the two stage (two 5-6 month periods) construction period is estimated below in Table 3-4. Up to 30 heavy vehicle deliveries per day (i.e.. 30 in, 30 out) for bulk equipment supply, including battery cubicles, inverters, ring main units, MV transformers, concrete and cable drums etc. Up to 20 light vehicles per day for site management personnel and visitors, plus 10 buses (each morning and evening) to transport construction workers. 6 Oversize deliveries for main power transformer(s) HV switchgear and control room building.

Table 3-4 Construction staging and anticipated construction vehicle numbers

Construction stage	Estimated one-way vehicle movements		Total vehicle movements
	Light vehicles (including shuttle buses)	Heavy vehicles	Oversize and/or overmass vehicles
Stage 1: Earthworks, site establishment, delivery and installation of BESS stage 1 infrastructure	60	60	12
Stage 2: Earthworks, site establishment, delivery and installation of BESS stage 1 infrastructure	60	60	12

Estimated total and maximum daily traffic movements during construction and peak construction are shown in Table 3-5.

Table 3-5 Estimated traffic volumes and requirements

Vehicle Type	Average vehicle movements per day		Peak vehicle movements per day	
	Daily (vph)	Peak hour (vph)	Daily (vph)	Peak hour (vph)
Light vehicles–- other than shuttle buses	30	15	40	20
Light vehicles–- Shuttle bus	20	10	20	10
Heavy vehicles	40	4	60	6
Total	**90**	**29**	**120**	**36**

Haulage route

The main haulage route to the Orana BESS would enter via the Mitchell Highway. The haulage route would most likely be via the Port of Newcastle and then on State Roads to the Development Footprint. Construction vehicles would range from light vehicles to 26m B-Doubles. Light vehicles would arrive during AM/PM peaks heavy vehicle deliveries would be spaced out during the day. Materials would generally be transported to the site on heavy vehicles up to B-double and would include, but not limited to the following:

- Electrical equipment and infrastructure including cabling, auxiliary electrical equipment and machinery, inverters, switchgear
- Battery containers and batteries
- Construction and permanent buildings and associated infrastructure
- Earthworks, grading and lifting machinery and equipment.

Specialist oversize equipment including the grid connection transformer, substation, switch room and large construction machinery would be managed under a heavy vehicle permit (refer to Section 6.3). This equipment would have ‘Oversize’ transport management in place to transport these items to site. A Construction Traffic Management Plan would be prepared following Project approval to manage haulage traffic during the construction phase.

The standard heavy vehicle (B-Double approved) haulage route as shown below in Figure 3-7 includes the following roads:

- Selwyn Road
- Industrial Drive
- New England Highway
- John Renshaw Drive
- Hunter Expressway
- Golden Highway
- Castlereagh Highway
- Goolma Road
- Site access driveway.

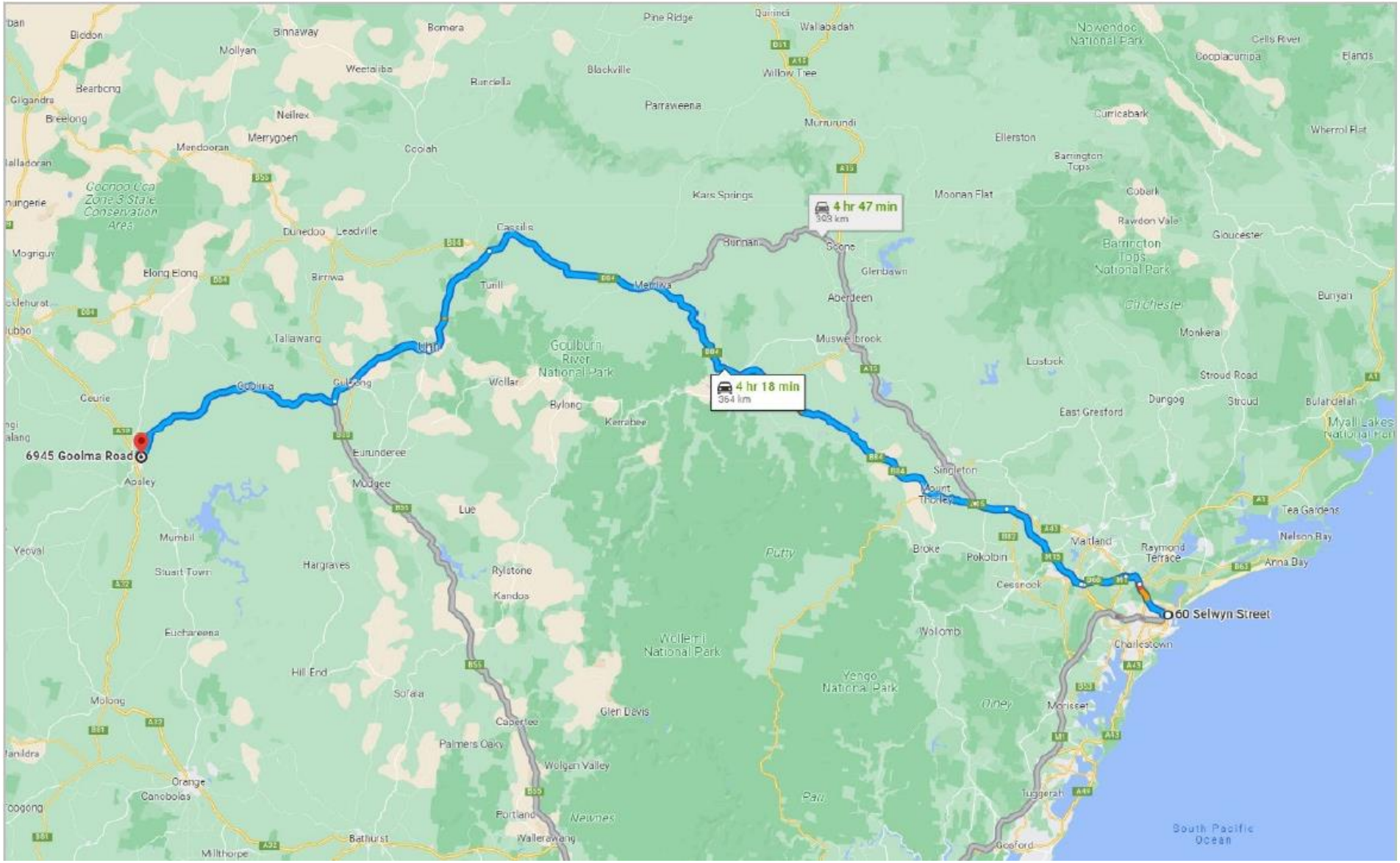


Figure 3-7 Haulage route map from the Port of Newcastle (Google Maps)

3.3.4 Operation

Operation hours and Project life

A total of one equivalent full time staff would be employed onsite when the BESS is operational, but the BESS would primarily be operated remotely. Associated work would be undertaken during the standard working hours of:

- Monday – Friday: 7am — 6pm
- Saturday: 8am – 1pm

Work would only be undertaken outside of these hours in an emergency and would be kept to a minimum.

The BESS would be in operation continuously. The energy storage system could be activated at any time. The BESS would operate automatically but there would be provision to both locally and remotely monitor the performance of the equipment and to activate the energy storage system.

The operational Project life is nominally 40 years. BESS refurbishment would be required at 20 years.

Activities

Activities undertaken during operation would include:

- Infrastructure maintenance
- Monitoring the performance of the BESS
- Inspection of the installation
- Routine preventative maintenance
- Emergency repair response (24 hours)
- Site security response (24 hours)
- Vegetation management within the Development Footprint in accordance with the fire management and biodiversity management plans.

Water requirements

Operational water requirements would be minimal. It is expected that about 30,000L of un-potable water would be required during operation. A water tank, for fire protection purposes, would be located adjacent to the skid-based modules, and would be finalised through consultation with fire and emergency service authorities. If additional water is required water would be obtained commercially.

Traffic movements

The travel demand during the operation phase of the Project is anticipated to be significantly less than the construction phase. Operational traffic is thought to be negligible with a maximum of two one-way vehicle trips per day, with an average of two to four one-way trips per week.

It is anticipated that the staff would drive light vehicles to the site each working day.

Lighting and CCTV

Under normal circumstances, there would be no night lighting located on site.

External lighting would be provided around the buildings and in the high voltage substation, but they would only be used on the rare occasions that staff are working on the site during the hours of darkness.

There may be some security lighting at critical locations around the perimeter of the site, but these would only be activated when the automatic security system senses an unauthorised site entry. Task lighting would be provided at PCS's.

CCTV security cameras would be located at the entrance gate and around the substation and battery storage, and O&M facilities and office areas.

3.3.5 Decommissioning and rehabilitation

The expected life of the proposed BESS is approximately 20 years. When the BESS is no longer viable, all above ground infrastructure, would be removed and decommissioning and rehabilitation of the site would commence.

The battery containers would be removed, and the footings on which they are supported, would be removed. As much of the battery equipment would be recycled as is allowed by recycling facilities, where possible. All buildings would be removed, including the PCSs together with the associated footings. All underground cabling would be removed.

The objective of decommissioning is to maximise recycling options and return the disturbed area to a safe, non-polluting and stable state. The broader area would remain suitable for continued agricultural or other land use options.

3.4 Proposed subdivision and land acquisition for Orana BESS Project

Pending Project approval, the Applicant intends to purchase up to 10ha of Lot 2 DP 1226751, containing the operational BESS site. This would require a subdivision to affect the purchase of a 'part-Lot'. As an integral part of this development application, the Applicant specifically seeks consent to establish a subdivision on Lot 2 DP 1226751.

The subdivision would comprise the BESS island only, as depicted by the shaded area below. Access to the new Lot would be maintained in perpetuity via a registered easement across the remainder of Lot 2 DP1226751 and part of Lot 2 DP1136578, substantially in accordance with the access road alignment shown below.

Pending Project approval, an accurate surveyed plan of the subdivision and residual lot would be prepared to pre-register new Lot and DP numbers with NSW Land Registry Services (LRS) such that Akaysha can secure the necessary certification from Dubbo Regional Council and register the revised Lots with LRS to allow the sale and purchase of the not subdivided area to occur commensurate with Financial Close for the Orana BESS Project.

Table 3-6 Proposed subdivision of Lot 2 DP 1226751 to facility the BESS

Indicative lot name	Landowner	Approximate area[3]
Lot A	Existing owner of Lot 2 DP 1226751	30.6ha
Lot B	Akaysha Pty Ltd	9.8ha

[3] These areas are approximate only. Final area values would be determined following the completed land survey.

Figure 3-8 Indicative subdivision required to separate the operational BESS, pending Project approval

3.5 Capital investment value of the Orana BESS

The Orana BESS would have an estimated capital investment of $879 million. A quantity surveyor's report confirming the capital investment has been provided to DPE.

4. Statutory context

4.1 Power to grant approval

Approval of the Project is sought under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The NSW State Environmental Planning Policy (Planning Systems) 2021 (SEPP Planning Systems) dictates the planning pathway for the Project.

Section 20 of Schedule 1 of the SEPP Planning Systems states that the following is considered a State Significant Development (SSD):

Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:

(a) has a capital investment value of more than $30 million, or

(b) has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance.

Electricity generating works are defined in the Standard Instrument – Principal Local Environment Plan (2006) as:

A building or place used for the purpose of:

(a) *Making or generating electricity, or*

(b) *Electricity storage*

The Project would have a capital investment cost estimate of more than $30 million ($879 million). Therefore, the Project is classified as “State Significant Development” under division 4.7 of the EP&A Act.

The Minister for Planning and Public Spaces is the consent authority for SSD, and SSD applications are assessed by DPE (unless specific conditions occur e.g., where 50 or more people have objected to the application, the local council has objected to the application; and/or the Applicant has disclosed a reportable political donation, whereby the Independent Planning Commission (IPC) would be the consent authority).

4.2 Permissibility

The Project is permissible under the NSW State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP) and Dubbo Regional Local Environmental Plan 2021 (Dubbo LEP).

Section 2.36(1b) of the TISEPP provides that development for the purpose of electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.

The Development Footprint is zoned as predominantly SP2 Infrastructure under the Dubbo LEP, which energy generation / storage being protected in the zone. Along the westernmost end of the access track where it crosses into the southern landholder owned lot, the land is zoned RU1 Primary Production.

4.3 Pre-condition to exercising the power to grant approval

Statutory reference (NSW)	Pre-condition	Relevance
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	Under the EPBC Act, if the Minister determines that an action is a 'controlled action' which would have or is likely to have a significant impact on a Matter of National Environmental Significance (MNES) or Commonwealth land, then the action may not be undertaken without prior approval of the Minster.	MNES have been reviewed in Section 6.1 of this EIS and in the BDAR (Appendix E.1). The BDAR and Biodiversity section have identified potential impacts of the Project on the Pink-tailed Legless-lizard which is a MNES entity. As such an EPBC referral is being issued to the Cth Department of Climate Change, Energy, the Environment and Water. Section 6.1 provides further detail around the referral process.
EP&A Act	Clause 8, section 4.12 of the EP&A Act, requires an EIS to support a DA for SSD. Section 4.36 of the EP&A Act provides that a development would be State Significant Development (SSD) if it is declared to be SSD by a SEPP.	The Project is SSD

Statutory reference (NSW)	Pre-condition	Relevance
Environmental Planning and Assessment Regulation 2021 (EP&A Reg)	Part 8 Division 5 of the EP&A Regulation specifies the form and content of EISs, which provide the basis for the Secretary's Environmental Assessment Requirements (SEARs) issued for Projects. Section 59 of the EP&A Regulation addresses public participation for SSD. Section 251 requires an 'estimated cost' of the CIV of a DA in order for the Planning Secretary to make their determination.	The Project is an SSD and must follow the SSD assessment process outlined in the EP&A Regulation
State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP)	Schedule 1 and Schedule 2 of the Planning Systems SEPP identifies development which is SSD due to the size, economic value or potential impacts of the development. Clause 20 of Schedule 1 of the Planning Systems SEPP defines SSD as including: *Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, solar or wind power) that:* *has a capital investment value of more than $30 million…*	The Project is SSD under the SEPP Planning Systems
Dubbo Regional Local Environmental Plan 2021	The site is located within land zoned SP2 (Infrastructure) under the Dubbo Regional LEP. Electricity generation is permissible with consent in this land zone. 'Electricity generating works' as defined by the Principal Local Environment Plan (2006) include electricity storage. Part 2.3 Division 4 of TISEPP relates to electricity generating works. The Project falls under	The Land use zone of the Development Footprint is SP2 Infrastructure which is a prescribed zone. A small area of the access track is zoned RU1

Statutory reference (NSW)	Pre-condition	Relevance
State Environmental Planning Policy (Transport and Infrastructure) 2021 (Transport and Infrastructure SEPP)	a development for the purpose of 'electricity generating work–' – as defined in the Standard Instrument, for making or generating electricity, or electricity storage in any land in a prescribed rural, industrial or special use zone	Primary Production. The declaration of the Project as SSD extends to all parts of the Project.
	Section 2.122 of the Transport and Infrastructure SEPP requires certain developments to be referred to TfNSW. Electricity generation/storage are not included within the SEPP. However, the Project would result in the generation of fewer than 200 vehicles per hour during peak construction and operation. As such, the requirements under Section 2.122 of the SEPP do not apply.	The Project would result in the generation of fewer than 50 vehicles per hour during peak construction and operation, thus the requirements under Section 2.121 of the Transport and Infrastructure SEPP do not apply.
State Environmental Planning Policy Resilience and Hazards 2021 (SEPP Resilience and Hazards)	Section 3.12 of the SEPP Resilience and Hazards requires consent authorities to consider the Project's preliminary hazard analysis (PHA).	The Project includes a BESS which requires preparation of a PHA.
	The SEPP Resilience and Hazards aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. Chapter 4 Section 4.6 of the SEPP Resilience and Hazards requires the remediation of land to be considered by a consent authority, when determining a DA.	Contamination associated with agricultural activities (e.g., pesticides, petrochemicals) may be present on the site.
State	The Primary Production SEPP provides for agricultural land use matters of State or	Only a small section of the

Statutory reference (NSW)	Pre-condition	Relevance
Environmental Planning Policy (Primary Production) 2021 (Primary Production SEPP)	regional significance. Part 2.2 Section 2.8 of the Primary Production SEPP identifies State significant agricultural land as land listed in Schedule 1. Schedule 1 of the Primary Production SEPP is currently incomplete/blank, with mapping yet to be completed or publicly available.	Development Footprint impacts RU1 land. However, in decommissioning, all above ground infrastructure would be removed and decommissioning and rehabilitation of the site would commence to return the disturbed area to a safe, non-polluting and stable state. The broader area would remain suitable for continued agricultural or other land use options.
National Parks and Wildlife Act 1974 (NPW Act)	The NPW Act is responsible for the conservation of objects, places or features of cultural value within the landscape, such as but not limited to places, object and features of significance to Aboriginal people, places of social value and places of historic, architectural or scientific value.	An Aboriginal Cultural Heritage Assessment (ACHA) was completed for the Project.
Biosecurity Act 2015 (Biosecurity Act)	The Biosecurity Act and supporting Biosecurity Regulation 2017 provide for the establishment and functions of Local Control Authorities for weeds (LGA or County Councils) and weed control obligations on public and private land.	The EIS provides for the control of priority weeds occurring at the Development Footprint as part of the Project.
Heritage Act	The Heritage Act defines ‘environmental heritage’ as those places, buildings, works, relics,	The Project would be located

Statutory reference (NSW)	Pre-condition	Relevance
1977 (Heritage Act)	moveable objects, and precincts, of State or local heritage significance, and aims to conserve these values. A property is a heritage item if it is listed in the heritage schedule of the local council's LEP or listed on the State Heritage Register	adjacent to one heritage item listed under the Dubbo LEP. Impacts to this item are considered in Section 6.10.
Roads Act 1993 (Roads Act)	Under section 138 of the Roads Act, work cannot be carried out over a public road without consent of the appropriate roads authority.	The Project requires upgrades to the local road network. Goolma Road is a state road under the management of TfNSW.
Biodiversity Conservation Act 2016 (BC Act)	Section 7.9 of the BC Act requires a biodiversity development assessment report (BDAR) to be prepared for SSD unless determined otherwise by the Planning Agency Head and the Environment Agency Head.	The Project requires a BDAR to be prepared.
Conveyancing Act 1919 (and *Real Property Act 1900*)	When land is leased from a landowner and the lease affects part of a lot or lots in a current plan, a subdivision under section 7A of the Conveyancing Act is required when the total term of the lease, together with any options of renewal, is more than five years. However, a lease of a BESS is treated as a lease of premises, irrespective of the lease term. A deposited plan would be prepared by a surveyor showing the part of the land as the BESS premises, together with any associated easements. Subdivision under section 23G of the Conveyancing Act is not required.	Land acquisition and indicative subdivision plans are provided in Section 3.4.
Waste Avoidance	The WARR Act includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. The Project's resource	Waste management and avoidance is assessed in Section

Statutory reference (NSW)	Pre-condition	Relevance
and Resource Recovery Act 2001 (WARR Act)	management options would be considered against a hierarchy.	7.1 of the EIS.

4.4 Mandatory matters for considerations

Statutory reference	Mandatory consideration	Section in EIS, where relevant
Consideration under the EP&A Act and EP&A Regulation		
Section 1.3	Relevant objects of the Act • 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 • To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment • To promote the orderly and economic use and development of land • To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	Section 6.9 Section 6.12 Section 6.1

Statutory reference	Mandatory consideration	Section in EIS, where relevant
Section 4.15	Relevant environmental planning instruments • TISEPP • SEPP Planning Systems • SEPP Resilience and Hazards • State Environmental Planning Policy (Biodiversity and Conservation) 2021 • Dubbo LEP Relevant planning agreement or draft planning agreement • In principal agreement to focus the Voluntary Planning Agreement on the Wellington township (as opposed to the broader Dubbo community) has been achieved. Regulations • EP&A Regulation • Biodiversity Conservation Regulation 2017 Likely impacts of the development (environmental, social and economic) • See Section 5.3 and Section 7 Suitability of the site for development • See Section 2 Submissions made in accordance with the Act or regulations • Refer to the Summary Public interest	

Statutory reference	Mandatory consideration	Section in EIS, where relevant
	• See Section 5 and commitments made in Section 6.12.3.	
Mandatory relevant consideration under EPIs		
SEPP Resilience and Hazards – section 3.7	Consideration must be given to current circulars or guidelines published by DPE as follows: • Hazard Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use and Safety Planning, • Hazard Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis, and • Multi-Level Risk Assessment.	Section 6.4 Appendix E.4
Dubbo LEP	• Objectives and land uses for zone SP2 and RU1 • LEP Section 3.3 – environmentally sensitive areas excluded	Section 6.9
Considerations under other legislation		
BC Act – section 7.14	The likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.	Section 6.1 and Appendix E.1

4.5 Approvals and licences

Table 4-1 Summary of licences and approvals required for the Project

Legal instrument	Approving authority	Approval or licence
Environmental Planning and Assessment Act 1979 **(NSW) (Part 4)**	DPE	State significant development applications require approval from the Minister for Planning or the Independent Planning Commission. This EIS has been prepared in accordance with the requirements of the Secretary of the DPE.
Roads Act 1993 **(NSW) (Section 138)**	TfNSW	Any works to public or classified roads require consent under this Act from the road's authority. TfNSW are the road authorities for Goolma Road.
Dubbo LEP	Dubbo Regional Council	The subdivision of the Orana BESS as discussed in Section 3.4 would require a subdivision certificate. There are no lot size restrictions in the SP2 land zone.

Note, if it is determined that additional licences or approvals are required, the Applicant would obtain these prior to commencement of relevant activities.

5. Engagement

Effective stakeholder engagement is essential to developing a project that is responsive to its social and environmental context. Effective engagement occurs when stakeholders have the information they need to understand a project and its impacts, and are provided with safe, respectful, and inclusive opportunities to participate in a meaningful way. Such engagement is fair and transparent, seeks to understand stakeholders' views, interests, values and concerns, and show how these views were considered in shaping the final design of the Project. When engagement is carried out in this way, it enables the development of Project legitimacy and trusting relationships, which in turn provide the foundation for social acceptance and good planning decisions.

5.1 Community/stakeholder engagement and consultation

This section summarises the detailed consultation activities undertaken to achieve these goals, considering community, specific Aboriginal community, and government agency stakeholders. It identifies:

- Issues and views raised by stakeholders.
- Opportunities to influence the Project.
- Plans for future engagement.

The Applicant and NGH have undertaken consultation with the community in accordance with the *Undertaking Engagement Guidelines for State Significant Projects* (DPIE, 2021a). The Applicant's engagement approach has been informed by the International Association for Public Participation's (IAP2) *Spectrum of Public Participation* (IAP2, 2018).

5.1.1 Community and stakeholder engagement strategy

A Community and Stakeholder Engagement Strategy (CSES) and summary table, provided in Appendix C, was developed by the Applicant during the Scoping Phase of the Project in 2022. The CSES has been designed to adhere to best practice principles, and outlines the Applicant's commitment to accountable, responsible, and transparent stakeholder engagement. The high-level objectives of this strategy are to:

- Identify stakeholders and possible stakeholder issues.
- Proactively inform and engage with the community and stakeholders regarding the Project.
- Create a framework to seek and encourage input from stakeholders throughout the development of the Project.
- Establish channels for the community to raise questions, issues, expectations, and concerns and to answer them.
- Identify and proactively communicate all the potential benefits and impacts of the Project.
- Develop an active and visible profile within the community to create trust and constructive relationships.
- Demonstrate commitment to the communities' sustainability and wellbeing.

- In order of precedence, avoid, minimise, or mitigate negative impacts from the Project.
- Seek to create and/or respond to interest in opportunities for local trades, service providers and suppliers created by the construction and operation of the Project.
- Reduce Project risk and improve outcomes by incorporating best practice principles.

Stakeholders were identified as those potentially impacted by the Project or having an interest in the Project. The IAP2 Spectrum is designed to assist in selecting the level of participation that defines the public's role in any public participation process. The Applicant has adopted the 'Involve' approach, as a minimum, in its engagement with stakeholders and the community. Stakeholder mapping determined the engagement approach for stakeholder categories, as shown below in Table 5-1 below.

Figure 5-1 Orana BESS Community Day, Rotary Markets

Table 5-1 Stakeholder categories and engagement methodologies

Stakeholder category	Characteristics	Engagement methodology
1. Near Neighbours and residents	Landholders directly adjacent to the Project and those within a 2km radius of the Project and/or with potential for direct line of sight. Potential to experience impacts (noise, air quality, visual etc.) as a result of the construction and operation of the Project.	• Focused stakeholder mapping to identify near neighbours. • Letter of introduction and copies of above relevant Project documents. • Telephone calls and face-to-face meetings as appropriate. • Personalised invites (via mailbox drop) to community information events. • Responding to specific queries and concerns in a timely manner. • Implementing neighbour agreements as necessary to formalise mitigation measures.

2. Local Community	Residents and other interested parties from Wellington and surrounds.
	It is important to ensure a clear and consistent message is delivered to the broader community. There may be opportunities and impacts to the broader community that are important to understand during the assessment of the Project.
	Accommodation and services for Project construction staff and other economic matters may be of interest.
		• Community information events at key Project milestones, including but not limited to:
		  ○ Project inception
		  ○ Lodgement of Scoping Report
		  ○ Lodgement of EIS / Public Exhibition
		  ○ Response to Submissions / Assessment
		• Above events to be advertised in local media and on Project website with sufficient notice.
		• Above relevant Project documents to be readily accessible at community events.
		• All queries responded to in a timely manner.
		• Formally engage representatives of the community during the social impact assessment.
		• Conduct a “jobs fair” for local labour, services and suppliers in conjunction with the EPC Contractor prior to commencement of construction.

3. First Nations	Representatives of groups such as Land Councils; local Elders	• Primary engagement via the ACHA process and in direct response to issues raised in SEARs and Submissions. • Notwithstanding, issue invites to community information events and engage on an exceptions basis.

Stakeholder category	Characteristics	Engagement methodology
4. NSW Department of Planning & Environment (DPE)	Consent body	• Engage frequently with appointed representatives of Energy Assessment Team and the Priority Assessments Programme, particularly in advance of key milestones such as Lodgement, Exhibition, Submissions and Assessment. • Conduct soft lodgement of key deliverables to ensure adequacy.
5. Dubbo Regional Council (DRC)	Local government body	• Provide letter of introduction and associated Project documentation, with emphasis on Council's executive leadership, planning team and local Wellington Ward Councillors. • Regular face-to-face meetings coincident with community events and key Project milestones. • Telephone call and email status updates at other times. • Openly explore local issues and concerns, including local employment, housing, road safety and other social impacts. • Openly explore VPA and application of community benefits fund.
6. Government agencies	These groups have the opportunity to request specific information within the SEARs. Specific information may be required from these groups during DPE's assessment of the application.	Primary engagement via direct response to issues raised in SEARs and Submissions, and/or on an exceptions basis as set-out below. • Transport for NSW (TfNSW) – Early and open dialogue around preferred point and nature of access/egress at Goolma Road. • Biodiversity and Conservation Division (BCD, DPE) – Informed discussion around selective vegetation removal and limited potential for SAII. • Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Open dialogue on any MNES and EPBC matters. • Rural Fire Service (NSW RFS) – Informed discussion on layout (once available), in particular asset protection zones relating to fire safety. • Elected Officials – Occasional letter updates at key Project milestones and invites to landmark events.

Stakeholder category	Characteristics	Engagement methodology
7. Business Groups	Local and regional businesses and industry groups. This development may be of particular interest to business owners in the area. Opportunities and potential impacts would need to be considered.	• Invites to jobs fair, in coordination with Local Chamber of Commerce, to maximise local content.
8. Media	Local media, such as newspapers.	• Responding to information requests and contributing to articles in local newspapers, as well as proactively providing updates at key milestones. • As a conduit to informing the local community as to upcoming information events.
9. General	Policies and principles that apply to all stakeholder categories.	• Develop and regularly update a Project website (www.oranabess.com.au). • Develop and regularly monitor a Project email address (OranaBESS@akayshaenergy.com.au). • Maintain a suite of community-facing Project documentation, including fact sheets, images, plans etc. • Maintain a “call log” of stakeholder engagement activities and outcomes throughout development.

5.1.2 Summary of engagement activities with stakeholders

Key stakeholders

Key stakeholder groups were identified for the purpose of documenting an informed understanding of the scale and potential impact of community sentiment for this Project.

The EIS period included a range of engagement activities aimed at broadening awareness of the Project, responding to concerns, working through issues and capturing opportunities. This has included:

- Face to face meetings and presentations
- Direct communications (emails, texts, telephone calls)
- Orana BESS Project website
- Dedicated email address
- Community information sessions/drop-in sessions at local venues
- Specific stakeholder group meetings and discussion sessions.

The identified key stakeholders are shown in Table 5-2. It should be noted that both the broader Project engagement and targeted social impact assessment (SIA) engagement processes have resulted in limited responses from the local community and stakeholders. This may in some part be due to the small scale and limited impact of the Project in comparison to larger nearby projects including wind and solar. However, a similar situation has been reported for other recent renewable energy Projects in the Wellington area as well as during targeted Orana BESS SIA interviews.

Table 5-2 Key stakeholders and consultation details

Activity	Details of consultation	Timing and reach
Wellington Community		
Community information session 1	These sessions, organised and facilitated by the Applicant, provided information to attendees in the form of a fact sheet with a link to the Project website, and the latest available plans. At both, the Applicant engaged in discussions with attendees to identify any issues or concerns as well as opportunities to maximise benefits to the local community. Attendees were invited provide their contact details if interested in receiving Project updates.	Thursday 17 March 2022 (2-5pm) Wellington Civic Centre Eight attendees
Community information session 2		Monday 19 September 2022 (2-5pm) Wellington Civic Centre Two attendees
Community information session 3	The Applicant hired and attended a stall at the local weekend markets. Corflute maps of the Project were displayed, and fact sheets were provided to interested community members. Discussions as above.	Saturday 25 February 2023 (8am-12pm) Wellington Rotary Markets Approximately 20 people engaged with the stall.
Near neighbour consultation		
Letters to near neighbours (Non-associated Receivers)	Letter invitations to the three community information sessions were hand delivered to all near neighbours. The first of these letters included an introduction to the Project, while the following letters also included links to the Project website and the Project page on DPE's Major Projects planning portal. All three letters provided Project contact details and extended an invitation for the neighbours to contact the Applicant if they would like to discuss any questions or concerns.	A week prior to each community information session: • Week beginning 7 March 2022 • Week beginning 12 September 2022 • Week beginning 13 January 2023 Reach: R1 to R10 (refer to Figure 1-4).

Activity	Details of consultation	Timing and reach
Targeted phone calls/liaison	Phone calls to near neighbours were made to support discussions around Project plans and potential impacts and mitigation options. Courtesy calls were made to advise of the upcoming community sessions.	
Near neighbour meetings (Non-associated Receivers)	One-to-one meetings were undertaken with potentially impacted near neighbours to understand concerns and identify mitigation options. Meetings were held in person. Maps and findings from technical assessments were provided as they became available. The neighbours were advised that additional information such as noise and visual assessments will be shared to inform ongoing discussions. Specific Non-associated Receivers concerns included: R1: visual impacts, noise, Electromagnetic fields and radio interference R2: Noise impacts R5: Visual impacts	Two face-to-face meetings in addition to numerous phone calls were held with one potentially impacted near neighbour. Multiple attempts were made to find a mutually convenient time to meet with another near neighbour (absentee owner) but have been unsuccessful. However, the Applicant has had numerous phone calls with this neighbour and has shared Project information via email.
Traditional media		
Public notices	Classified advertisements about the community information sessions and market stall were advertised in the Wellington and District Leader (local weekly newspaper issued on Wednesdays). These notices were also posted on the Project website.	A week prior to each community information session: • Week beginning 7 March 2022 • Week beginning 12 September 2022 • Week beginning 13 January 2023
Digital tools		

Activity	Details of consultation	Timing and reach
Website	Provides a central location for information, updates, and to register interest in construction and operation opportunities. Community update and jobs enquiry pages were created in early 2023.	Created in February 2022. Available throughout the scoping and EIS phases.
Stakeholder group presentations/briefings		
Magmatic Resources	Provided briefing and discussion re Mineral Exploration Rights. Magmatic Resources advised that whilst their exploration licence encompasses the BESS site, it has no intention of mining in the immediate vicinity and that mining activities would only occur elsewhere within the licence area significantly to the north of the Orana BESS site.	Meetings: • 7 June 2022 (MS Teams) • 24 February 2023 (in person)
	General Project update and invitation to community engagement events.	Emails: • 31 August 2022 • 9 September 2022 • 16 February 2023
SIA targeted consultation		
SIA interviews	Semi-structured phone and online interviews were undertaken to inform the SIA. Purposive and snowball sampling techniques were used to identify possible participants. Interviews were conducted with the following stakeholder groups: • Near neighbours (2) • Wellington residents (2) • Social locality businesses & business organisations (1) • Employment, training & industry services/stakeholders (2) • Local & state government agencies (4)	September 2022 – January 2023

Activity	Details of consultation	Timing and reach
	• Community & special interest groups (1) • Environmental organisations (2) • Aboriginal representatives (1)	

5.1.3 Summary of findings

Community and stakeholder engagement undertaken to date has revealed a general level of support for the Project, with some localised concerns from two near neighbours. While expressing support for renewable energy in general, the limited concerns expressed by the near neighbours was primarily focused on the following topics:

- The visual change a BESS would bring to the landscape character.
- Noise impacts from inverters and associated cooling systems, particularly in the evening.
- Emissions ratings of the BESS, particularly the inverters.
- EMF/radio interference.
- Floodlighting.
- Fire risks.
- Devaluation of property value.

Broader community feedback suggests general satisfaction that an investment of this magnitude would occur in Wellington and a desire to see maximum follow-on benefits to the local community. Topics of interest included:

- Maximising local employment, skills and training opportunities.
- Community benefit sharing opportunities.

Common concerns centred on the potential negative impacts of the construction workforce on the local rental housing market and availability of short-term accommodation for tourism, and health services in Wellington. These concerns were related to past experiences with renewable energy developments in the region.

5.1.4 Summary of key issues and opportunities identified for the Project

The Project team responded to all community queries and views on the Project. Table 5-3 aligns the key issues discussed with the strategic categories required for an EIS and separates the views of the near neighbours with the broader community. More detailed analysis of these issues and proposed mitigation measures are provided in the SIA (refer to Appendix E.8).

Table 5-3 Key community Project issues and opportunities

Topic	Strategic category (as per EIS requirement)	Details and Project team responses
Employment, training and procurement opportunities	Economic, environmental, and social impacts of the Project	Stakeholders identified a key need for an active and supportive approach by the Applicant to benefit local people through employment opportunities presented by the proposed Project. For example, there is a need for pre-employment programs to give people not just training but experience. The development of a Local Participation Plan is proposed to enhance positive impacts.
Impacts on the local economy	Economic, environmental, and social impacts of the Project	Consultation with stakeholders noted the economic benefits for local pubs, takeaways, shops, and accommodation in Wellington that have resulted in the past from the influx of solar farm workers in the local area. Consultation with local agencies and business representatives highlighted the importance that local people placed on seeing tangible outcomes for local business, even over the short term. The development of a Local Participation Plan and a Local Procurement Policy is proposed to enhance positive impacts.
The ability to share benefits through a community benefit	Economic, environmental, and social impacts of the Project	During SIA consultation and broader EIS engagement, stakeholders were invited to share

Topic	Strategic category (as per EIS requirement)	Details and Project team responses
sharing program		their thoughts about potential community investment initiatives. Consultation revealed that local stakeholders highly value benefit sharing schemes, and that this is seen by many as a key potential Project benefit. Several SIA interviewees noted the visible community benefit schemes of other major projects in the area, and the positive impact that this has had on community acceptance of those projects. In conjunction with a VPA, the Applicant has committed to developing a community benefit sharing program that is tailored to the local context, to maximise local benefits and designed to have a positive and lasting impact on the Wellington community.
Impacts on local housing and accommodation	Economic, environmental, and social impacts of the Project	Wellington and broader Dubbo area are experiencing severe housing pressures and the workforce influx may further constrain the availability of accommodation options for both residents and tourists. This becomes a particular concern when considering cumulative impacts. Stakeholders suggested that any additional impacts from the construction workforce would add to housing pressures. These impacts would be felt most by vulnerable population groups, who are already being impacted by housing costs. The Applicant has committed to hiring locally

Topic	Strategic category (as per EIS requirement)	Details and Project team responses
		(where possible) to reduce accommodation burdens and is recommended to work closely with Dubbo Regional Council and other key stakeholders in Wellington and Dubbo to develop an Accommodation and Employment strategy to minimise negative impacts on the rental market and other users of short-term accommodation, such as tourists.
Amenity impacts for near neighbours	Economic, environmental, and social impacts of the Project	Project engagement with some near neighbours noted concerns related to visual amenity, noise impacts, and way of life. The nearest neighbours who would overlook the site were consulted early in the planning phase to discuss visual amenity impact on their property. Within the Project planning phase, consideration was given to siting the facility to take advantage of local terrain and vegetation and thereby minimise views to the south and south-west. Consideration was also given to ensuring that the colours of the buildings within the site blend into the landscape as much as possible. Some near neighbours highlighted concerns about health impacts related to sleep disturbance resulting from noise and night-lighting during construction and operation of the BESS. Their concerns centred on the inverters and the potential for night-time noise from BESS operation and

Topic	Strategic category (as per EIS requirement)	Details and Project team responses
		cooling systems. They described household members as highly sensitive to ongoing noise, including construction traffic and activities, and the impact of noise during the night leading to sleep deprivation. The Applicant has committed to working closely with impacted near neighbours to develop appropriate and acceptable mitigation measures.

5.1.5 Future engagement activities

Engagement activities, as presented below in Table 5-4, are planned to align with the public exhibition of the EIS. These activities have been identified to maximise participation in this formal submission process, as well as during the DPE's assessment and determination of the Project.

Table 5-4 Engagement activities throughout exhibition

Stakeholders	Key actions
Near neighbours	Project Team available on request to discuss the Project with near neighbours.
Community	During exhibition • Newspaper advertisements, letter box drop (residents identified as key receivers as per Figure 1-4) and email newsletter, via registered email contacts, notifying exhibition of EIS and community information session. Post Exhibition update • Email newsletter, via registered email contacts, notifying completion of response to submissions. Post Determination update • Email newsletter, via registered email contacts, notifying outcomes of determination. All phases • Keep website up to date with the latest Project information.

Pending approval, future engagement activities would continue commensurate with the findings of engagement carried out during the preparation of this EIS during construction and operation of the Project. Notwithstanding, a jobs fair would be held in conjunction with the Principal Contractor, once appointed and closer to commencement of construction. This would be suitably advertised in wide-ranging local media ahead of time.

To ensure consistency with *Undertaking Engagement Guidelines for State Significant Projects* (DPIE, 2021), during construction and operation, the Applicant would continue to:

- Undertake proactive, transparent and collaborative engagement, spanning from informing on construction activities to involving and collaborating through benefit sharing opportunities.
- Gather ideas from locals regarding opportunities to work with local businesses and minimise construction impacts.
- Actively engage during the operation and decommissioning stage of the Project in line with the conditions of approval.

- Foster strong relationships with key stakeholders and further liaise with Dubbo Regional Council and other key stakeholders regarding the implementation of the:
    i) **Community and Stakeholder Engagement Strategy**
    ii) **Industry Participation Plan**
    iii) **Community Enhancement Fund**.

(described in more detail in the SIA, Appendix E.8).

Table 5-5 Engagement activities post-approval

Stage	Key actions
Construction Planning	• Revision of CSES to ensure open, transparent, timely and accessible communication of Project information. • Establish accessible, adequate, and responsive grievance and remedy mechanisms in the event of complaints. • Engagement with near neighbours in relation to planned traffic arrangements, construction activities and impact mitigations. • Detailed engagement with impacted neighbours in relation to visual impact mitigations, including proactive planting of screening vegetation; and noise impact mitigations. • Once a main contractor has been appointed, hold employment and business opportunities briefings and community networking meeting, prior to the construction phase, to discuss employment, procurement, and local services (e.g., accommodation providers, cafes etc.) opportunities and to register those interested in participating. Monitor registration of interest form responses on website and advertise in local and regional newspapers. • Engagement with Aboriginal stakeholders, including welcoming involvement when there is an event on Country at the Subject Land, e.g., Welcome to Country, smoking ceremony to mark key Project milestones, and other work and cultural opportunities for ongoing involvement. • Ongoing engagement to finalise Community Benefit Sharing Program arrangements.
Construction	Implementation of CSES, including: • Open, transparent, timely and accessible communication of Project information. • Proactive updates via email (to registered interests) and public notices regarding construction activities and expected impacts (traffic, noise, dust). • Delivery of updates to interested stakeholder groups such as Dubbo Regional Council, Wellington Business Chamber, and Aboriginal groups.

Stage	Key actions
	Monitoring and evaluating the effectiveness of the CSES, including: • Undertake regular review of this CSES. • Ensure that website is maintained with up-to-date information. • Keep an accurate record of all feedback from consultation activities and all correspondence with the community. • Regularly monitor and respond promptly to email and phone queries. • Monitor and review complaint register.
Operation	• Continue to proactively engage into operation and decommissioning stage to ensure the local community and interested stakeholder groups are well informed on key elements of the Project. • Open, transparent, timely and accessible communication of Project information. • Engagement with near neighbours with key details regarding operation details of the site. • Engagement with Dubbo Regional Council and the local community to highlight benefits and key milestones during operation. • Actively engage via email and posted letters to residents within a 2km radius any substantial maintenance work be carried out during operation and mitigate any impacts that may arise. • Continue to foster strong relationships with community via the establishment of community partnerships and industry participation. • Ongoing engagement associated with Community Benefit Sharing Program arrangements. • Proactively communicate decommissioning to interested stakeholder groups and the wider community.

5.2 Aboriginal community consultation

The consultation with Aboriginal stakeholders for this Project was undertaken in accordance with Section 60 of the *National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2019* and following the process outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRP). The guide outlines a four-stage process of consultation as follows:

- Stage 1 – Notification of Project proposal and registration of interest.
- Stage 2 – Presentation of information about the proposed Project.
- Stage 3 – Gathering information about cultural significance.
- Stage 4 – Review of draft cultural heritage assessment report.

The full list of consultation steps, including those groups and individuals who were contacted, and a consultation log is provided in the ACHA (Appendix E.2) A summary of actions carried out in these stages is also included in the ACHA.

The ACHA has been finalised in consideration of the Aboriginal community feedback and comments after the conclusion of the 28-day review period.

In addition to the formal ACHA process, the Applicant was also introduced to members of the Wellington LALC by the CEO of Dubbo Regional Council at a Council run event on the morning of 19 September 2022. Invites were extended to meet again with the LALC members at the Project community event later that day.

5.3 Agency consultation

5.3.1 Secretary's environmental assessment requirements (SEARs)

As the Project is classified as State Significant Development (SSD), a Scoping Report was prepared, and SEARs were requested. The SEARs were provided by DPE on 11 July 2022 (Appendix A). The SEARs are intended to guide the structure and content of this EIS and reflect the responsibilities and concerns of NSW government agencies in relation to the environmental assessment of the Project. Appendix A provides a summary of the SEARs from the various agencies and cross reference where specific issues are addressed within this EIS.

5.3.2 Agencies' additional comments and consultation

As part of preparing the EIS for the SSD development application, the SEARs require that the relevant State or Government authorities, infrastructure and service providers, community groups, affected landowners, exploration licence holders, quarry operators and mineral title holders be consulted during the preparation of the EIS. The issues raised through consultation with these entities are provided in Table 5-6 below.

Table 5-6 Agency consultation to date

Attendees and date	Consultation undertaken
Dubbo Regional Council	
17-Mar-22 – Face to Face Murray Woods, CEO Natasha Coomber, Economy Stephen Wallace, Development Councillor Richard Ivey Councillor Jessica Gough Mayor Matthew Dickerson	General Akaysha & Project introduction. Specific discussions focussed on the Goolma Road access point, local jobs/content, workforce & accommodation, Voluntary Planning Agreement (VPA)/community fund, of which availability of local accommodation was most pertinent. Akaysha advised of its intent to source local labour, trades, suppliers and service providers from within the region, which would limit its demands on housing.
19-Sep-22 – Face to Face Murray Woods CEO Stephen Wallace, Development Steven Jennings	General update on Project status. Specific discussion on VPA and community benefits fund, including specifically co-funding a mountain bike facility at Mount Arthur west of Wellington with other renewable developers in the region. Akaysha agreed to advise whether a capital or an ongoing contribution was preferrable."
16-Feb-23 – email Murray Woods CEO Stephen Wallace, Development Steven Jennings	Courtesy email inviting Council representatives to upcoming Community Event.
21-Mar-23 – email and call Murray Wood, CEO Stephen Wallace, Development Luke Ryan, Infrastructure"	General status update, in particular advice on inclusion within the Accelerated Approvals Pathway and expected dates of lodgement/exhibition. Also continued to explore arrangements for a Voluntary Planning Agreement and Community Benefit Fund and requested copies of a draft VPA for review.
Transport for NSW (TfNSW)	
10-Mar-22 Hayley Sarvanandan	Access off Goolma Road discussions.

Attendees and date	Consultation undertaken

Mar-23
Alexandra Power, Team Leader Development Services-Renewables
	A draft Traffic Impact Assessment (TIA) prepared by Amber Pty Ltd was provided for comment to ensure it would be suitable once formally lodged as part of this EIS. A request for a meeting to discuss the Project / workshop any concerns was made by Amber and NGH to TfNSW.
	
	It is noted that some of the level of detail being requested by TfNSW is not considered by the Applicant to be required to support the impact assessment but would be developed within construction management plans in consultation with TfNSW, pending Project approval and subsequent to appointment of contractors. This approach is consistent with the State significant development guidelines – preparing an environmental impact statement (DPIE December 2021) which state: *… with some large, complex projects this flexibility is often essential as it is difficult, if not impossible, to deal with all aspects of the design of these projects at the EIS stage.*
	
	The Project has taken a conservative approach where possible and acknowledges current information gaps. It is underpinned by the Project's commitment to capture this higher level of Project-specific detail in consultation with affected stakeholders, within environmental management plans, developed in tandem with the final detailed design. Specifically, this includes:
	
	Mitigation measure T1: A Construction Traffic Management Plan (CTMP) will be prepared and implemented. The CTMP will include additional information not available at this stage in the planning process including:
	• *Road transport volumes, distribution and vehicle types broken down into:*
	  ○ *Hours and days of construction*
	  ○ *Schedule for phasing/staging of the* Project*.*
	• *The origin, destination and routes for:*
	  ○ *Employee and contractor light traffic*
	  ○ *Heavy vehicle traffic*
	  ○ *Oversize and overmass traffic.*
	
	Some issues raised by TfNSW concern cumulative impacts and as above, would require more accurate data, closer to construction with regard to understanding and managing overlapping construction schedules.

Attendees and date	Consultation undertaken
	Amber's response to each specific issue raised by TfNSW is provided as part the updated TIA (Table 7 in Appendix E.3) and has been incorporated into the final TIA. It is noted that the traffic and access assumptions provided to Amber by the Applicant are clearly stated in the TIA but cannot be known with a high level of accuracy at this time. They should be considered the Applicant's best approximation. The traffic assessment has applied a cautionary approach understanding this uncertainty.
Department of Planning (DPE)	
1-Jun-22 – Video call Andy Nixey	Pre-lodgement meeting – discussion around the content of the Scoping Report.
20-Dec-22 – Video call Dan Couriel Silvio Falato James Sellwood	DPE invited Akaysha to submit the Orana BESS for consideration in the Priority Assessment Programme. This initial meeting was to review the Project information, validate its eligibility and to discuss the content required as part of a formal application.
31-Jan-23 – Video call "Dan Couriel Silvio Falato James Gilchrist"	Akaysha have been successful in being included within the Priority Assessment Programme. This kick off meeting was to run through the program processes and roles and responsibilities. DPE committed to send through a draft service charter for review.
8-Feb-23 – Phone call Andy Nixey	General update on Project status and discussion on the respective roles and responsibilities of the Energy Assessment Team and the Priority Assessment Programme. In respect of the latter, a request was made to DPE to allow soft lodgement of the EIS ahead of finalising the ACHAR process to advance the Project timelines. DPE ultimately agreed to this request.
9-Feb-23 Dan Couriel	Akaysha proposed soft lodgement timeline 2023 with one caveat of the comments from the RAP would still need to be included due to the 28 day period required for comments.
10-Feb-23 James Gilchrist	DPE provided Akaysha with a draft service charter for participation in the Priority Assessment Program. Outlining the principles and the assessment process schedule. Akaysha sent back comments on the proposed schedule.

Attendees and date	Consultation undertaken
14-Feb-23 James Gilchrist	Discussion around the priority assessment service charter and the reviewed dates. DPE enquired as to the state of the CIV test as there is a CIV review process underway and this has implications on the timeline. Agreed to submit the CIV along with the soft submission and CIV review would occur in parallel and ideally occur before hard submission.
DPE Biodiversity, Conservation & Science (BCS)	
10-Jun-22 – Video call Andy Nixey (DPE) Ben Ellis (BCS) Samantha Wynn (BCS)	Discussion regarding Serious and Irreversible Impacts BCS recognised the "avoid-minimise-mitigate" strategy applied to the site layout and design. BCS subsequently asked if they could refer to the Orana BESS as a reference case for avoid-minimise-mitigation techniques.
11-October-22 – Video call (NGH) Ben Ellis (BCS) Samantha Wynn (BCS)	Discussion between ecology team and BCS to discuss survey methods require for listed threatened species. Specifically, the Golden Sun Moth and the Pink tailed legless lizard.
Transgrid	
23-Jun-22 – Video Call Kenson Ho Adam Hoare	"Discussion regarding establishing BESS Site access via Transgrid Wellington 330kV Substation. Transgrid advised it would be accepted in principle but could not be guaranteed for the long-term.
17-Jan-23 – Phone call and email Nirvana McNaughton	Discussion with Transgrid to secure its landowner consent to the DA to facilitate electrical connection of the battery to the Wellington Substation. Discussions resulted in the addition of transmission line option 2 (via an underground cable route) to increase optionality.
NSW Rural Fire Service (RFS)	
15- Nov-22 – Phone call (NGH)	Contacted RFS on the 1300 NSW RFS phone number seeking advice and consultation on the preliminary design layout of the Project. RFS indicated that they could not offer advice on the Project until the EIS is on exhibition on the Major Projects website.

Attendees and date	Consultation undertaken
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	
3- March-23 – Video conference (NGH)	NGH presented an overview of the Project, its responsiveness to key environmental matters, and conclusions of the biodiversity assessment, with specific reference to Matters of National Environmental Significance (these are captured as part of the prescribed NSW Biodiversity Assessment Method). A decision was made by the Applicant to refer the Project under the EPBC Act.
DPE CIV improvement team	
23-Mar-23 – Video conference	DPE are undertaking a CIV Improvement Project, Major Projects Advisory team are looking into CIV estimates. DPE assessed Akaysha's previously provided CIV and had a number of questions on assumptions and inclusions Akaysha agreed to update the CIV to respond to comments Made
29-Mar-23 - Email	Akaysha provided updated CIV addressing comments DPE accepted revised CIV via email 30/03/2023

6. Assessment of key issues

In the sections below, what have been identified as the key environmental issues for the Project are considered. The Project-specific SEARs requirement is stated first, then the existing environment pertaining to the issue, the nature and scale of impacts anticipated and the mitigation measures developed to ensure these risks can be managed with a high level of confidence. This is considered separately for the phases of the development (construction, operation and decommissioning / rehabilitation) where relevant.

6.1 Biodiversity

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Biodiversity:

An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPE determine the proposed development is not likely to have any significant impacts on biodiversity values;

The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM; and

If an offset is required, details of the measures proposed to address the offset obligation.

The specialist biodiversity development assessment report (BDAR) was prepared by NGH consulting. It is summarised below and appended in full in Appendix E.1.

6.1.1 Approach

The BDAR was carried out using the Biodiversity Assessment Methodology (BAM) 2020, in consultation with the Biodiversity Conservation Division (BCD). This includes consideration of Matters of National Environmental Significance, pursuant to the *Environment Protection and Biodiversity Conservation Act 1999.* The assessment is supported by comprehensive field survey and mapping.

Definitions

The BAM is legislated under the BC Act and as such, terminology is prescribed and sometimes differs from the terms used in the EIS:

- The Development Footprint definition is consistent: all areas of land which may be directly impacted by the proposal, either during construction, operation or decommissioning. The Development Footprint accounts for all disturbance required to allow for construction activities.
- The *Subject Land* definition differs from the EIS. It is an important term in the BDAR to show the broader survey coverage and ensure indirect impacts are considered

appropriately. This summary has been amended to align terms with the EIS and avoid confusion.

Avoid and minimise impacts

BCD were consulted on 20 May 2022 with regard to avoiding and minimising impacts. They considered the structural woodland to be higher biodiversity value. The Applicant has moved the BESS as far north as possible and elongated the BESS east – west as much as possible (resulting in an irregular and sub-optimal layout) to minimise impacts on structural woodland and keep the transmission line impact area as low as possible. Potential impact to fauna habitat values, which include hollow bearing trees but also rock outcropping, has been minimised in this way also as hollow and outcropping are predominantly in the south of the site.

6.1.2 Existing environment

Landscape context

Landscape features were initially identified using aerial imagery and GIS spatial data including contours, vegetation maps, hydrology, etc during field planning. Site visits were used to confirm the extent and condition of landscape features in and around the Development Footprint.

The site is within the Inland Slopes IBRA subregion. It is undulating topography with grazing being the dominant land use. The site is adjacent to a Goolma Road, to the west is agricultural land and to the north Wellington Solar Farm and the Transgrid Substation. Wellington township, particularly peripheral residential areas, is located to the south. Two unnamed ephemeral waterways occur within the broader site. There was water present with minimal to no flow occurring during start of August site visit, however, heavy rains at end of August site visit resulted in fast flows. The Macquarie River flooded in Wellington at the same time.

No state or regionally significant biodiversity links occur within 1500m assessment area. The surrounding remnants are fragmented with many areas being cleared for cropping or grazing. The woodland areas have been modified with many trees and shrubs being removed or impacted due to grazing. There are no caves, karsts, or cliffs within the Development Site.

There are some imbedded, partially imbedded and surface granite rocks scattered around the site.

Excluded areas

Two small areas of exotic vegetation were recorded. The first was around the substation and the second was a small area downhill from the existing dam. The road reserve contained patches of exotic vegetation. These areas were surveyed using BAM plots to determine the floristic cover and abundance. The infrastructure that formed part of the areas not containing native vegetation included the building roads and hardstands areas around the Wellington township, substation, and solar farms. All of these areas were excluded from the native vegetation extent mapping.

Matters of National Environmental Significance

One Matter of National Environmental Significance is considered relevant to the Project; an EPBC referral is being prepared for the Pink-tailed Legless-lizard.

A summary of the other matters identified by the Commonwealth Protected Matters Search Tool within 1500m radius around the Development Footprint is summarised below.

Table 6-1 Matters of National Environmental Significance search results

MNES	Result	Is there an implication for this assessment?
World Heritage Properties	None	No
National Heritage Places	None	No
Wetlands of International Importance	4	No – all four are more than 150 km away
Great Barrier Marine Park	None	No
Commonwealth Marine Area	None	No
Listed Threatened Ecological Communities	4	No – field assessment confirmed none of these communities occur in the Development Footprint
Listed Threatened Species	34	Yes – the proposal may adversely impact the Pink-tailed Work lizard. EPBC referral submitted.
Listed Migratory Species	11	No – the Project is unlikely to impact these 11 bird species
Commonwealth Land	3	No – Australian Telecommunications Corporation and Australian Postal Corporation land would not be impacted by the proposal
Commonwealth Heritage Places	1	No, Wellington Post Office would not be impacted by the proposal
Listed Marine Species	18	No – The Project would not impact marine species
Whales and other Cetaceans	None	No
Critical Habitats	None	No
Commonwealth Reserves Terrestrial	None	No
Australian Marine Parks	None	No
Habitat Critical to the Survival of Marine Turtles	None	No
State and Territory Reserves	None	No
Forest Regional Agreements	None	No
Nationally Important Wetlands	None	No
Key Ecological Features (Marine)	None	No
Biologically Important Areas	None	No
Bioregional Assessments	None	No
Geological and Bioregional Assessments	None	No

Survey methods and effort

Field assessments conducted in June 2020, and April and May 2022 were used to confirm the extent and condition of native vegetation cover in and around the Development Footprint. Targeted surveys where required as required under the BAM. Surveys included:

- Plot-based vegetation survey
    - A site inspection and nine Vegetation Integrity (VI) plots (BAM plots) were conducted across the Development Site from 20-22 September 2022. The aim of this field work was to assess the vegetation visually and conduct an acceptable number of VI plots in the representative PCTs observed onsite.
- Species search transects
    - NGH ecologists undertook the targeted flora surveys for threatened flora species using the parallel field traverse walking surveys on average 10m apart
    - NGH ecologists undertook transect surveys for threatened invertebrate species including the Golden Sun Moth and Key's Matchstick Grasshopper
- Call Play-back
    - Call playback followed by spotlighting was used to survey for Barking Owl, Masked Owl, Bush-stone Curlew and Squirrel Glider for the August 2022 survey.
- Spotlighting
    - Spotlighting was used for Koala and Squirrel Glider or combined with call playback and a follow up spotlight for nocturnal birds.
- Koala Spot Assessment Technique (SAT) surveys
    - Nine SAT surveys were undertaken within the Development Site to assess the presence of koalas
- Camera traps
    - Camera traps were used to survey for Brush-tailed Phascogale in the Development Footprint. Under the survey guidelines, four cameras traps need to be installed for the first hectare and two cameras for each hectare after that. Cameras were deployed for a month
- Reptiles
    - NGH ecologists undertook surveys for Pink-tailed Legless Lizard using the rock turning method on two separate days covering suitable habitat within the Development Site (47.87 ha).

Limitations

Surveys are only ever a snap shot of species occurrence at a site. However, the targeted survey program was in accord with the BAM (which includes prescribed threatened species survey timing and methods) with minor justifiable exceptions as follows:

- Golden Sun Moth surveys on 20 December 2022 were carried out later in the day due to delay in arriving (road works), however, weather was warm and relatively still until towards the end of the survey – which was too windy, but the area being surveyed during higher winds was in poor condition – not ideal for this species).
- Golden Sun Moth survey on 6 January 2023 between 10.30 am – 2.30pm. Weather changed during surveys – wind picked up during survey, cloud cover changed over time, was sunny with some clouds at first, then lot of cloud cover, then became less cover.

- Golden Sun Moth survey on 12 January 2023 was carried out later in the day due to a delay in arriving (road works). The day was very warm and three breaks were taken in the shade during the survey time. Beginning of the day had a mild breeze, 10-15% cloud. Towards end of survey wind stronger than a breeze, cloud came in and became approximately 75% cover, then thunder.

Plant Community Type (PCT)

Native vegetation extent within the Development Footprint is limited to one Plant Community Type (PCT266) with a combined area of 48.29 hectares (refer to Figure 6-1). The remaining vegetation within the Development Footprint is considered exotic. The PCT is associated with the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC under the BC and EPBC Act. The PCT was confirmed to meet the requirements of the BC Act listed *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,* however, did not meet the condition thresholds for the EPBC Act equivalent of this TEC.

Threatened species identified onsite or assumed to occur

No threatened flora were considered relevant for further assessment; for all species generated by the BAM, targeted surveys did not detect the presence of any individuals.

Considering threatened fauna, *Aprasia parapulchella* (Pink-tailed Legless Lizard) and *Tyto novaehollandiae* (Masked Owl) were identified during targeted surveys (refer to Figure 6-2 and Figure 6-3). *Polytelis swainsonii* (Superb Parrot) was assumed to be present for foraging only. This was confirmed by an expert. Species polygons for the Pink-tailed Legless Lizard and Masked Owl have been determined based on potential habitat within the Development Footprint, referenced against habitat constraint information provided in the Threatened Biodiversity Data Collection. This generates an offset obligation.

Table 6-2 Threatened species surveys for candidate fauna species in the Development Footprint

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**	**Effort (hours & no. people)**		
Yass Daisy	*Ammobium craspedioides*	Parallel transects	☒ Yes ☐ No	20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm **Total: 6 hours 28 mins**	No	No

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**	**Effort (hours & no. people)**		
Ausfeld's Wattle	*Acacia ausfeldii*	Parallel transects	☒ Yes ☐ No	20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm **Total: 6 hours 28 mins**	No	No
Pink-tailed Legless Lizard	*Aprasia parapulchella*	Rock turning method	☒ Yes ☐ No	Rock turning method undertaken on two separate days – covering suitable habitat	Yes	No
Bush Stone-curlew	Burhinus grallarius	Call play back	☒ Yes ☐ No	1 location 1/08/2022 1 location 2/08/2022 1 location 3/08/2022 1 location 4/08/2022 Total: 4 hours	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**		**Effort (hours & no. people)**		
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Area search method	☒ Yes	☐ No	12/12/2022 approximately 6.10am - 7.09am (2ha area survey) 12/12/2022 8.45pm 13/12/2022 7.39am 13/12/2022 7.02pm 14/12/2022 7.40am 14/12/2022 8.42pm 15/12/2022 7.20am **Total: 5 hours**	No	No
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Walking transects / tree hollow inspection Bioacoustic recording	☒ Yes	☐ No	19/09/2022, 4.30pm 20/09/2022, 9am 20/09/2022 4.25pm 21/09/2022 7.16am 22/09/2022 8.05am 22/09/2022 3.25pm **Total: 4 hours 20 mins**	No	No
Euphrasia arguta	*Euphrasia arguta*	Parallel transects	☒ Yes	☐ No	12/12/2022 (near substation. Also assessing where suitable to do KMG and GSM surveys) 13/12/2022 (BESS site. Also assessing area for EPBC quality and suitable areas for KMG and GSM) **Total: 13 hours**	No	No

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**	**Effort (hours & no. people)**		
Tumut Grevillea	*Grevillea wilkinsonii*	Parallel transects	☐ Yes ☒ No	20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm **Total: 6 hours 28 mins**	No	No
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Area search method	☒ Yes ☐ No	19/09/2022, 4.30pm 20/09/2022, 9am 20/09/2022 4.25pm 21/09/2022 7.16am 22/09/2022 8.05am 22/09/2022 3.25pm **Total: 4 hours 20 mins**	No	No
Little Eagle	*Hieraaetus morphnoides*	Area search method	☒ Yes ☐ No	19/09/2022, 4.30pm 20/09/2022, 9am 20/09/2022 4.25pm 21/09/2022 7.16am 22/09/2022 8.05am 22/09/2022 3.25pm **Total: 4 hours 20 mins**	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**		**Effort (hours & no. people)**		
Key's Matchstick Grasshopper	*Keyacris scurra*	Invertebrate transects	☒ Yes	☐ No	13/12/2022 20/12/2022 **Total: 15 hours**	No	No
Square-tailed Kite	*Lophoictinia isura*	Area search method	☒ Yes	☐ No	19/09/2022, 4.30pm 20/09/2022, 9am 20/09/2022 4.25pm 21/09/2022 7.16am 22/09/2022 8.05am 22/09/2022 3.25pm **Total: 4 hours 20 mins**	No	No
Barking Owl	*Ninox connivens*	Call play back	☒ Yes	☐ No	2 locations 1/08/2022 2 locations 2/08/2022 2 locations 3/08/2022 2 locations 4/08/2022 **Total: 8 hours**	No	No
Brush-tailed Phascogale	*Phascogale tapoatafa*	Camera traps	☒ Yes	☐ No	14/12/2022 – camera set up 5&6/01/2023 - changed baits/changed low charge batteries **Total: 30 nights**	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**		**Effort (hours & no. people)**		
Squirrel Glider	*Petaurus norfolcensis*	Call play back/Spotlighting	☒ Yes	☐ No	Call Playback 2 locations 1/08/2022 2 locations 2/08/2022 **Total: 4 hours**	No	No
Koala	*Phascolarctos cinereus*	SATs/ Spotlighting	☒ Yes	☐ No	Spotlighting **Total: 15 person hours** SATs 02/08/2022, 1pm – 2.46pm, 1hr 46min one person hours 03/08/2022, 9.27am – 10.49am, 1hr 22mins one person hours NGH SAT method: 21/9/2022 3.25pm – 5.06pm 22/9/2022 9.00am – 9.48am **Total: 5 hours 36 minutes**	No	No
Superb Parrot (Foraging)	*Polytelis swainsonii*	Area search method	☒ Yes	☐ No	19/09/2022, 4.30pm 20/09/2022, 9am 20/09/2022 4.25pm 21/09/2022 7.16am 22/09/2022 8.05am 22/09/2022 3.25pm **Total: 4 hours 20 mins**	Yes	No

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**	**Effort (hours & no. people)**		
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*	Parallel transects	☒ Yes ☐ No	20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm **Total: 6 hours 28 mins**	No	No
Silky Swainson-pea	*Swainsona sericea*	Parallel transects	☒ Yes ☐ No	20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm **Total: 6 hours 28 mins**	No	No

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment
		Survey method (e.g., harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**	**Effort (hours & no. people)**		
Small Purple-pea	*Swainsona recta*	Parallel transects	☒ Yes ☐ No	20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm **Total: 6 hours 28 mins**	No	No
Golden Sun Moth	*Synemon plana*	Invertebrate transects	☒ Yes ☐ No	13/12/2022 20/12/2022 06/01/2023 12/01/2023 **Total: 30.5 hours**	No	No
Masked Owl	*Tyto novaehollandiae*	Call play back	☒ Yes ☐ No	2 locations 1/08/2022, 2 person hours 1 location 2/8/2022, 1 person hour 1 location 3/8/2022, 1 person hour 1 location 4/8/2022, 1 person **Total: 5 hours**	Yes	No

Figure 6-1 PCT Mapping

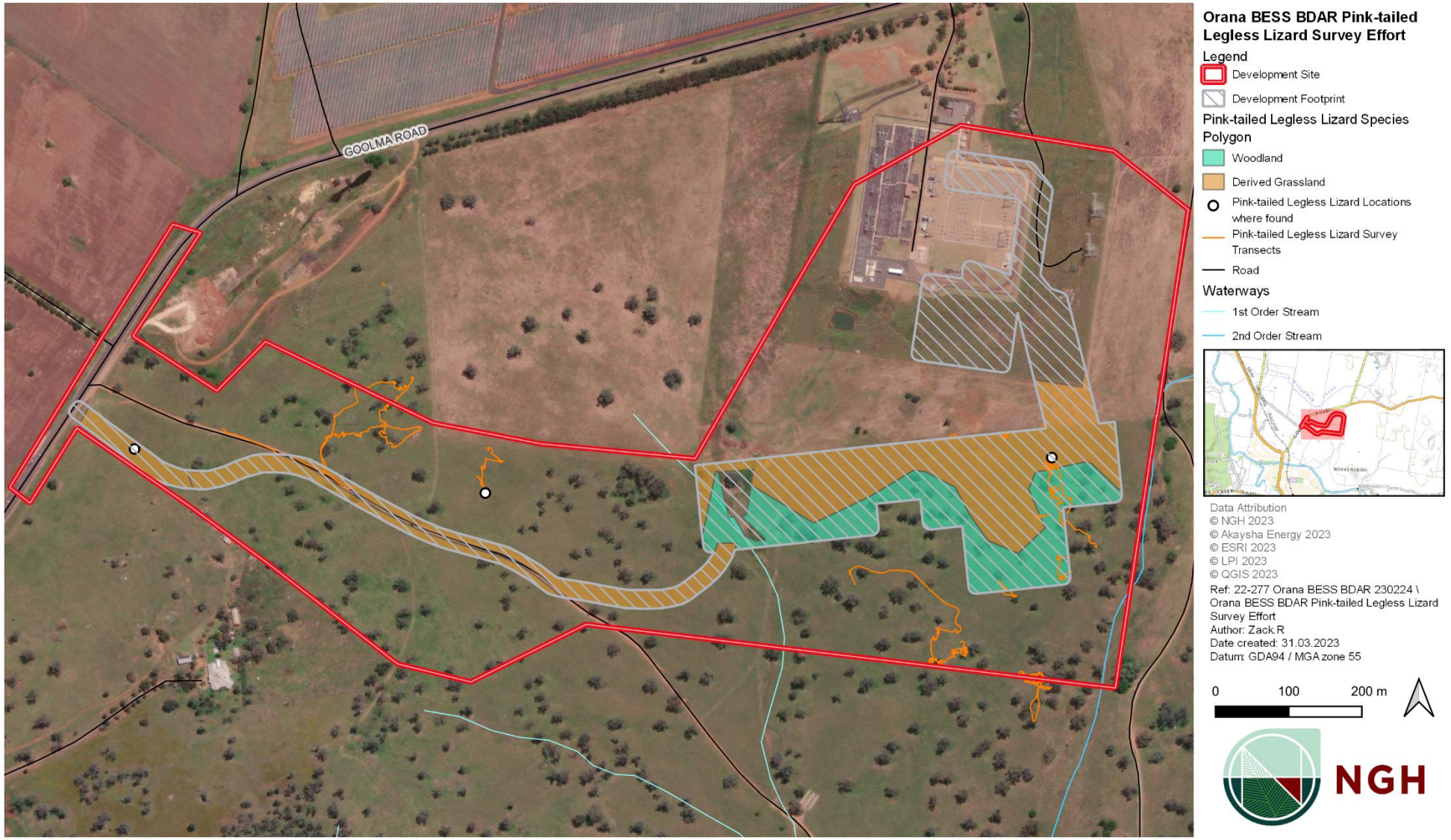


Figure 6-2 Pink-tailed Legless Lizard species polygon

Figure 6-3 Masked Owl species polygon

6.1.3 Potential impacts

Direct, indirect and prescribed impacts

After consideration of the ability to avoid and minimise impacts, the following residual biodiversity impacts are considered relevant to the construction stage of the Project:

- Vegetation clearance would impact PCT266 in the Development Footprint. There is expected to be a total loss of 3.66 ha of PCT 266 Woodland in a low-good condition and 6.96 ha of PCT 266 in poor condition.
- This clearing of native vegetation, although in poor condition, includes 37 hollow bearing trees which could provide suitable habitat for some threatened species. As such, direct impact to habitat for threatened species could occur during construction.
- Potential for soil and water contamination, generation of dust, light or noise. These are generally considered to be highly manageable and affect minimal additional impact areas temporarily. Note:

The following potential indirect impacts to native vegetation surrounding the Development Footprint were identified as being relevant to the construction and operational phases of the Project:

- Inadvertent impacts on adjacent habitat or vegetation.
- Introduction and spread of disease and pathogens from the site to adjacent vegetation.
- Introduction and spread of weeds and pests from the site to adjacent vegetation.
- Dust, noise and vibration impacts to surrounding vegetation and habitat values.

Prescribed impacts

- Impact on threatened entities associated with karst, caves, crevices, cliffs, rocks and other geological features of significance. Potential loss of rocky habitat for the Pink-tailed Legless-lizard in the Development Site through inappropriate storage of machinery, equipment and infrastructure.
- Impacts on connectivity of habitat of threatened entities. Connectivity may be impacted from construction of the BESS and access track, for the Pink-tailed Legless-lizard by reducing suitable habitat given the species cryptic nature and living underground.
- Impacts on water quality, water bodies and hydrological processes that sustain threatened entities. Construction and decommissioning of the BESS would disturb soils and potentially lead to sediment or other pollutants being present in runoff, mobilising and entering local waterways or waterbodies, adversely impacting on water quality.
- Impacts of vehicle strike to threatened fauna or flora that are a part of a TEC. The installation of access track to the BESS and other infrastructure may increase the likelihood of vehicle strike to a minor extent.

Potential Serious and Irreversible Impact (SAII) entities

PCT 266 under the BC Act, is associated with the TEC 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 Bioregion. This TEC is considered a SAII TEC and impacts to this SAII TEC have been avoided where possible, with a maximum of 10.62 ha proposed to be impacted. Clearing within this zone is not expected to have a significant impact on

the community, given the large majority of the patch being retained (78% of TEC within the Development Site retained).

Targeted surveys were carried out for *Tumut Grevillea (Grevillea wilkinsonii*) and *Euphrasia arguta*, which are SAII listed species. They were not detected. These two species are considered to not occur within the Development Site. Therefore, no SAII listed threatened species would be impacted and require further assessment.

6.1.4 Mitigation measures

The primary mitigation for the Project is the design of the track and Development Footprint to avoid key biodiversity values. The result for the BESS is an irregular and sub-optimal design but one which would minimise vegetation clearing in better condition areas. This increases both CAPEX and OPEX and isn't ideal from an operations and maintenance perspective but has been purposely adopted as part of an avoid-minimise-mitigate strategy to ensure the Project is approvable, given its proximity to NSW and federally listed entities.

Mitigation measures also include offsets as calculated under the BAM, see below.

Offset requirement

Ecosystem credits were not required impacts to Zone 1 and Zone 2 vegetation (PCT 266) as the Vegetation Integrity (VI) score for the zones are below the threshold required for offsetting.

Species credits are generated by the BAM calculator however, for *Aprasia parapulchella* (Pink-tailed Legless Lizard) and *Tyto novaehollandiae* (Masked Owl).

Table 6-3 Offset requirement for the Project

Species Credit Species	Biodiversity risk weighting	Area of habitat for species	Species credits required	Suitable IBRA Subregion for offset
Aprasia parapulchella **Pink-tailed Legless Lizard**	2	6.92 ha (Veg Zone 2) 3.42 ha (Veg Zone 1)	26	Any in NSW
Tyto novaehollandiae **Masked Owl**	2	1.81 ha (Veg Zone 1) 3.29 ha (Veg Zone 2)	12	Any in NSW

Offsets required under the EPBC Act

The Pink-tailed Legless-lizard has been identified as having the potential to be impacted by the development. This is the only Matter of National Environmental Significance considered relevant to the Project; an EPBC referral is being prepared for the Pink-tailed Legless-lizard.

- If deemed to be a ‘controlled action’ further assessment and EPBC approval would be sought
- If deemed to constitute a significant impact, an offset obligation under the EPBC Act would also be generated;
- For the purpose of assessment and offsets, the NSW Biodiversity Conservation Act’s Biodiversity Assessment Method is endorsed and would be proposed to meet any EPBC Act obligation.

On balance, the biodiversity assessment demonstrates the Project has considered the 'avoid and minimise' biodiversity impacts mandate and the residual impacts are able to be offset. The offset is sufficiently small that development of a Project-specific offset (stewardship) site to meet the obligation is unlikely to be considered practical. The credits could be purchased from the credit market or requisite funds paid directly to the Biodiversity Conservation Trust, as allowed under the NSW *Biodiversity Conservation Act 2016* to meet this obligation.

The key to managing the risks and impacts is in the development of site-specific protocols and manage plans to manage the key risks of clearing and habitat disturbance. With the implementation of the following measures, which form commitments of the Project, the impacts are considered manageable.

Table 6-4 Biodiversity mitigation measures

Mitigation number	Mitigation measure	Project stage
B1	Completion of Biodiversity Management Plan to minimise impacts on biodiversity. The Biodiversity Management Plan needs to include the following: • Hollow-bearing tree protocol (Appendix E) • Pink-tailed Legless Lizard management plan • Masked Owl management plan • Identification of temporary fencing location based on the development footprint. • Unexpected Finds Protocol • Staff training and induction measures which include Maked Owl, Pink-tailed Legless Lizard, Superb Parrot and Grey-headed Flying Fox, Diamond Firetail and Turquoise Parrot. • Management of biodiversity mitigation measures for indirect and prescribed impacts.	Pre-Construction
B2	Timing works to avoid critical life cycle events such as breeding or nursing. • Hollow bearing tree removal should be timed to avoid breeding season for the highest number of species such as Masked Owl. • Rock removal to be completed when Pink-tailed Legless Lizard is not breeding	Pre-clearance surveys prior to construction
B3	Masked Owl management plan • Pre-clearance surveys of HBTs to determine if Masked Owl are breeding on site. • Avoid HBT removal if any Masked Owl breeding on site • Ecologist present during tree removal • Threatened species protocol	Pre-construction
B4	Pink-tailed Legless Lizard management plan • Consultation with the species expert to determine timing for relocation of this species prior to construction • Any proposed relocation undertaken by an appropriately qualified ecologist • Pre-clearance surveys	Sept-Nov Autumn (warmer months)

Mitigation number	Mitigation measure	Project stage
	• Relocation of scattered rocks in the development site from the development footprint by an experienced ecologist • Threatened species protocol for managing individuals if construction occurs when species are likely to be underground • Avoid creation of rock piles. Rocks should be loosely scattered in the development site • Avoid any relocation during breeding season (December - March)	
B5	Pre-clearing protocols • Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed trained spotter catcher during clearing events. • Staged clearing, supervised by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required. • A hollow bearing tree clearing protocol has been included in **Error! Reference source not found.** for the 37 HBTs. T he clearing protocol includes pre-clearance surveys and a protocol for managing fauna during clearing or if any harm or injury may occur but also how to avoid and minimise harm to wildlife.	Construction
B6	Relocation of habitat features (fallen timber, hollow logs and rock) from within the Development Site. • All rock, fallen timber and hollow logs should be relocated outside of the construction area under the supervision of an Ecologist or spotter catcher.	Construction
B7	Staff inductions • Induct all staff prior to construction to identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance.	Prio to and during construction
B8	Clearing protocols • Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed. • Documented clearance protocols to mark and protect vegetation to be retained. • Use handheld machinery where possible and have elevated work platform check hollows prior to tree felling	Pre-construction
B9	Install temporary fencing to protect significant environmental features such as riparian zones. Prior to construction commencing,	Construction

Mitigation number	Mitigation measure	Project stage
	exclusion fences and signage would be installed around habitat to be retained.	
B10	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas. Ensure machinery and equipment as clean and free from pathogens and weeds prior to entering site	Construction
B11	Preparation of a Biodiversity Management Plan (BMP) for the site to include: • How to remove and dispose of vegetation and topsoil containing weeds declared under the Biosecurity Act 2015 during and after construction. • Reporting any occurrences of pathogens such as Myrtle Rust and Phytophthora.	Construction, operation
B12	Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment. An erosion and sediment control plan would be prepared and implemented.	Construction
B13	Use of temporary fencing to protect significant environmental features.	Pre-construction Construction
B14	Introduce speed limits to reduce vehicle strike	Pre-construction Construction

6.2 Aboriginal heritage

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Heritage:

An assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011) and the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010), including results of archaeological test excavations (if required); and

Provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010).

This section summarises the findings of the Aboriginal Cultural Heritage Assessment (ACHA) undertaken by NGH Pty Ltd and is provided in Appendix E.2. The ACHA provides an assessment

of the potential Aboriginal heritage impacts of the Project and the recommended measures to mitigation them. The assessment addresses the SEARs outlined above.

6.2.1 Approach

A specialist ACHA was undertaken by NGH to provide an assessment of the Aboriginal cultural values associated with the Orana BESS and to assess the cultural and scientific significance of any Aboriginal heritage sites recorded. Further, the ACHA assesses the potential impacts to Aboriginal sites and provides management strategies that may mitigate any impacts. The full report is provided in Appendix E.2.

The ACHA report was prepared in line with the following:

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

Consultation with Aboriginal stakeholders was undertaken in accordance with clause 60 of the *National Parks and Wildlife Regulation 2019* following the consultation steps outlined in the ACHCRP. As a result of this process, five Aboriginal groups registered their interest in the Project. These were:

- Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC)
- Thomas Dahlstrom
- Yurwang Gundana Consultancy Cultural Heritage Services (YGCCHS)
- Edgerton Kwiembal Aboriginal Corporation (EKAC)
- Tubba-Gah (maing) Wiradjuri Aboriginal Corporation (TWAC).

No response was received from Wellington Local Aboriginal Land Council (LALC), but they would continue to be included in the consultation as the Project is within the Wellington LALC area.

A copy of the draft ACHA report was provided to Registered Aboriginal Parties (RAPs) for review as well as specifically inviting comment on the results, the significance assessment, and the recommendations. A comprehensive account of the consultation steps undertaken to comply with the ACHCRP, as well as a summary of the actions completed by NGH, and responses received from RAPs are provided in Appendix E.2.

The section below summarises the archaeological context of the site, the archaeological investigation methods and results, potential impacts and required mitigation strategies.

6.2.2 Existing environment

Archaeological context

Cultural areas are difficult to define and “must encompass an area in which the inhabitants have cultural ties, that is, closely related ways of life as reflected in shared meanings, social practices and interactions” (Egloff *et al*. 2005:8). Depending on the culture defining criteria chosen - i.e. which cultural traits and the temporal context (historical or contemporary) - the definition of the spatial boundary may vary. In Australia, Aboriginal “marriage networks, ceremonial interaction and

language have been central to the constitution of regional cultural groupings" with the distribution of language speakers being the main determinate of groupings larger than a foraging band (Egloff et al. 2005, pp. 8 and 16).

Wellington is within an area identified as part of the Wiradjuri language group. This is an assemblage of many small clans and bands speaking a number of similar dialects (Tindale 1974, MacDonald 1983, Horton 1994).

The Aboriginal Heritage Information Management System (AHIMS) is a database of previously recorded Aboriginal heritage sites in NSW. As a starting point, the search would indicate whether any sites are known within or adjacent to the investigation area. A search of the AHIMS database was conducted over an area of approximately 1km^2 centred on Lot 2 DP1226751 on 11 April 2022 (Client ID: 674727). There were 20 Aboriginal sites and no declared Aboriginal Places recorded in the search area. The results of the AHIMS search are shown below in Figure 6-4 and Table 6-5. One site within the search area was mistakenly recorded in a previous survey which has been updated to 'not a site'. The 'not a site' recording (#36-4-0201) is not mapped, and the locations of sites # 36-4-0117 and 36-4-0118 are not mapped due to the wishes of knowledge holders from the local Aboriginal community. Ten sites (artefact scatters and isolated finds) have been destroyed during development of Wellington Solar Farm (under development consent SSD-8573).

Table 6-5 AHIMS site types and frequency within the search area

Site Type	Number	Frequency
Isolated find	9	45%
Artefact scatter	5	25%
Restricted	3	15%
Potential Archaeological Deposit (PAD)*	2	10%
Not a site	1	5%
Total	**20**	**100%**

* Incorrectly registered as PADs; should be Modified Trees.

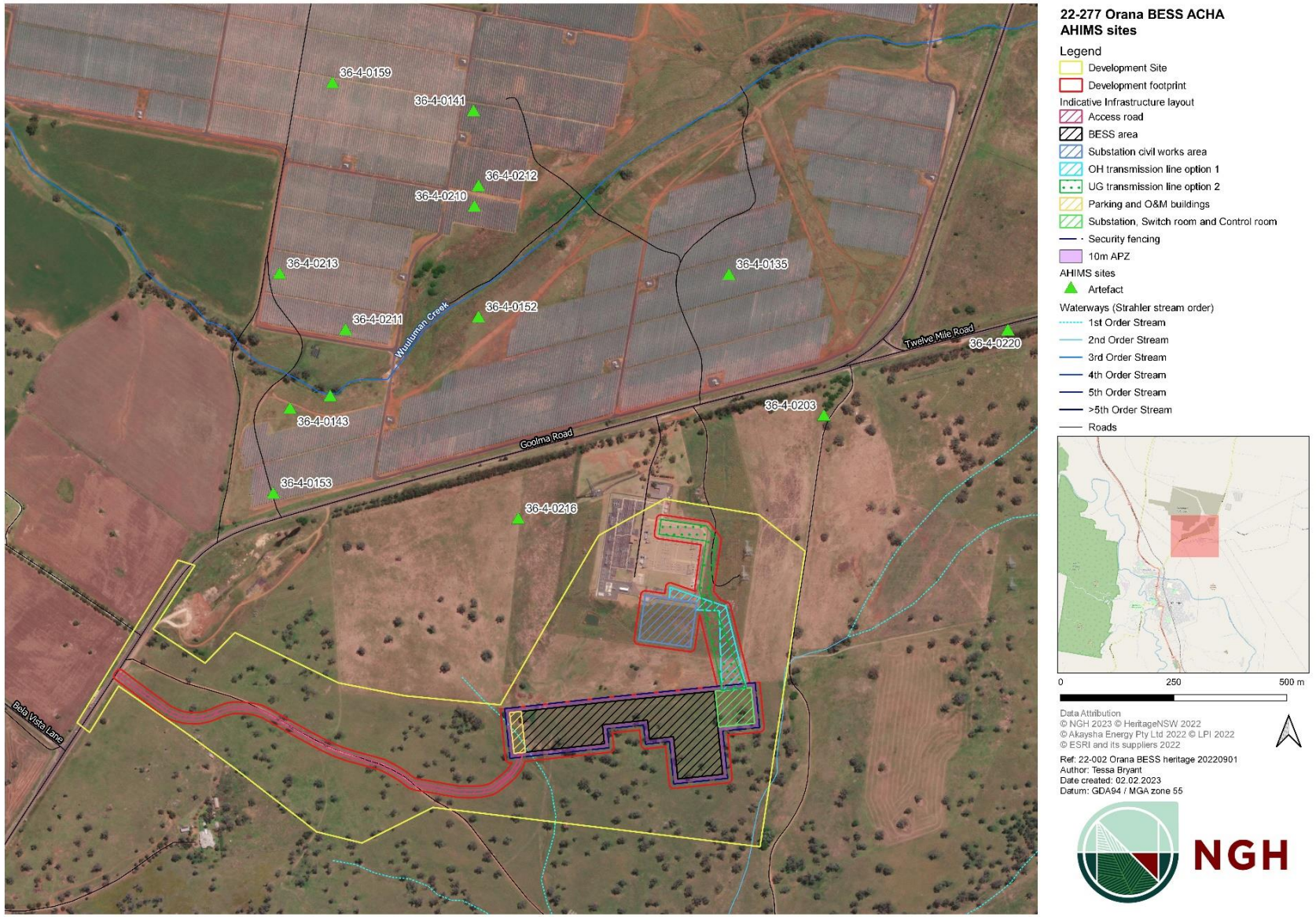


Figure 6-4 AHIMS sites within the search area

There are no sites previously recorded within the Development Footprint. There is one site recorded on AHIMS within the Development Site (#36-4-0117). The location for this site, a culturally modified tree (CMT) that is incorrectly recorded as a PAD on AHIMS, is immediately outside the southern boundary of the Development Site. This location difference is due to the margin of error in site recording using non-differential GPS and the point being recorded outside of the tree canopy to the north of the tree. The tree location was confirmed during the archaeological survey. AHIMS #36-4-0118, the other modified tree incorrectly recorded as a PAD, is approximately 50m south of the Development Site.

Three restricted sites are also located within the search area. NGH has been advised that these sites are also CMT (scarred trees) and have their location restricted. These sites (#36-4-0224, 36-4-0225 and 36-4-0223) are all outside of the Development Site. These trees are adjacent to and up to 100m south of the Development Site. NGH believes that two of these location restricted CMT sites are duplicate recordings of CMT #36-4-0117 and CMT #36-4-0118. These duplicate recordings were likely made due to the error in AHIMS listing sites #36-4-0117 and #36-4-0118 as PAD. Therefore, the five CMT site recordings south of the Development Site reflect three CMTs.

In addition to the CMTs there are two stone artefact sites located within 500m of the Development Site. AHIMS #36-4-0203, an isolated find (chert core), is approximately 300m north of the Development Site and #36-4-0216, also an isolated find, was recorded approximately 180m northwest of the Development Site boundary.

Overall, the main site features present within the search area are stone artefacts and scarred (modified) trees. Stone artefacts, comprising both isolated finds and artefact scatters have been recorded both on the surface and during subsurface excavation. Raw materials of stone artefacts recorded in the area include silcrete, chert, quartz, basalt, volcanic and sandstone. Stone artefact types include flakes, flaked pieces, cores, retouched flakes, manuports and grindstone fragments.

Other heritage register searches were undertaken to identify any heritage items or places adjacent to, or within the Project Area. The desktop searches were undertaken on 12 April 2022 of the relevant heritage registers including the Australian Heritage Database, the NSW State Heritage Inventory (SHI) and Section 170 registers. The Australian Heritage Database includes items on the National and Commonwealth Heritage Lists while the SHI includes items on the State Heritage Register and items listed by state agencies and local government. The Dubbo Regional Local Government Area (LGA) was formed in 2016 following a merger of the Wellington Council and City of Dubbo Council.

The results of the Australian Heritage Database search indicated that:

- There are no sites on the World Heritage List within the former Wellington LGA.
- There is one site on the National Heritage List within the former Wellington LGA, being the Wellington Caves on the Mitchell Highway, which is not near the Development Site.
- There is a single site on the Commonwealth Heritage List within the former Wellington LGA (Wellington Post Office), which is not within or near the Development Site.
- There are 43 sites on the Register of the National Estate (a non-statutory archive) within the former Wellington LGA. None of the sites are located within the Development Site. Nanima Homestead is located to the immediate southwest of the Development Site.

The results of the NSW SHI database search indicated that:

- There are fifteen (15) previously recorded heritage sites listed on the State Heritage Register within the Dubbo Regional LGA. Four sites are in Wellington, but none are located within or adjacent to the Development Site.

- There are 414 previously recorded heritage sites listed on the LEP within the Dubbo Regional LGA, of which, 64 sites are in Wellington. While none are located within or the Development Site there are two adjacent Homesteads located in proximity to the Development Site (Figure 2-5):
    - Nanima Homestead (listing no. I51), the closest part of the curtilage is adjacent to the southwest of the Development Site; and
    - Keston Homestead (listing no. I50) curtilage to the north on the other side of Goolma Road adjacent to potential road upgrade area.

No other known previously recorded heritage sites are located within or adjacent to the Development Site.

Archaeological investigation summary

The survey fieldwork was undertaken by the team over a single day on 24 November 2022. The team consisted of NGH Archaeologist Dr Tessa Bryant, with representatives of Wellington Valley Wiradjuri Aboriginal Corporation and Yurwang Gundana Consultancy Cultural Heritage Services. During the survey, notes were made about visibility, photographs were taken, and any possible Aboriginal objects or features identified were inspected, assessed, and recorded if deemed to be Aboriginal in origin.

It is considered by NGH that the survey of the Development Site during the investigation had sufficient survey coverage. It was discussed with the Aboriginal community representatives that were present for the survey at the beginning of the survey what the planned methodology would be and the representatives agreed with the survey effort during discussions at the end of the survey.

No new Aboriginal sites were identified during the survey. Although ground surface visibility was poor there were exposures across the Development Site that indicated a generally shallow topsoil, with bedrock outcropping across both low crests and slopes. The majority of the Development Site consisted of sloping ground with no elevated flat areas adjacent to the first order tributaries that had higher potential to contain Aboriginal archaeological deposits. Based on the topography, generally shallow soils and the known archaeology from the local area there is a low potential for subsurface Aboriginal archaeological deposits.

6.2.3 Potential impacts

The proposed development and associated construction activities would require the use of heavy machinery and would cause significant ground disturbance. Any Aboriginal heritage objects that are within this footprint would therefore likely be totally impacted. One previously recorded CMT located is approximately 150 m from any of the infrastructure components within the proposed Development Footprint and can be protected by delineating it as an ‘avoidance area’.

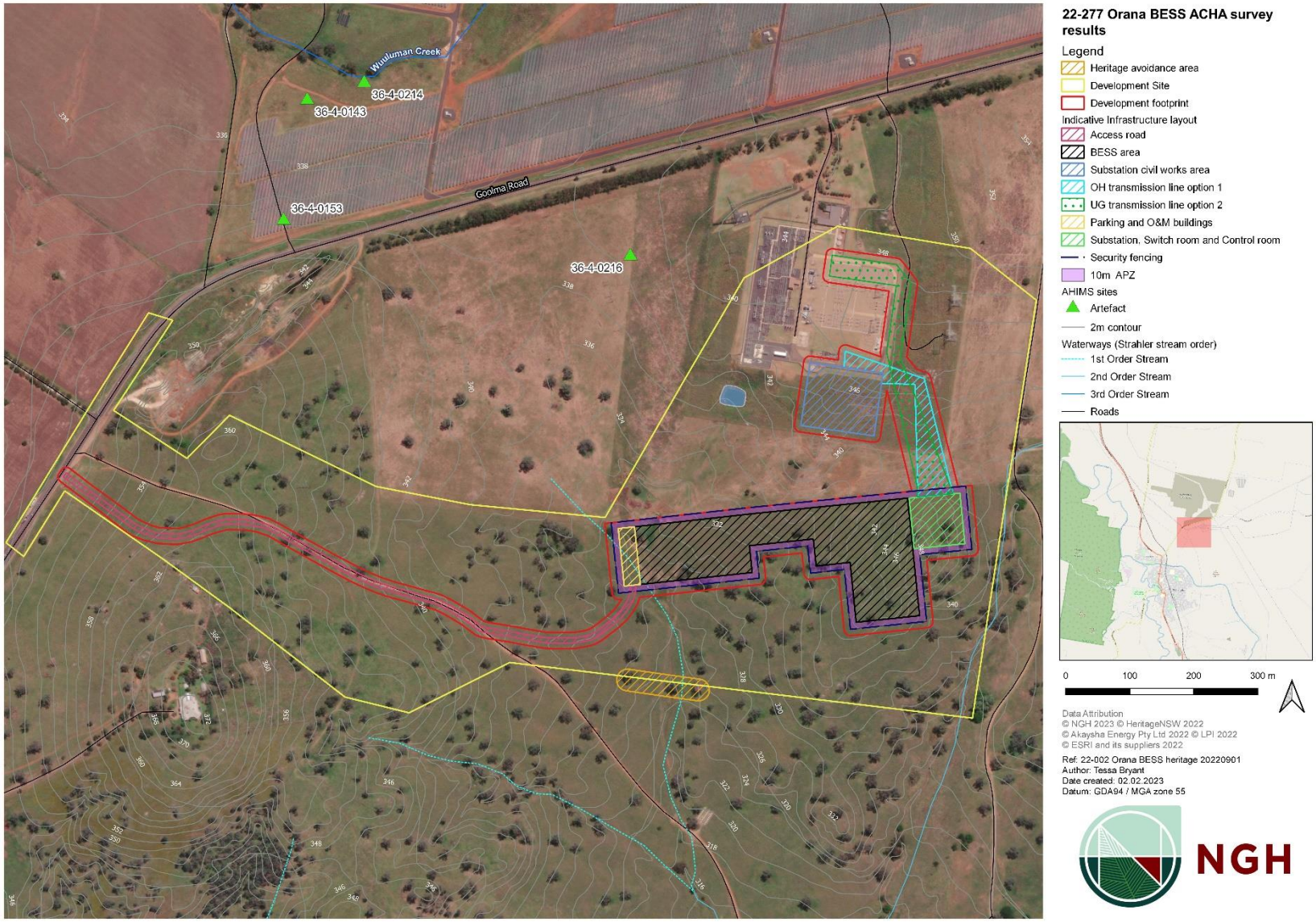


Figure 6-5 Heritage restraints – avoidance area in southern part of Development Site to ensure no impacts to adjoining CMT

Overall, there is considered that there is a low potential for surface or subsurface stone artefacts to be present or to be harmed by the Project. Further, there are no known specific values, scientific, social or cultural, aesthetic or historic within the Development Site that would be impacted by the Project.

Unexpected finds

All Aboriginal heritage objects are protected under the NPW Act Under Part 6 of the Act, though in a State Significant Development (SSD) Development Consent may be issued that allows for conditional harm to Aboriginal objects. However, there are some circumstances where despite undertaking appropriate heritage assessment prior to the commencement of works Aboriginal cultural heritage items are encountered that were not anticipated that may be of scientific and/or cultural significance. Therefore, it is possible that unexpected heritage items may be identified during construction, operation, and maintenance works. If an unexpected find of an Aboriginal object and remains are discovered during construction then an Unexpected Finds Protocol would be followed. The protocol is detailed in the ACHA and includes a procedure for Unexpected human skeletal remains and for unexpected Aboriginal objects (Appendix E.2).

6.2.4 Mitigation measures

Safeguards and mitigation measures relating to Aboriginal heritage are provided in Table 6-6.

Table 6-6 Aboriginal heritage mitigation measures

Mitigation number	Mitigation measure	Project stage
AH1	Works must not impact the CMT sites to the south of the Development Site. If works are to extend outside of the indicative Development Footprint in close proximity to the modified trees (AHIMS#36-4-0117, 36-4-0118, 36-4-0223, 36-4-0224 and 36-4-0225) then a “no-go zone” with a 10 m buffer within the Development Site should be established to ensure there are no inadvertent impacts to these CMTs (see area in Figure 11-1 of the ACHA). The “no go zone” fence should be hi-visibility mesh and be in place for the duration of the construction.	Design Construction Operation Decommissioning
AH2	Aboriginal heritage will be included within the Construction Environment Management Plan (CEMP) or equivalent for the Project. This will include an unexpected finds protocol and will include an onsite induction and be developed in consultation with the RAPs for the Project. Site personnel will be advised that there are registered Aboriginal heritage sites within the vicinity of the Development Site and ground disturbance is not allowed outside of the approved areas.	Construction
AH3	In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity and follow the protocol provided in Appendix B of the ACHA.	Construction

Mitigation number	Mitigation measure	Project stage
	Heritage NSW and the police should be notified. Further assessment shall be undertaken to determine if the remains were Aboriginal or non-Aboriginal.	
AH4	Further archaeological assessment will be required if the proposal activity extends beyond the area of the current investigation. This will include consultation with the RAPs and may include further field survey.	Pre-construction Construction
AH5	Consultation with the RAPs for the Project will be maintained through the approvals process and post-approval construction.	Pre-construction Construction
AH6	A copy of the final ACHA will be lodged with AHIMS and provided to each of the RAPs for their records.	Pre-construction

6.3 Access and traffic

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Transport:

An assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport of materials by rail;

An assessment of the likely transport impacts to the site access route, site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance;

A cumulative impact assessment of traffic from nearby developments; and

Provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority;

6.3.1 Approach

Amber Pty Ltd were contracted to undertake the Traffic Impact Assessment (TIA) included in Appendix E.3. The TIA sources desktop traffic information to understand the current traffic environment. Predicted traffic volumes estimated by the Applicant are then modelled to assess whether any upgrades or other safety measures are required to be implemented as part of the Project. It includes a:

- Traffic assessment
- Route assessment
- Cumulative assessment
- Intersection assessment.

A copy of the TIA was provided to the roads' authority of Goolma Road, Transport for NSW. The TIA was updated to address the agency's additional information requests (refer to Section 5.3.2). It is noted that the traffic and access assumptions provided to Amber by the Applicant are clearly stated in the TIA but cannot be known with a high level of accuracy at this time. They should be considered the Applicant's best approximation. The traffic assessment has applied a cautionary approach understanding this uncertainty.

The TIA also responds directly to advice received from TfNSW in March 2023

6.3.2 Existing environment

Road formation

The site is located on the south-eastern side of Goolma Road approximately 2km northeast of Wellington. The site has good access to the State Road network via Goolma Road and Mitchell Highway which link with nearby regional towns.

Goolma Road is a State Road under the care and management of Transport for NSW. It runs in a general northeast-southwest alignment between Castlereagh Highway in Gulgong and Mitchell

Highway in Wellington. It has a sealed carriageway width of approximately 7 metres which accommodates one lane of traffic in each direction, and it has a speed limit of 100km/hr at the site frontage.

Existing access to the Development Site is via a farm gate and an unsealed entrance directly from Goolma Road. The existing access to the site services properties on the landowners lots.

Existing traffic volumes

Amber commissioned a traffic count on Goolma Road at the site frontage in order to determine the existing road environment. The count was undertaken from Monday 12 September to Monday 19 September 2022. The results are summarised below in Table 6-7.

Table 6-7 Goolma Road traffic volumes

Direction of travel	Traffic Volumes (vpd)	Weekday AM (vph)	Weekday PM (vph)	85th Percentile Speed	Heavy Vehicle Percentage
Northbound	1,212	165	87	94.1km/hr	16%
Southbound	1,189	58	167	96.5km/hr	
Both Directions	2,401	223	255	95.3km/hr	

The traffic volumes for Goolma Road for each hour have been separated into north and southbound movements and are shown in Figure 6-6.

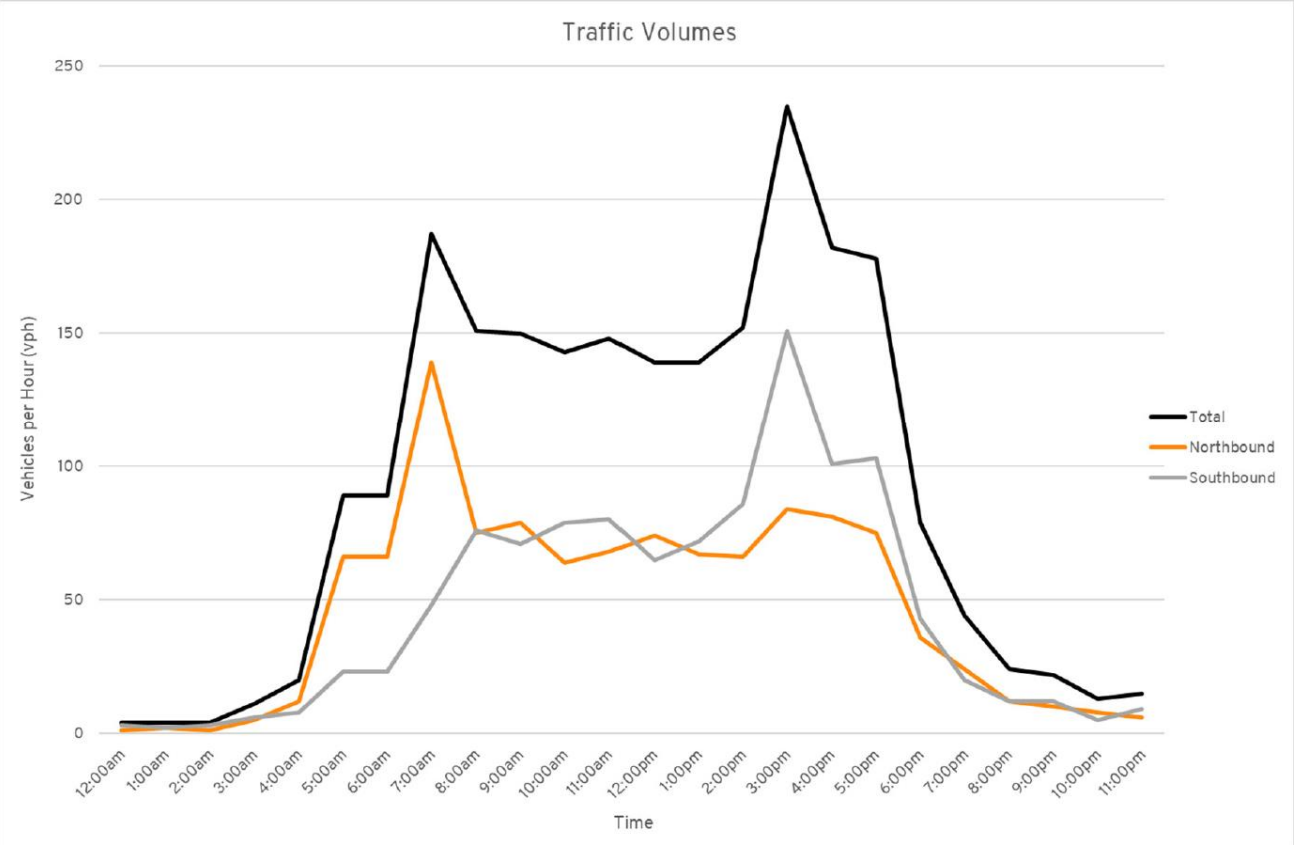


Figure 6-6 Goolma Road Traffic Volume Data

The survey data indicates Goolma Road currently experiences:

- Most traffic movements between the hours of 7:00am and 5:00pm
- Pronounced morning and evening peaks (northbound and then southbound, respectively).

Overall, the survey data suggests that Goolma Road currently accommodates a moderate level of traffic.

No public transport services operate within the vicinity of the site. However, two school bus routes operate along Goolma Road.

Restricted vehicle access

The TfNSW Restricted Vehicle Access Map for the surrounding area is shown in Figure 6-7. The green lines indicate approved B-Double routes while the black lines represent approved routes with travel conditions. As the figure shows, Goolma Road and the Michell Highway are B-Double approved routes.

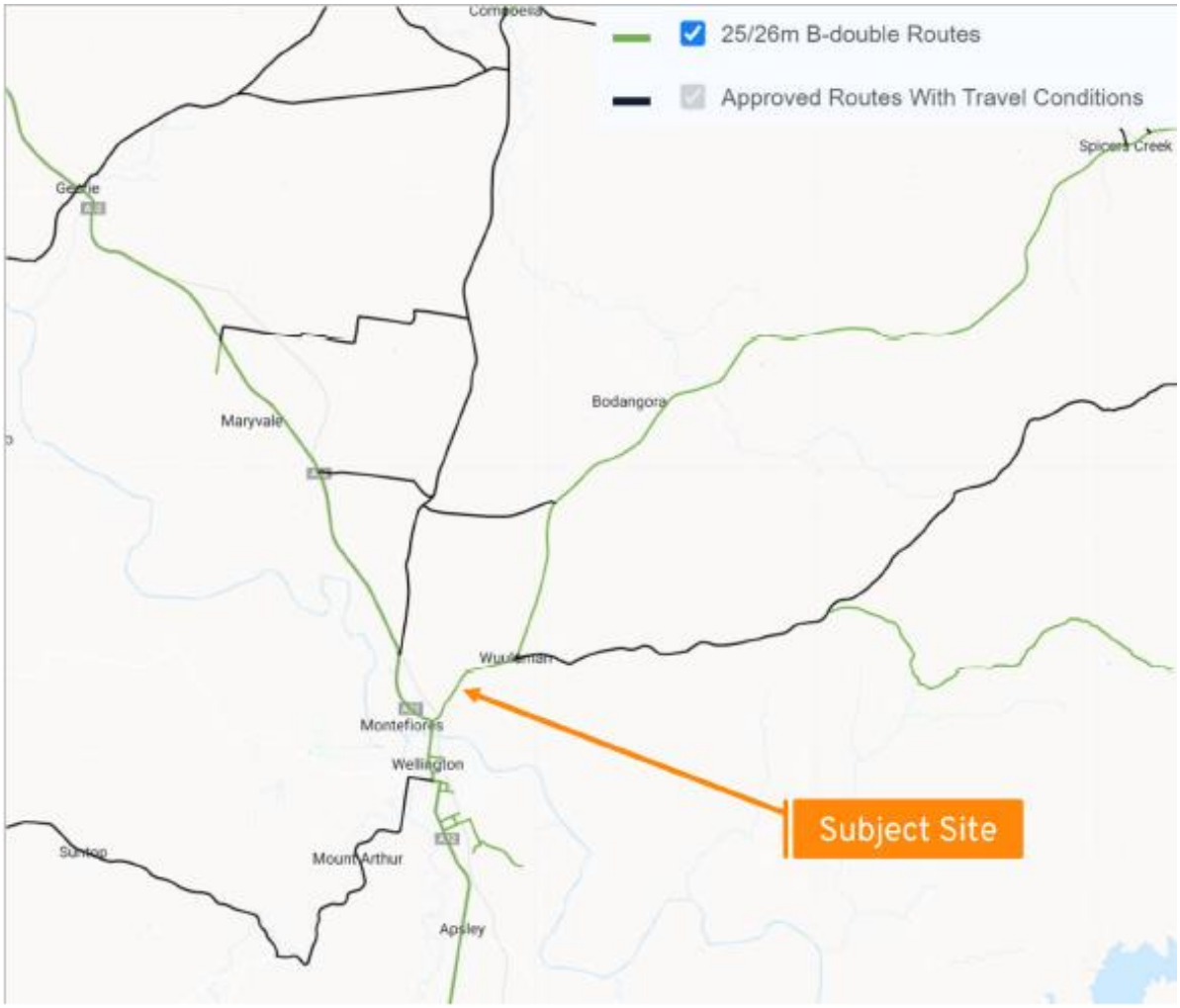


Figure 6-7 TfNSW Restricted Access Vehicle Map

Crash history

The TIA conducted a review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all injury crashes within 1km of the site access. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2016 to 2020. The crash search recorded no crashes and as such, it is concluded that the road network is currently operating in a relatively safe manner.

6.3.3 Potential impacts

Impacts of the Project on local traffic could include:

- Damage to the road assets, if infrastructure is not sufficient to support the projected loads and increased traffic
- Delays or increased risks to users of Goolma Road, due to increased traffic.

Impacts are most relevant to construction when traffic volumes and loads would be highest. Operational traffic impacts include a very minimal increase in traffic volumes but are also considered where relevant below.

Construction

Traffic assessment

Increased traffic generation

Construction traffic generated by the BESS can broadly be separated into the following three categories:

- Light vehicles associated with staff accessing the site, including shuttle buses that would be provided that can transport staff to/from the site reducing the need for private vehicle use.

Heavy vehicles which include the following:

- Medium and Heavy Rigid Trucks
- Truck and Dog vehicles would be used to transport earthwork material to and from site
- Articulated Vehicles and 26 metre long B-Doubles would be used to transport larger plant.

Six Oversized and overmass (OSOM) vehicles would be required for the delivery of larger components such as the transformer, site office buildings, and earthmoving machinery. Anticipated traffic movements are summarised in Section 3.3.3.

Traffic distribution

Traffic accessing the site would do so via the existing site access to Goolma Road. Staff would primarily be located in be located in Wellington and Dubbo and the nearby regional centres, with all plant expected to be delivered from Port of Newcastle. The following provides a breakdown of the anticipated access distribution for each of the vehicle classifications outlined within Section 3.3.3:

- Light Vehicles and Shuttle Buses: It is anticipated that 95% of staff would access the site from the south and 5% would access the site from the north.
- Heavy Vehicles: It is anticipated that vehicle movements on the road network will be distributed evenly between north and southbound movements. Heavy vehicles accessing the site from the chosen delivery port would enter from the north, and vehicles associated with the delivery and collection of equipment and materials would predominantly enter the site from the south.

During the morning peak all vehicle movements would be towards the site and in the evening peak all vehicle movements would be away from the site. Heavy vehicle movements would be distributed throughout the day and would be split evenly between inbound and outbound movements.

The peak hour for construction would occur at the start and end of the day when staff are transported to/from the site. The majority of staff would typically arrive on-site between 6:00am and 7:00am. However, staff generally have staggered finish times which results in the evening peak hour being less pronounced. For the purposes of this assessment, it has been assumed that all staff depart between 5:00pm and 6:00pm and the evening peak traffic volumes is 80% of the morning peak volume.

The subsequent traffic volumes at the site access during the morning and evening peak hour are provided within Figure 6-8.

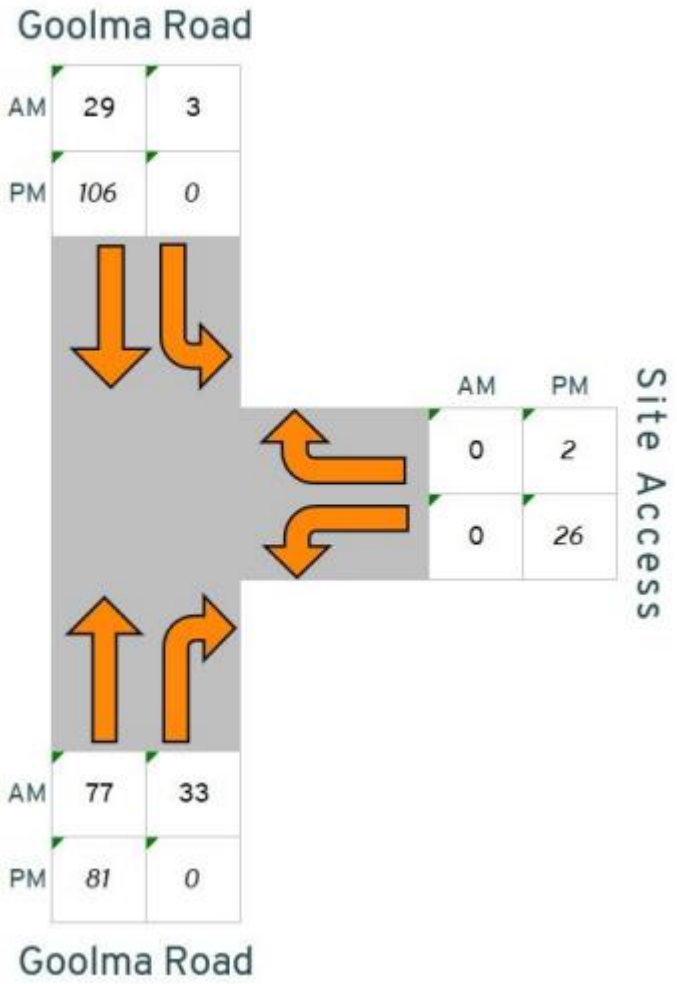


Figure 6-8 Expected Peak Hour Traffic Volumes at Site Access During Peak Construction

Level of Service at the Goolma Road and site access point

Level of Service is a qualitative measure used to describe the operating conditions of a section of road or an intersection. Levels of Service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) and represent the perception of the road conditions by motorists including speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

The RTA *Guide to Traffic Generating Developments* (October 2002) (RTA Guide), suggests that ideally rural roads should not exceed service volumes at Level of Service C. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays are experienced (RTA, 2002). Table 4.5 of the RTA Guide sets out two-way hourly road capacities for two-lane roads for different levels of service with a design speed of 100 km/hr based on different terrain types. The traffic volumes expected to be accommodated on the surrounding road network during the peak hour are shown within Table 6-8.

Table 6-8 Expected peak hour traffic volumes during construction

Road	AM Peak (6:00am)			PM Peak (5:00pm)		
	Existing Volume (vph)	*Expected Volume (vph)*	Level of service	Existing Volume (vph)	*Expected Volume (vph)*	Level of service
Goolma Road	106	139	A	187	213	A

Therefore, during the peak hours of the solar farm construction, the Great Western Highway would accommodate approximately 213 vehicles per hour during peak construction, which is well within the capacity of the road network and the road is expected to continue to operate with a good level of service based on Table 4.5 of the RTA Guide.

During the middle of the day the traffic movements are expected to be predominantly associated with heavy vehicles with approximately 6-8 vehicle movements per hour. This increase in traffic can be readily accommodated on the road network.

Accordingly, the road network is able to readily accommodate the traffic generated by the development during the construction and operation periods.

Cumulative traffic impacts

The BESS is proposed to be constructed in two stages with each stage expected to take 6 - 9 months. Stage 1 is expected to start in Q3 2024 and Stage 2 is expected to start in Q1 2025 with the stages not expected to overlap. The assessment outlined earlier demonstrates that the road network would continue to operate with ample spare capacity even during the peak construction period of the BESS.

A review has been undertaken for the major projects within the vicinity of the site which indicates there is the potential for a number of projects to overlap, particularly from other renewable projects which are outlined below:

- Wellington South BESS is located 300 metres east of the site and is not yet approved
- Uungula Wind Farm is located 18km east of the site and is not yet approved
- Aspley BESS is located 12km south of the site and is not yet approved
- Wellington North Solar Farm is located 4.5km north of the site with construction understood to have commenced July 2022
- Wellington Solar Farm is located north of the site and has completed construction.

The Uungula Wind Farm and Wellington South BESS projects have the potential for overlapping construction periods. The traffic information for both projects has been assessed in the TIA. If construction overlaps with the Project, it is expected Wellington South BESS would generate about 78 back and forth vehicle trips in the morning and afternoon peaks and Uungula Wind Farm would generate about 111 back and forth vehicle trips. The cumulative traffic impacts are re-calculated below in Figure 6-9 and Table 6-9.

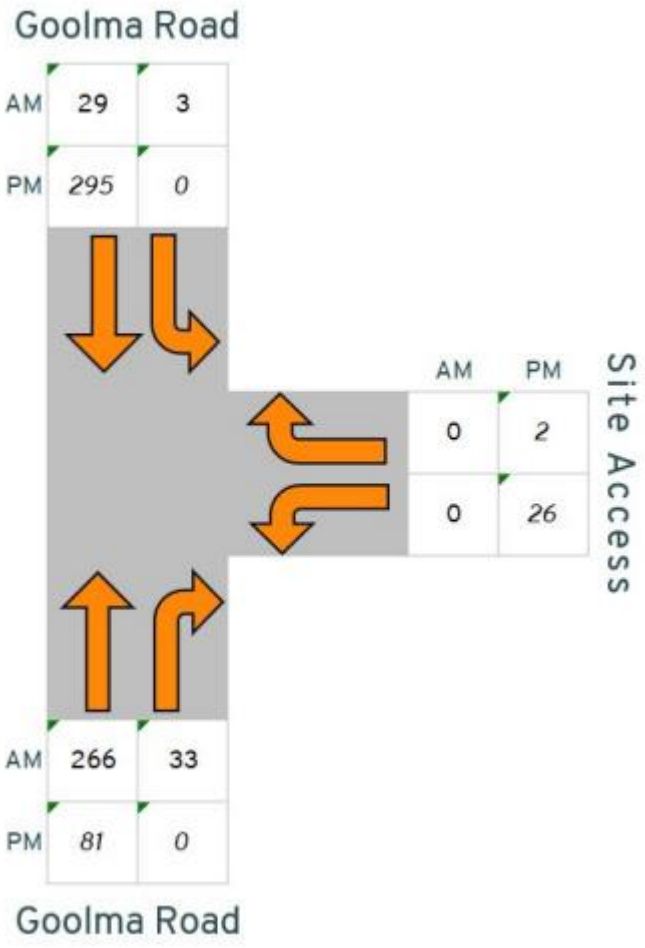


Figure 6-9 Traffic Volumes at Site Access During Peak Construction Including Cumulative Volumes

Table 6-9 Expected Peak Hour Traffic Volumes During Construction with Cumulative Volumes

Road	AM Peak (6:00am)		PM Peak (5:00pm)	
	Expected Volume (vph)	Level of Service	Expected Volume (vph)	Level of Service
Goolma Road	328	A	402	A

Therefore, in the event the construction periods overlapped the road network is expected to continue to operate with a good level of service.

Accordingly, the combined increase in traffic generated by the site and these projects is expected to have a minimal cumulative impact on the road network in the surrounding area.

Plant delivery

B-Double movements would travel via the haulage route identified in Section 3.3.3 and TIA (Appendix E.3). OSOM vehicles would be subject to separate permit applications and regulations and the relevant permits would be applied for as part of the preparation of the Construction Traffic Management Plan.

The Project is expected to generate six OSOM deliveries (12 vehicle movements) during construction. The vehicles would include, but not be limited to, the following deliveries:

- Transformer
- Substation
- Switch room
- Site office
- Larger construction machinery.

The largest component to be delivered to the site is expected to be the transformer. The Applicant has advised that the exact transformer model has yet to be determined and as such a transport company is unable to be approached to confirm the configuration of the delivery vehicle. The transformer model would be confirmed following development consent approval.

A review of the nearby renewable energy projects indicates that the access route has been utilised by other projects in the area such as the Bodangora Wind Farm, Wellington Solar Farm, and Wellington North Solar Farm. Further, the access route from Port of Newcastle is regularly used by renewable energy projects.

Given the route utilises the State Road network and has been adopted by other projects it is concluded that the route is able to be utilised by OSOM vehicles associated with the Project with permits to be applied for as part of the CTMP.

Intersection assessment

Turn treatments

Austroad's *Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings* specifies the turning treatments required at intersections (Austroads, 2020). Figure 3.25 of the guide (reproduced below as Figure 6-10) specifies the required turn treatments on the major road at unsignalised intersections.

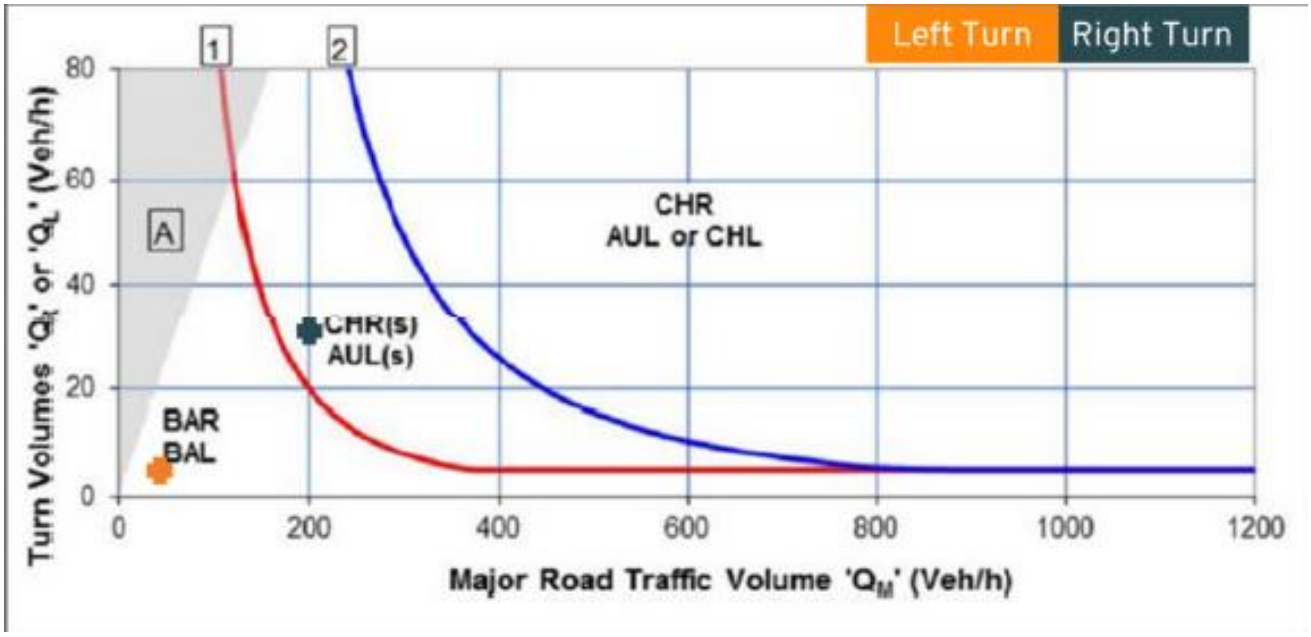


Figure 6-10 Required turn treatments on the major road at unsignalised intersections

BAL *Basic Left Turn*
BAR *Basic Right Turn*
CHR *Channelised Right Turn*

CHL Channelised Left Turn.

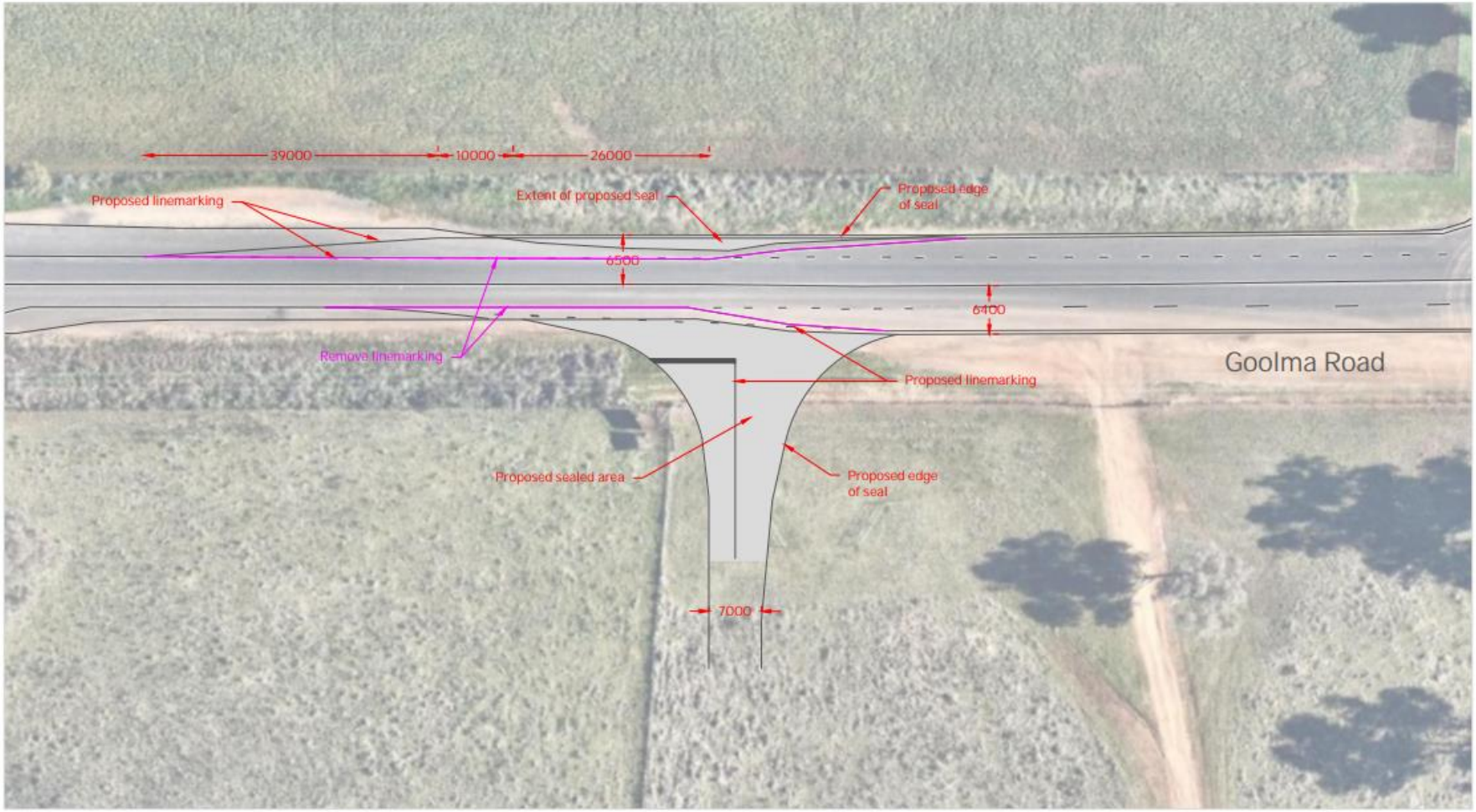
During construction of the solar farm, additional vehicle movements would be generated at the intersection of site access and Goolma Road. The requirement to provide turn facilities is primarily generated during the morning peak hour when staff access the site which occurs from 6am to 7am. Table 6-10 identifies the required turning treatments based on the expected traffic volumes at the intersection.

Table 6-10 Turning volumes for turn treatment calculations

Turning treatment	Traffic volume (vph)		Requirement
	Turn volume	Major road	
Right Turn	31	109	BAR
Left Turn	5	58	BAL

The intersection would require a Basic Left Turn (BAL) and a Basic Right Turn (BAR) treatment. The design for the intersection is provided in Figure 6-11.

The proposed access design is concluded to be acceptable and is considered to meet the intent of the Austroads Guidelines.



The following design details have been taken from Austroads Guide to Road Design Part 4A:

Rural Basic Right-turn Treatment (BAR) Section 7.5.1.
1: Design speed of 100km/h.
2: Lane widths of 3.7m have been used.
3: Formation/carriageway widening is 2.8m.
4: Taper lengths calculate to 39m.
5: Storage length is 26m for one 26m design vehicle.

Rural Left-turn Treatment (BAL) Section 8.2.1.
1: Design speed of 100km/h.
2: Lane widths of 3.7m have been used.
3: Formation/carriageway widening is 2.3m.
4: Taper length calculates to 32m.
5: Minimum length of parallel widened shoulder used from Table 8.1 is 25m.

Orana Battery Energy Storage System
6945 Goolma Road, Wuuluman
Proposed Access Design/Amendments

DRAWN: MW
DATE: 04/10/2022
DWG NO: 370-S01A
SCALE at A3: 1:500

Amber 02

Figure 6-11 Proposed access design

Sight distance

Where Goolma Road intersects the site access point the 85th percentile of vehicle speeds is 95km/hr. Using this speed the safe sight distance is 217m, this is determined using the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads , 2021).

Accordingly, the adopted operating speed is 95km/hr which is based on the 85th percentile speed recorded as part of the tube count survey presented in the TIA. The subsequent SISD requirement is 214 metres based on a reaction time of 1.5 seconds. It is noted that there is a minor downward grade from the northeast which equates to less than 2%. The required correction of the SISD in Table 4.2 of the Austroads Guide is 5-6 metres.

In order to confirm the available sight distance at the access, a site visit was undertaken which identified the available sight distance is 224 metres to the northeast and 300+ metres to the southwest. As such, the available SISD exceeds the requirement by 4-5 metres to the northeast and greatly exceeds the requirement to the southwest. Therefore, the sight distance at the access complies with the requirements of the Austroads Guide and vehicles are expected to be able to safely exit the site.

Operational traffic

During operation the BESS is expected to generate a minimal level of traffic associated with maintenance and operation services. The BESS is expected to be operated by up to six full time staff, however, most operations would be undertaken remotely. Standard operational traffic would be minimal and limited to light vehicle movements which would not add additional strain to the local road network.

It is expected that batteries and transformers would need to be replaced at least once during the operational life of the Project. An Operational Traffic Management Plan would be prepared prior to any additional bulk material deliveries during operation. This plan would be complied in consultation with the relevant road authority and consider any changes in the road network to ensure additional movements can be undertaken safely.

Decommissioning traffic

At the end of the operational life of the Project all above ground infrastructure would be dismantled and removed from the Development Footprint. Internal roads, if not required for ongoing farming purposes or fire access, would be removed and the site reinstated as close as possible to its original state. Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A Decommissioning Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

6.3.4 Mitigation measures

The traffic assessment has demonstrated the network is able to accommodate the traffic generated by the development during the construction, operation and decommissioning stages.

The vehicles are subject to specific road permits such as OSOM vehicles that would be applied for by the contractor once the dimensions of the load and the specific delivery vehicle are known.

A new site access has been designed to allow two B-Double vehicles to pass. No further road upgrades are required to manage impacts on the road assets or road safety.

The key to managing the residual risks of the Project centre on the development and implementation of a Construction Traffic Management Plan, as set out below.

Table 6-11 Traffic and transport mitigation measures

Mitigation number	Mitigation measure	Project stage

T1	A Construction Traffic Management Plan (CTMP) will be prepared and implemented. The CTMP will include additional information not available at this stage in the planning process including:
	• Road transport volumes, distribution and vehicle types broken down into:
	  ○ Hours and days of construction
	  ○ Schedule for phasing/staging of the Project.
	• The origin, destination and routes for:
	  ○ Employee and contractor light traffic
	  ○ Heavy vehicle traffic
	  ○ Oversize and overmass traffic.
	Specific mitigation measures that will be implemented and included in the CTMP are as follows:
	• OSOM movements will be defined by further route assessment. If substantial road upgrade is required due to excessive OSOM size requirements, the Applicant would select smaller plant
	• Ensure that 80% of the construction workforce travel to the site via shuttle bus
	• Neighbours, stakeholders and major projects nearby the of the BESS will be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access
	• All heavy vehicle movements are recommended to occur outside of school times when school buses are expected on Goolma Road
	• Loading and unloading will occur within the Development Footprint. No street or roads will be used for material storage at any time
	• All vehicles will enter and exit the site in a forward direction
	• The following code is to be implemented as a measure to maintain safety within the site:
	  ○ Utilisation of only the designated transport routes
	  ○ Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities.
	• Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas
	• All permits for working within the road reserve must be received from the relevant authority prior to works commencing
	• A map of the primary haulage routes highlighting critical locations
	• An induction process for vehicle operators and regular toolbox meetings
		Construction

Mitigation number	Mitigation measure	Project stage
	• A complaint resolution and disciplinary procedure • Local climatic conditions that may impact road safety of employees throughout all Project phases (e.g. fog, wet and significant dry, dusty weather) • Any construction outside of normal working hours would only be undertaken with prior approval from relevant authorities.	
T2	An Operational Traffic Management Plan will be implemented in consultation with the relevant roads authority prior to any additional major material deliveries requiring large vehicle movements during operation.	Operation
T3	A Decommissioning Traffic Management Plan will be implemented in consultation with the relevant roads authority prior to decommissioning of the Project.	Decommission

6.4 Hazards – Preliminary Hazards Assessment

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Hazards:

A preliminary risk screening completed in accordance with the State Environmental Planning Policy (Resilience and Hazards) 2021.

A Preliminary Hazard Analysis (PHA) must be prepared in accordance with the Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-Level Risk Assessment (DoP, 2011). The PHA must:

- **Consider all recent standards and codes; and**
- **Verify that the area designated for the BESS, and separation distances to on-site and off-site receptors and between BESS sub-units, is sufficient to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning (DoP, 2011); and**
- **An assessment of potential hazards and risks including but not limited to bushfires, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields;**

A Preliminary Hazard Analysis (PHA) was prepared by Sherpa Consulting (refer Appendix E.4). It was completed to identify the hazards and assess the risks associated with the Project and details measures which, when implemented, would reduce these hazards and risks to acceptable levels. The scope of the PHA considered the proposed infrastructure associated with the Project including battery enclosures and electrical conversion systems (e.g. inverters and transformers), the on-site substation, transmission line connection infrastructure, an operations and management (O&M)

building, and ancillary infrastructure. The PHA was focused on the risk to surrounding land uses (off-site impacts) and assesses if the development is appropriate for the location based on potential impact to sensitive receptors (i.e. Non-associated Receivers).

In addition, the risks of bushfire and electric and magnetic fields (EMFs) was assessed (only within this chapter below; no appended assessment).

6.4.1 Preliminary risk screening

The objective of the preliminary risk screening was to determine whether the Project is considered as 'potentially hazardous industry' in the context of SEPP Resilience and Hazards. In this content, this effectively means a development which, if it were to operate without employing any measures to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk to the locality in terms of human health, life, or property, or to the biophysical environment.

To determine whether the Project is potentially hazardous, the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (DoP, 2011) (Hazardous and Offensive Development Guideline) was used to undertake the risk screening process. The risk screening process considers the type and quantity of hazardous materials to be stored on site, distance of the storage area to the nearest site boundary, as well as the expected number of transport movements. The PHA includes a summary of these matters as well as the relevant SEPP screening threshold.

Further, the Hazardous and Offensive Development Guideline outlines other risk factors for consideration to identify hazards outside the scope of the risk screening method. The PHA notes that a review of these risk factors was completed and that the Project would not involve any.

Overall, the preliminary risk screening found that the Project is not considered as 'potentially hazardous industry' and does not require a PHA. The main findings are summarised as follows:

- The storage and transport of hazardous materials for the Project would not exceed the relevant risk screening threshold.
- There are no other risk factors identified that could result in significant off-site impacts.
- The Project is not considered as 'potentially hazardous' with respect to DG storage and transportation and does not require a PHA.

6.4.2 Preliminary hazard analysis

Notwithstanding the outcome of the preliminary risk screening, the SEARs require (1) a PHA and (2) an assessment of potential hazards and risks. To address these requirements, a PHA was completed following the methodology specified in HIPAP 6, which is focused on off-site impacts and includes the following steps:

1. Establishment of the study context.
2. Identification of hazards resulting from the Project operations and events with the potential for off-site impact *(Hazard Identification)*.
3. Analysis of the severity of the consequences for the identified events with off-site impact, e.g. fires and explosions *(Consequence Analysis)*.
4. Determination of the level of analysis and risk assessment criteria.
5. Analysis of the risk of the identified events with off-site impact (*Risk Analysis*).

6. Assessment of the estimated risks from identified events against risk criteria to determine acceptability (*Risk Assessment)*.

The PHA assessed the events associated with proposed operation of the BESS (i.e. excluding construction) and is focused on the risk to surrounding land uses (i.e. off-site impacts) to assess if the Project is appropriate for the location. The Development Footprint boundary was used to define and determine off-site impact based on potential to impact sensitive receptors (i.e. Non-associated Receivers).

The Multi-level Risk Assessment Guideline sets out three levels of risk analysis that may be appropriate for a land use safety planning assessment and was consulted to determine the level of analysis required for the PHA.

Hazard identification

Hazard Identification (HAZID) aims to identify all reasonably foreseeable hazards and associated events that may arise due to the operation of the facilities and defining the relevant controls through a systematic and structured approach. The identified hazards, events, applicable infrastructure and the relationships with causes, consequences and controls are summarised in the HAZID register that is contained at Table 6.3 of the PHA (Appendix E.4). In short, the findings are as follows:

- A total of 12 hazardous events were identified, with none assessed to have a significant off-site impact due to their consequences and controls.
- The proposed BESS is located approximately 12m from the northern lot boundary; this area would be managed as an asset protection zone. Some hazardous events (i.e. fires) may extend beyond this boundary (i.e. off-site impact in the context of HIPAP 6). However, the consequences from these events are not expected to result in significant off-site impacts (serious injury and/or fatality to the public or off-site population) as:
    - The BESS would be situated in a rural area.
    - The nearest Non-associated Receiver is located approximately 680 m from the proposed BESS (R1).

6.4.3 Electric and magnetic fields

Electric and magnetic fields (EMF) are naturally present in the environment. They are present in the earth's atmosphere as electric fields, while static magnetic fields are created by the earth's core. EMF are also produced wherever electricity or electrical equipment is in use, meaning people are exposed to them as part of daily life.

Various studies have been conducted to determine the effects of EMF exposure. There are well-established acute effects on the nervous system due to exposure to high levels of EMF. Other studies have been conducted to understand the effects of long-term exposure to EMF, including to increased rates of childhood leukemia. Based largely on limited evidence, the International Agency for Research on Cancer has classified EMF as 'possibly carcinogenic to humans'. However, the ICNIRP views that the current existing scientific evidence is too weak to ascertain a causal relationship that prolonged exposure to EMF is related with increased risk of childhood leukemia. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is a federal government agency assigned with the responsibility for protecting the health and safety of people and the environment from EMF. ARPANSA advises that *"The scientific evidence does not establish*

that exposure to [EMF] found around the home, the office or near powerlines and other electrical sources is a hazard to human health".

Although adverse health impacts have not been established, the possibility of impact due to exposure to EMF cannot be ruled out. As part of a precautionary approach, the PHA assesses the typical exposure levels to EMF for the Project. In this respect, the ICNIRP has produced a publication to establish guidelines for limiting EMF exposure to assist in providing protection against adverse health effects. The PHA outlines the EMFs associated with the different components of the Project as well as controls to limit exposure to EMF.

Conclusion

The PHA concludes that:

- EMF created from the Project would not exceed the ICNIRP occupational exposure reference level.
- As the strengths of EMF attenuate rapidly with distance, the ICNIRP reference level for exposure to the general public would not be exceeded and impact to the general public in surrounding land uses would be negligible.
- For the risk assessment, consequence from exposure to EMF was assumed to result in no or minor injury ('Insignificant').

6.4.4 BESS separation distances

As per the SEARs, the PHA includes a requirement to *'consider all recent standards and codes'* and *'demonstrate that the separation distances between the BESS to onsite or off-site receptors and the separation distances between BESS sub-units prevent fire propagation'*. Specifically, the Applicant must demonstrate that the proposed BESS capacity would be able to fit within the land area designated for the BESS accounting for separation distances between the:

- BESS sub-units (racks, modules, enclosures, etc.), to ensure that a fire from a sub-unit does not propagate to neighbouring sub-units.
- The overall BESS and other onsite or off-site receptors.

This section of the PHA addresses:

- Review of separation distances/clearances provided between the BESS sub-units against applicable codes and standards and manufacturer specification.
- Verification that the required land area for the proposed BESS capacity would fit within the land area designated for the BESS.
- Review of separation distances between the BESS and onsite and off-site receptors.

Separation distances between BESS sub-units

The National Fire Protection Agency (NFPA) 855 *Standard for the Installation of Stationary Energy Storage Systems* is widely viewed as the most comprehensive set of best practice guide in the industry. A review of NFPA 855 was undertaken to determine the required separation distances between the BESS units. NFPA 855 specifies the default maximum allowable energy storage and minimum separation between units and walls. However, NFPA 855 also specifies that the BESS may be installed in units with larger energy storage or smaller separation if they meet the fire and explosion testing in accordance with UL 9540A *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems*. The UL 9540A testing is a method used for

various means, including to assist in assessing or developing mitigation measures for a failure event, propagation of a failure, or consequences of an event. It is currently considered to be the most appropriate methodology to provide comprehensive, consistent, and reliable data for battery failure testing. The product datasheet indicates that the BESS units are compliant with UL 9540A and the Project layout, including fire detection and protection systems, is in accordance with the manufacturers recommendations.

On-site receptors

The closest onsite receptors to the proposed BESS would be other Project infrastructure located within the Development Footprint. Dedicated areas have been allocated for (1) the O&M building (2) substation, switch room and control room. Detailed layouts for these areas would be developed post-approval and would include suitable means of egress in the event of an emergency.

Off-site receptors

Non-associated Receivers or occupied areas are considered as sensitive receptors for determination of off-site impact. The nearest sensitive receptor is 680m from the proposed BESS.

Conclusion

The review of BESS separation distances found that:

- The proposed BESS has been tested to UL 9540A and the results indicate that:
    - Module-to-module propagation was not observed, and
    - Unit level results show a fire does not propagate from one Stack750E to another.

  The result of the UL 9540A test form a key parameter to determine clearances.
- Installation manuals were not available at the time of the PHA, and Sherpa was unable to verify the manufacturer specified clearances. However, Sherpa assume that the clearances included in the proposed BESS layout reflect the manufacturer's specified clearances.
- The designated land area can accommodate the BESS units to meet the proposed capacity, as verified by detailed general arrangement drawings.
- There is a considerable separation distance between the proposed BESS and the TransGrid substation (i.e. >100 m). The separation distance to the O&M building and BESS substation would be refined during detailed design in the post-approval stage. As the O&M building would be manned by personnel from time to time, it is recommended that it be at least 30.5m from the closest BESS enclosure. This clearance corresponds with the minimum safety perimeter in the event of an emergency specified in the Battery Emergency Response Guide.
- The closest Non-associated Receiver is approximately 680m away from the proposed BESS. No off-site impact is expected as the BESS would be situated in a rural area and there is a large separation distance to the nearest sensitive receptor.

Level of analysis determination

The HAZID found that for all identified events the resulting consequences are not expected to have significant off-site impacts, based on the key considerations that the proposed BESS would be situated in a rural area and the nearest sensitive receptor is located approximately 680m away.

Additionally, the identified events are expected to present negligible societal risk impact for similar reasons, with the nearest township of Wellington being located approximately 2km away.

Based on the above findings and the Multi-level Risk Assessment Guideline, a fully qualitative approach (i.e. Level 1 analysis) was determined appropriate. This risk analysis is presented in section 10 of the PHA.

The HIPAP 4 recommends a set of qualitative criteria/principles be adopted concerning the land use safety acceptability of a development. The risk assessment against the HIPAP 4 criteria is provided in section 11 of the PHA (Appendix E.4).

Risk analysis

Risk is defined as the likelihood of a specified undesired event occurring within a specified period or in specified circumstances. For each identified event, the risk to off-site population was qualitatively determined from the resulting consequence/severity and likelihood using a matrix. The acceptance criteria used to assess the risk for off-site population are as follows:

- High and Extreme – Unlikely to be tolerable; review if activity should proceed.
- Medium – Tolerable, if So Far As Reasonably Practicable.
- Very Low and Low – Broadly acceptable.

For each event, the severity rating was qualitatively assigned based on the consequence description identified in the HAZID register using the category scale shown in Table 10.2 of the PHA, which in turn was reproduced from AS/NZS 5139:2019 *Electrical installations – Safety of battery systems for use with power conversion equipment*. For the PHA, the severity scale was used to assess impact for off-site population.

The likelihood of an event was estimated using the category scale shown in Table 10.3 of the PHA, which in turn was reproduced from AS/NZS 5139. The likelihood ratings were assigned based on knowledge of historical incidents in the industry and in consultation with Akaysha Energy.

The qualitative risk results for the identified events are summarised below.

Table 6-12 Risk results summary

Hazard	Event	Significant off-site impact?	Risk analysis (off-site and public impact)		
			Severity	Likelihood	Risk
Electrical	Exposure to voltage	No	Insignificant	Unlikely	Very Low
Energy	Arc flash	No	Insignificant	Unlikely	Very Low
Fire	BESS fire	No	Insignificant	Unlikely	Very Low
Chemical	Release of electrolyte from the battery cell (liquid/vented gas)	No	Insignificant	Unlikely	Very Low

Hazard	Event	Significant off-site impact?	Risk analysis (off-site and public impact)		
			Severity	Likelihood	Risk
	BESS coolant or refrigerant leak	No	Insignificant	Unlikely	Very Low
Explosive gas	Generation of explosive gas	No	Insignificant	Unlikely	Very Low
Reaction	Thermal runaway in battery	No	Insignificant	Unlikely	Very Low
EMF	Exposure to EMF	No	Insignificant	Rare	Very Low
External factors	Water ingress (e.g. rain, flood)	No	Insignificant	Unlikely	Very Low
	Vandalism due to unauthorised personnel access and deliberate damage to the BESS	No	Major	Unlikely	Medium
	Lightning strike	No	Insignificant	Unlikely	Very Low
Escalation risk	Escalation from the BESS to adjacent on-site substation	No	Insignificant	Unlikely	Very Low

Key findings are that:

Consequence:

The PHA found that for all events (including events such as a BESS fire and/or explosion) the impacts are not expected to have significant off-site impacts. This is due to the rural location of the proposed BESS and the separation from sensitive receptors.

Likelihood:

The highest likelihood rating for all events is ‘unlikely’ (i.e. not expected to occur, but there is a slight possibility it may occur at some time).

Risk analysis:

A total of 12 hazardous events were identified. The breakdown of these events according to their risk ratings are as follows:

- Medium' risk event: 1. This relates to unauthorised person access to the proposed BESS resulting in vandalism/asset damage. While no significant off-site impact is expected, a severity rating of 'major' was assigned to account for the trespasser potentially injuring themselves.
    - The PHA notes that the controls for this event are well understood and would be implemented. In addition to the rural location of the site, security fencing, cameras and warning signs would be provided.
    - Mitigation measures also include onsite security and presence of staff during operational hours. These prevention and mitigation measures are expected to significantly reduce the likelihood of this event, and the likelihood rating is 'unlikely'.
- 'Very Low' risk events: 11. Most of these events relate to fire and/or explosion events, with no significant off-site impact expected (i.e. more likely to affect onsite employees). The PHA identified proposed prevention controls to reduce the likelihood of these fire events and mitigation controls to contain them. Based on the identified controls, the highest likelihood for these events is 'unlikely'.

Risk assessment

Assessment against company risk acceptance criteria

Of the 12 events identified, all were rated as 'very low' risks except for one 'medium' risk event, as above. To reiterate, the controls for this event are well understood and would be implemented, while various prevention and mitigation measures are expected to significantly reduce the likelihood of this event so that its likelihood rating is 'unlikely'. All identified events are not expected to have significant off-site impacts. Therefore, based on the risk acceptance criteria, the risk profile for the proposed BESS is assessed to be tolerable.

Assessment against HIPAP 4 criteria

Table 11.1 in the PHA provides an assessment against the HIPAP 4 qualitative land use planning risk criteria. In all respect, compliance is assessed to be achieved. An abridged version of the assessment is shown below.

Table 6-13 Assessment against HIPAP 4 qualitative risk criteria

HIPAP 4 qualitative risk criteria	Complies?
All 'avoidable' risks should be avoided. This necessitates the investigation of alternative locations and alternative technologies, wherever applicable, to ensure that risks are not introduced in an area where feasible alternatives are possible and justified.	Yes
The risk from a major hazard should be reduced wherever practicable, irrespective of the numerical value of the cumulative risk level from the whole installation. In all cases, if the consequences (effects) of an identified hazardous incident are significant to people and the environment, then all feasible measures (including alternative locations) should be adopted so that the likelihood of such an incident occurring is made very low. This necessitates the identification of all contributors to the resultant risk and the consequences of each potentially	Yes

HIPAP 4 qualitative risk criteria	Complies?
hazardous incident. The assessment process should address the adequacy and relevancy of safeguards (both technical and locational) as they relate to each risk contributor.	
The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) should, wherever possible, be contained within the boundaries of the installation.	Yes
Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk.	Yes

Conclusions

The PHA was completed to identify the hazards and assess the risks associated with the proposed operations of the BESS at the planning stage to determine risk acceptability from land use safety planning perspective.

The PHA was completed following the methodology specified in HIPAP 6, the Multi-level Risk Assessment Guideline, and HIPAP 4. A Level 1 PHA (qualitative) was completed. The PHA concluded that:

- For all identified events associated with the proposed operation of the BESS, the resulting consequences are not expected to have significant off-site impacts.
- The proposed BESS meets the HIPAP 4 qualitative risk criteria.

6.4.5 Safeguards and mitigation measures

Safeguards and mitigation measures relating to hazards are provided below.

Table 6-14 Hazard mitigation measures

Mitigation number	Mitigation measure	Project stage
H1	Locate the O&M building appropriate distance from the closest BESS enclosure to correspond with the minimum safety perimeter in the event of an emergency specified in Powin's Battery Emergency Response Guide.	Design Construction Operation
H2	Review the investigation reports on the Victorian Big Battery Fire (occurred on 31 July 2021) and implement relevant findings for the Project. The publicly available investigation reports include: • Energy Safe Victoria: Statement of Technical Findings on fire at the Victorian Big Battery. • Fisher Engineering and Energy Safety Response Group: Report of Technical Findings on Victorian Big Battery Fire.	Design Construction Operation
H3	Consult with Fire and Rescue NSW (FRNSW) to ensure that relevant aspects of fire protection measures have been	Design

Mitigation number	Mitigation measure	Project stage
	included in the design. This may include: • Type of firefighting or control medium. • Demand, storage, and containment measures for the medium. The above aspects will form an input to the Fire Safety Study, which may be required as part of the development consent conditions, for review and approval by FRNSW.	Construction Operation

6.5 Hazards - Bushfire

6.5.1 Existing environment

Bush fire presents a threat to human life and assets and can adversely impact ecological values. Bush fire risk can be evaluated and managed by considering environmental factors that increase the risk of fire (fuel load and type, topography and weather patterns), as well as specific activities (such as hot works) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines, energy storage systems and other electrical components).

This Project is an SSD and is therefore exempt from requiring a bush fire safety authority (BFSA) under Section 4.41(f) of the EP&A Act. Section 5.16(3) requires “the Planning Secretary is to consult relevant public authorities and have regard to the need for the requirements to assess any key issues raised by those public authorities”, which includes consulting with the New South Wales Rural Fire Service (NSW RFS) and Fire and Rescue NSW (RFNSW) regarding bush fire considerations.

The Development Footprint is predominantly cleared of woody vegetation to the north into the TransGrid substation lot. From the south, east and west scattered native woodland exists. The topography of the Development Footprint slopes from higher in the west to lower in the east. Elevation on site ranges from 360m to 320m Australian Height Datum (AHD). The lowest point on site is associated with the first order waterway.

The Development Footprint is not identified as bush fire prone land on the NSW RFS Bushfire Prone Land (BFPL) map, as shown in Figure 6-12. The nearest mapped BFPL is about 550m east of the Development Footprint (refer to Figure 6-12). BFPL assessments are based on allocation of the vegetation present into one of three broad categories, as follows:

- Category 1: which includes areas of forest, woodland, heath, forested wetland and timber plantation. Highest risk category
- Category 2: rainforests and “lower risk vegetation parcels” these parcels contain remnant vegetation, but it is limited in its connectivity to larger areas and contain land management practices and a bushfire plan that identifies the appropriate management of bushfire risk
- Category 3: which includes grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands. Moderate risk category
- Exclusion: Areas of vegetation less than 1 hectare and greater than 100 metres separation from category 1, 2 or 3 vegetation; small patches or strips of remnant vegetation; managed grasslands; agricultural cropland; gardens; and mangroves are not mapped as bushfire prone.

The Orana Bush Fire Risk Management Plan (NSW RFS, 2020) identifies the Development Site as being within the Orana Bush Fire Management Committee (BFMC). The Orana BFMC manages 1,280,600ha of land in total. Section 1.3.4 of the Orana Bush Fire Risk Management Plan states that there are on average 200-250 bush fires per year, 10-15 of which are considered major fires. The fires in the management area are typically ignited by careless acts by individuals, farm machinery, campfire escapes, lightning strikes, poorly maintained power lines, burning of stolen vehicles, vehicles tracking over dry vegetation, escaped legal burns and arson. The typical bushfire season runs from October 1 and runs through to March 31.

The main bush fire hazards for the site include the following:

- Woody vegetation within and to the east south and west of the site
- Unmanaged grassland vegetation within and adjacent to the site
- Transmission lines crossing the site (refer to Figure 6-12)
- Car accidents and incorrect cigarette disposal along the minor local roads passing the site.

Existing water resources available for firefighting within the Subject Land are limited with the main water source being the Macquarie River. The Wellington RFS ‘fire control centre’ is located 2.2km south west of the Development Footprint at 71 Gisborne St, Wellington. The trip by road to the Orana BESS proposed access point is 4 minutes.

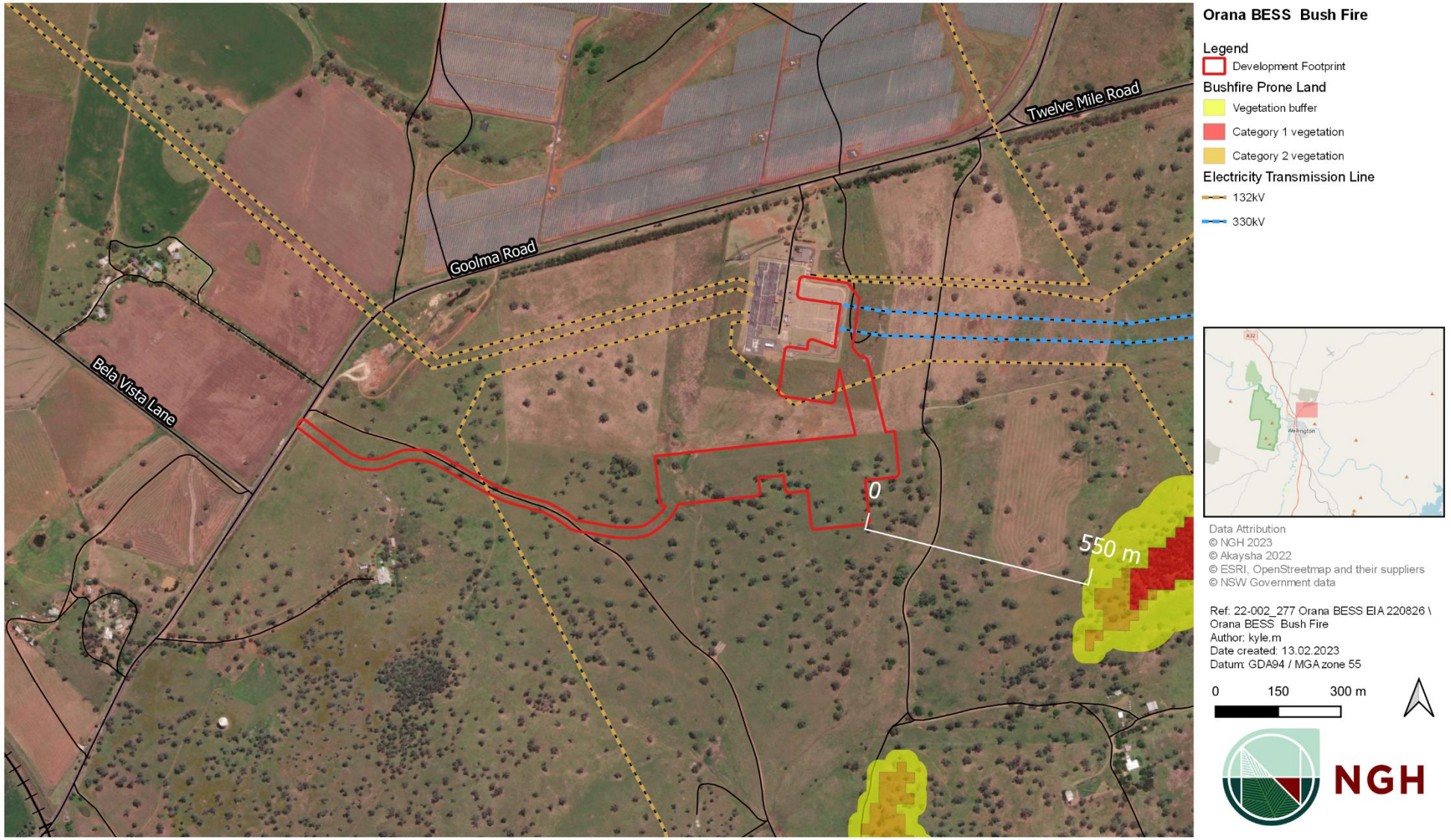


Figure 6-12 Mapped bush fire prone land

Guidelines

NSW RFS Planning for Bush Fire Protection 2019

According to NSW RFS *Planning for Bush Fire Protection 2019* (PBP) (NSW RFS, 2019) an acceptable level of protection from bush fire is achieved for developments through a combination of strategies which:

- Control the types of development permissible in bush fire prone areas
- Minimise the impact of radiant heat and direct flame contact by separating development from bush fire hazards
- Minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers
- Enable appropriate access and egress for the public and firefighters
- Provide adequate water supplies for bush fire suppression operations
- Focus on property preparedness, including emergency planning and property maintenance requirements
- Facilitate the maintenance of APZ), fire trails, access for firefighting and on site equipment for fire suppression.

The PBP guidelines provide six key Bush Fire Protection Measures (BPMs) for developments:

1. APZs
2. Access
3. Construction, siting and design
4. Landscaping
5. Services
6. Emergency and evacuation planning.

Regarding Section 8.3.5 (of PBP), BESS projects are not identified, however, the standard set for solar and wind have been adopted. The following measures to be incorporated into the design and operation of the Project:

- BESS design would incorporate appropriate fire detection and protection, including a fire water tank and hydrant system.
- A minimum 10m APZ for the structures and associated buildings/infrastructure.
- The APZ must be maintained to the standard of an inner protection area (IPA) for the life of the development (to the specifications identified in Appendix 4 of PBP).

The PBP also requires a bush fire emergency management and operations plan, covering:

- Work that should not be carried out during total fire bans.
- Detailed measures to prevent or mitigate fires igniting.
- Notification of the Wellington RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate.

- Appropriate bush fire emergency management planning and availability of fire-suppression equipment, access and water.
- Storage and maintenance of fuels and other flammable materials., covering:
    - The suspension of work involving risk of ignition during total fire bans.
    - The availability of fire-suppression equipment, storage and maintenance of flammable materials.
    - Notification of the local NSW RFS District Fire Control Centre for any works during the fire danger period that have the potential to ignite surrounding vegetation.
    - Bush fire emergency management planning.

6.5.2 Potential impacts

Construction and decommissioning

Potential fire ignition sources during construction and decommissioning stages of the Project include:

- Earthworks and slashing machinery causing sparks
- Hot works activities such as welding, soldering, grinding and use of a blow torch
- Sparks and contact ignition from vehicles in long combustible vegetation
- Smoking and careless disposal of cigarettes
- Use of petrol-powered tools
- Operating plant fitted with power hydraulics on land containing combustible material
- Electrical faults during testing and commissioning
- Storage of chemicals and hazardous materials.

The Development Footprint proposed is predominantly on low slope land in a low (Grassland) to moderate (woody vegetation) fuel environment. Bush fire risks during construction and decommissioning would be managed through the standard mitigation measures recommended in this EIS.

Existing access roads and informal farm roads, as well as proposed APZ, and BESS service road would provide RFS and emergency service access throughout the site.

Operation

The key risk identified and discussed below is in relation to the operation of Lithium-ion batteries.

Lithium-ion batteries

Fire risks

Lithium-ion cells contain highly flammable electrolytes within a metal prismatic can or metalized pouch that have seals designed for a 10 to 20-year service life. The ambient operating temperature range for Lithium-ion systems can span -10 to 50 degrees Celsius but the cells inside the containers are kept within a smaller range, 10 to 30 degrees Celsius, through the enclosure's thermal management system that is sized to keep the cells within the recommended operating

temperature range under normal conditions. Excessive overcharging leads to heating within cells that can initiate 'thermal runaway' triggering new chemical reactions through breakdown of the electrolyte, additional heat generation and ultimately the venting of gases containing carbon monoxide, carbon dioxide and hydrogen.

Gas combustion occurs when the electrolyte vapours or combustible decomposition products come into contact with air and there is an ignition source, or the temperature reaches the autoignition point of 350–400°C (Recharge, 2013). Monitoring of module temperature and voltage combined with a well-designed controls system prevents excessive overcharging and heating by taking the system offline before critical conditions are reached. Since thermal runaway in one battery cell can initiate thermal runaway in adjacent cells it is important to design features that prevent propagation of fire among modules in the event that a fire is initiated. More detailed analysis of this hazard is included in the PHA report which is attached in Appendix E.4.

Fire causes

Battery overheating may be caused by a range of factors including electrical shorting, rapid discharge, overcharging, manufacturers defect, poor design and mechanical damage (Recharge, 2013). Lithium-ion batteries (LIB) do not produce any exhaust gases during normal operation, but they can produce flammable and toxic gases if there is a fault (Department of Commerce (WA), 2017). The main failure modes for these battery systems are either latent (manufacturing defects, operational heating, etc.) or abusive (mechanical, electrical, or thermal) (Blum & Long, 2016).

A large majority of incidents involving Lithium-ion batteries have been due to failure to adhere to packing and transport requirements, use by non-professionals for innovative applications or use in non-controlled storage conditions (Recharge, 2013).

In addition, the operational stage of the Project has the following associated bush fire risks due to internal ignition:

- Overheating in the substation
- Grass fire ignition from vehicles and maintenance machinery
- Poor groundcover management and associated increase in fuel loads.

Risk and incident management

During operation of the BESS, bush fire and structural fire risks are considered manageable provided the following strategies are adopted:

- Control of grass fuels around the APZ
- Maintenance of equipment
- Application of best practice and technical standards
- Design of electrical components to minimise ignition potential.

It is noted that the fire containment system has been extensively tested by the manufacturer and proven to be successful.

Factors listed in Department of Commerce (Department of Commerce (WA), 2017) to avoid and mitigate battery fire impacts include:

- Building codes applicable to batteries (national and local), changes to floor loadings and National Construction Code requirements for battery installations

- Manufacturer's recommendations to protect the system from weather and extreme heat, light and temperature
- Adequate ventilation
- Containment of electrolyte spills
- Adequately fire-rated walls are used to avoid or delay the spread of fire
- Adequate access/egress for installation and maintenance
- Adequate mechanical protection.

Battery location and spatial design are also important safety factors. Large-scale Lithium-ion energy storage systems can further mitigate widespread impact by isolating different parts of a system. The design and layout of Orana BESS is in accordance with manufacturers recommendations.

Fire containment and suppression systems need to be employed to deal with a potential battery fire event, applying the Suppression through Cooling, Isolation, and Containment (SCIC) approach (Butler, 2013). These would be specified to the appropriate Australian Standards at Orana BESS.

Lithium-ion fires require specific training, planning, storage, and extinguishing interventions, catering for both progressive burn-off or explosive events (Butler, 2013).Though the specific battery manufacturer and model has not yet been determined, it is anticipated that each battery module within the implemented solution would have its temperature and voltage monitored.

The fire suppression system within the Energy Storage System would comprise the storage and release of inert gas within each battery container using either electrical detectors/ionisers, or a mechanical system in which the heat destroys a seal to release the gas.

There would be spare air-conditioning units in storage on site for replacement. In the event of failure of one of the units, the system would be able to maintain safe operating temperatures. If all air-conditioning units fail, the auto shutdown of the batteries would prevent overheating.

Standards and guidelines

The installation of lithium-ion batteries has been identified as in need of relevant standards and Standards Australia is developing a new standard (AS/NZS 5139) for smaller scale battery installations (Standards Australia, 2017). The Clean Energy Council provides requirements for accredited installers, the Australian Energy Storage Council has produced a Guide for Energy Storage Systems, and the WA Department of Commerce has released a guide for electrical contractors in relation to battery storage systems (Department of Commerce (WA), 2017).

Akaysha would appoint a tier-one EPC Contractor to install the Orana BESS, using suitably trained, skilled and experienced personnel.

Asset Protection Zone

Section 8.3.5 of the PBP guidelines provides minimum APZ requirements for solar farm developments located in designated bush fire prone land. These APZ prescriptions would be applied to the BESS infrastructure to provide defendable space and to manage heat intensities at the infrastructure interface. This is considered reasonable given the site is not within bushfire prone land and most solar farms would include a BESS component.

In accordance with Section 8.3.5 of PBP, an APZ of a minimum width of 10m would be provided around all buildings, substation and BESS. The 10m APZ set back requirement would also be

applied to any woody vegetation plantings undertaken around the perimeter of the BESS. All the APZs would be managed as an IPA, to the specifications of Appendix 4 of PBP.

The APZ surrounding the proposed BESS unit and substation would include gravel surfacing to minimise the risk of fire escaping from the facilities and the risk of external fire affecting the facilities.

Fuel hazard management

According to the PBP guidelines, the APZ to the standard of an IPA should provide a tree canopy cover of less than 15% located greater than 2m from any part of the roofline of a building and should not overhang any building. Trees should have lower limbs removed up to a height of 2m above the ground. There would be no understory as the BESS APZ would be gravel.

There would be no trees or shrubs within the APZ established for the BESS. Grassland Fuel Hazard is a function of grass height and cover, with variation according to curing and species fuel characteristics. Grass fuel outside the BESS would be monitored and managed using stock grazing or mowing to maintain safe fuel levels. Grass height outside the APZ would be maintained at or below 10cm throughout the fire season.

Site access

Access specifications would comply with Table 7.4a of the PBP guidelines, including:

- A minimum carriageway width of 4m
- Minimum vertical clearance of 4m
- Capacity for passing using reversing bays and/or passing bays every 200m suitable for fire tankers
- Property access roads are two-wheel drive, all-weather roads
- Property access must provide a suitable turning area in accordance with Appendix 3 (of PBP).

The turn radius and swept path clearance on access roads would be more than suitable for Category 1 Tankers (Medium Rigid Vehicle), refer to Section 6.3.

Fire-fighting resources and preparedness

Water storage tanks would be installed within the Development Footprint for fire-fighting and other non-potable water uses, with a 65mm Storz outlet, a metal valve and a minimum of 20,000 litres reserved for fire-fighting purposes (as per Table 5.3d of the PBP). Rainwater tanks installed beside site buildings for staff amenities would also enable RFS connectivity of Storz outlets. Suitable fire extinguishers and PPE would be maintained at site buildings.

The BFEMOP would be developed prior to commissioning in consultation with the local NSW RFS District Fire Control Centre to manage fire risks, resources and preparedness. Following commissioning of the BESS, the preparedness of local RFS and Fire and Rescue brigades would be enhanced through site orientation and information events and the facilitation of training in the management of Li-ion battery fires. An Emergency Response Plan, including an Evacuation Plan, BFEMOP (with a specific battery fire response section) Flood Response Plan and Spill and Contamination Response Plan would also be developed to enable rapid, safe and effective incident response.

The Project would not present a substantial bushfire threat or represent an unacceptable hazard in the event of a bush fire affecting the development. Implementation of the mitigation measures in this EIS are considered sufficient in managing the identified risks.

6.5.3 Mitigation measures

Bush fire risks during construction and decommissioning would be managed through standard mitigation strategies (refer to Table 6-15). Specific fire risks strategies would be adopted including:

- Adequate setbacks, access and firefighting facilities maintained onsite.
- Control of grass fuels levels.
- Proper design and maintenance of equipment.
- Application of best practice and technical standards.

These form commitments of the Projects, as set out below.

Table 6-15 Bushfire management mitigation measures

ID	Safeguards and mitigation measures	Project stage
BF1	Dangerous or hazardous materials shall be stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids*.	Construction Operation Decommissioning
BF2	Develop a BFEMOP to include but not be limited to: • Detailed measures to prevent or mitigate fires igniting • Construction work that should not be carried out during total fire bans • Availability of fire-suppression equipment, access and water • Storage and maintenance of fuels and other flammable materials • Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate • Appropriate bush fire emergency management planning. In developing the BFEMOP, NSW RFS and FRNSW will be consulted on the volume of water supplies, fire-fighting equipment maintained on-site, fire truck connectivity requirements, proposed APZ and access arrangements, communications, vegetation fuel levels and hazard reduction measures.	Construction Operation Decommissioning

ID	Safeguards and mitigation measures	Project stage
BF3	An APZ of minimum 10m will be maintained between remnant or planted woody vegetation and the BESS and ancillary infrastructure. Average grass height within the APZ will be maintained at or below 5cm on average throughout the October to March fire season. Average grass height outside the APZ, will be maintained at or below 10cm throughout the fire season.	Construction Operation
BF4	Non-combustible (steel or concrete) water storage tanks should be installed adjoining the main internal access road, or nearby the BESS, for fire-fighting and other non-potable water uses, with a 65mm Storz outlet, a metal valve and a minimum of 20,000 litres reserved for fire-fighting purposes, in accordance with PBP. The final location/s of water tanks will be determined in agreement with NSW RFS and FRNSW recommendations.	Construction
BF5	Appropriate fire-fighting equipment will be held on site to respond to any fires that may occur at the site during construction. This equipment will include fire extinguishers, a 1000 litre water cart (fitted with suitable hosing, fittings and diesel firefighting pump) retained on site on a precautionary basis. Equipment lists would be detailed in Work Method Statements.	Construction
BF6	The NSW RFS and Fire and Rescue NSW will be provided with a contact point for the BESS, during construction and operation.	Construction Operation
BF7	Following commissioning of the BESS, the local NSW RFS and Fire and Rescue brigades will be invited to an information and orientation day covering access, infrastructure, firefighting resources on-site, fire control strategies and risks/hazards at the site	Operation
BF8	The access track will comply with the requirements of property access roads in accordance with Table 5.3b of the PBP. All access and egress tracks on the site would be maintained and kept free of parked vehicles to enable rapid response for firefighting crews and to avoid entrapment of staff in the case of bush fire emergencies.	Construction Operation Decommissioning
BF9	A Hot Works Permit system shall be applied to ensure that adequate safety measures are in place. Fire extinguishers would be present during all hot works. Where practicable hot works would be carried out in specific safe areas (such as the Construction Compound temporary workshop areas).	Construction Operation Decommissioning

ID	Safeguards and mitigation measures	Project stage
BF10	Protocols to manage activities in bushfire danger weather, including Total Fire Ban days, will be developed.	Construction Operation Decommissioning
BF11	Prior to operation of the BESS, an Emergency Response Plan (ERP) will be prepared in consultation with the RFS and FRNSW. This plan must include but not be limited to: • Specifically addresses foreseeable onsite and off-site fire events and other emergency incidents. • Risk control measures would include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, decontamination procedures, minimum evacuation zone distances and a safe method of shutting down and isolating the PV system (either in its entirety or partially, as determined by risk assessment). • Outline other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the site. • Two copies of the ERP are stored in a prominent 'Emergency Information Cabinet' which is located in a position directly adjacent to the site's main entry point. Once constructed and prior to operation, the operator of the facility will contact the relevant local emergency management committee.	Design Construction Operation Decommissioning
BF12	Fire risks associated with the lithium-ion energy storage facility would include: • Locating the BESS as far as practicable from any sensitive receptors or large stands of vegetation. • Installing reliable automated monitoring (voltage and temperature), alarm and shutdown response systems. • Installing reliable integrated fire detection and fire suppression systems (inert gas). • Ensuring the battery containers are not vulnerable to external heat effects in the event of a bush fire. • Designing appropriate separation and isolation between battery containers and between batteries and other infrastructure, including gravel surfacing around the facility for a minimum 10m in accordance with APZ.	Design

ID	Safeguards and mitigation measures	Project stage
	• Compliance with all relevant guidelines and standards. • Preparation of a specific Battery Fire Response Plan, under the general BFEMOP, in consultation with fire authorities, fire suppression experts and in reference to relevant standards and guidelines. • Facilitation of first responder training in the management of Lithium-ion battery fires at the site for local brigades.	

6.6 Visual amenity

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Visual:

Including a detailed assessment of the likely visual impacts (including night lighting) of all components of the project (including transmission lines and any other ancillary infrastructure) on surrounding residences, scenic or significant vistas and road corridors in the public domain and on the Siding Spring Observatory in accordance with the *Dark Sky Planning Guideline* (2016).

A specialist assessment of landscape and visual impacts was prepared by Moir Landscape Architecture Pty Ltd. It is summarised below and appended in full in Appendix E.5.

6.6.1 Assessment approach

The Land and Visual Impact Assessment (LVIA) identifies and determines the landscape character, key landscape features and sensitivity of viewers. The potential visual impact of the Project is then assessed based on the relationship between the visual sensitivity and visual magnitude. The assessment was undertaken as follows:

- Objective assessment of the relative aesthetic value of the landscape; defined as visual quality and expressed as high, moderate, low or very low. This assessment generally relates to variety, uniqueness, prominence and naturalness of the landform, vegetation and water forms within each character type.
- Determination of the landscape sensitivity and its ability to absorb different types of development on the basis of physical and environmental character.
- An assessment of viewer sensitivity to change. This includes how different groups of people view the landscape (for example, a resident as opposed to a tourist), and how many people are viewing the Project and from how far away.
- Viewpoint analysis to identify areas likely to be affected by development of the site and a photographic survey using a digital camera and a handheld GPS unit to record position and altitude.
- Preparation of photomontages depicting the Project.

- Assessment of visual impacts. Suggestions are made for suitable development patterns that would maintain the area's visual quality.

6.6.2 Existing environment

The surrounding land character can be recognised as rural properties with large lots cleared to support farming activities and renewable energy systems. The existing TransGrid substation and Wellington Solar Farm north of the Site forms an integral part of the visual character within this area. The site is generally flat with cleared areas and some scattered vegetation. The topography of the Subject Land gradually rises to form hills to the southwest and southeast of the site. Refer to Figure 6-13.

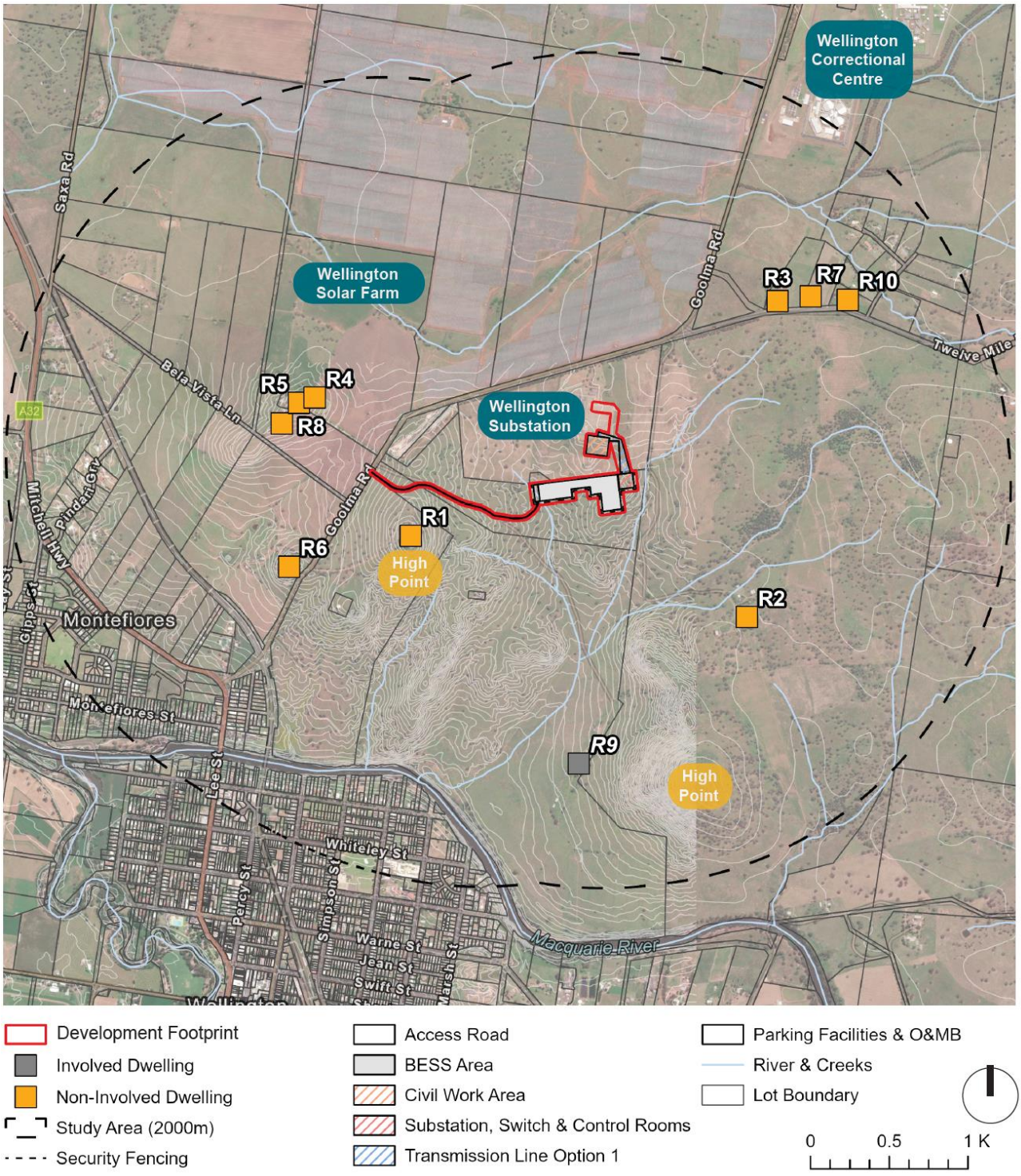


Figure 6-13 Visual context (Figure 03A of the LVIA)

The land surrounding the site has been cleared to support agricultural activities and infrastructure associated with energy production.

The TransGrid Substation forms a dominant part of the existing visual character along with the expansive Wellington Solar Farm visible on the northern side of Goolma Road (refer to Figure 6-14 and Figure 6-15). The transmission lines, solar panels and other elements associated with the substation are existing features in the wider visual landscape. Landscape screening has been implemented along the substation's northern boundary to assist with the screening from surrounding land (refer to Figure 6-16). Wellington Correctional Centre is located to the Northeast of the Project along Goolma Road (refer to Figure 6-13).

Figure 6-14 Views of the existing substation from the Development Site

Figure 6-15 Views of Wellington Solar Farm (Source: Moir LA drone photograph)

Figure 6-16 Existing Wellington substation screen plantings along Goolma Road

Four roads were identified close to the Site identified as Goolma Road, Twelve Mile Road, Bela Vista Lane and Mitchell Highway. Primary access to the Site would be from Goolma Road. Twelve Mile Road and Bela Vista Lane are low use local roads servicing surrounding dwellings and rural properties. Dense vegetation associated with screening the Substation forms a typical character along this stretch of Goolma Road. Mitchell Highway is approximately 1.50 km southwest of the Site, a major commuter road connecting the towns of Wellington to Dubbo.

Wellington town centre is located approximately 4 km southwest of the Site. Other towns located in proximity are Geurie, Wongarbon and Dubbo. Several dwellings have been identified neighbouring the Project in Wuuluman and Wellington. Surrounding dwellings are typical rural residential dwellings with surrounding vegetation utilised as wind breaks and screening.

Most receivers are located to the northeast, southwest and southeast including residences along Twelve Mile Road, Bela Vista Lane and Goolma Road. Select residences off Goolma Road are positioned on higher elevations and have views towards the Project. Views from residences along Twelve Mile Road are contained by either topography or vegetation corridors.

Figure 6-17 Typical local landscape character, timbered ranges above more open lowlands

6.6.3 Potential impacts

Zone of visual influence

A Zone of Visual Influence (ZVI) map was prepared to understand the theoretical visibility of the proposed infrastructure at an early stage of the Project's assessment. It represents the area over which a development can theoretically be seen and is based on topography. The ZVI analysis does not take into account the influence of vegetation or built structures in screening views.

The ZVI has been prepared using a maximum assumed height of 5 metres to represent the general height of infrastructure within the BESS footprint. The figure below shows that topography would screen and rule out visual impact from seven Non-associated Receivers (Referred to as Non-associated Dwellings in LVIA and figures) within 2km of the Project. Two Non-associated Receivers identified a portion (between 50- 75%) of potential visibility towards the Project. Finally, one Non-associated Receiver within 2km would have a 75-100% of potential visibility towards the Project.

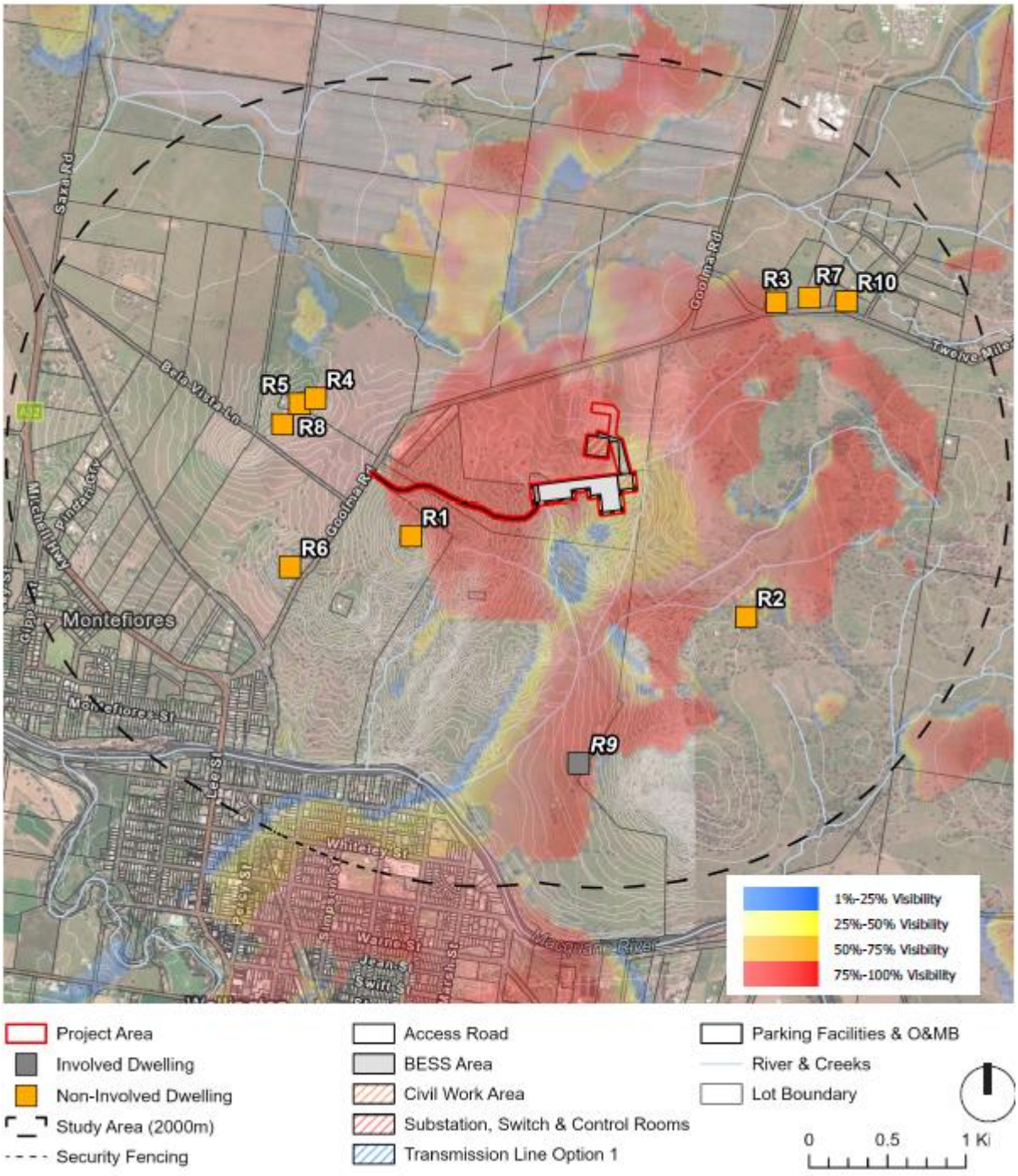


Figure 6-18 Zone of Visual influence map

Viewpoint analysis

Based on the results of the ZVI analysis, topographical maps, field work observations, landscape character and the popularity of vantage points, 13 viewpoints, have been selected to be representative of the range of views surrounding the Development Footprint (refer to Figure 6-19). The general viewing direction of each viewpoint is identified in the figures in Section 6 of the LVIA report provided as Appendix E.5.

Viewpoints for this study have been taken from accessible public land (typically gates, walking tracks, roads, recreation reserves and lookouts) and residential dwellings (with permission from landowners (VP12 and VP06) which were identified as having a potentially high visual impact through the desktop review process.

Table 6-16 below evaluates the potential visual impact based on visual sensitivity and magnitude. Of the 13 viewpoints assessed as part of this LVIA, eight received a visual impact rating of 'Very low', three were rated as 'Low', two of the viewpoints were rated as 'Moderate'. Any areas considered 'Low' visual impact are considered to have adequate screening or roadside vegetation which obscures most views.

Photomontages have been prepared for public viewpoint VP07 (PM01) and private viewpoint VP12 (PM02) refer to Figure 6-20. A wireframe from Non-associated Receiver R2, has also been included to provide confirmation on the screening of the Project from within the curtilage of the dwelling.

Viewpoints selected for the preparation of photomontages are generally those viewpoints determined to have the greatest potential for visibility of the Project and the highest visual impact to comparison to other viewpoints analysed. Due to existing roadside vegetation and very low visibility of the Project, the highest visual impact would be experienced along small sections of Goolma Road where vegetation has been cleared, or from receptors at a higher elevation in close proximity of the Project. A combination of topography and intervening vegetation would make the Project indiscernible from other locations and would have a very low visual impact.

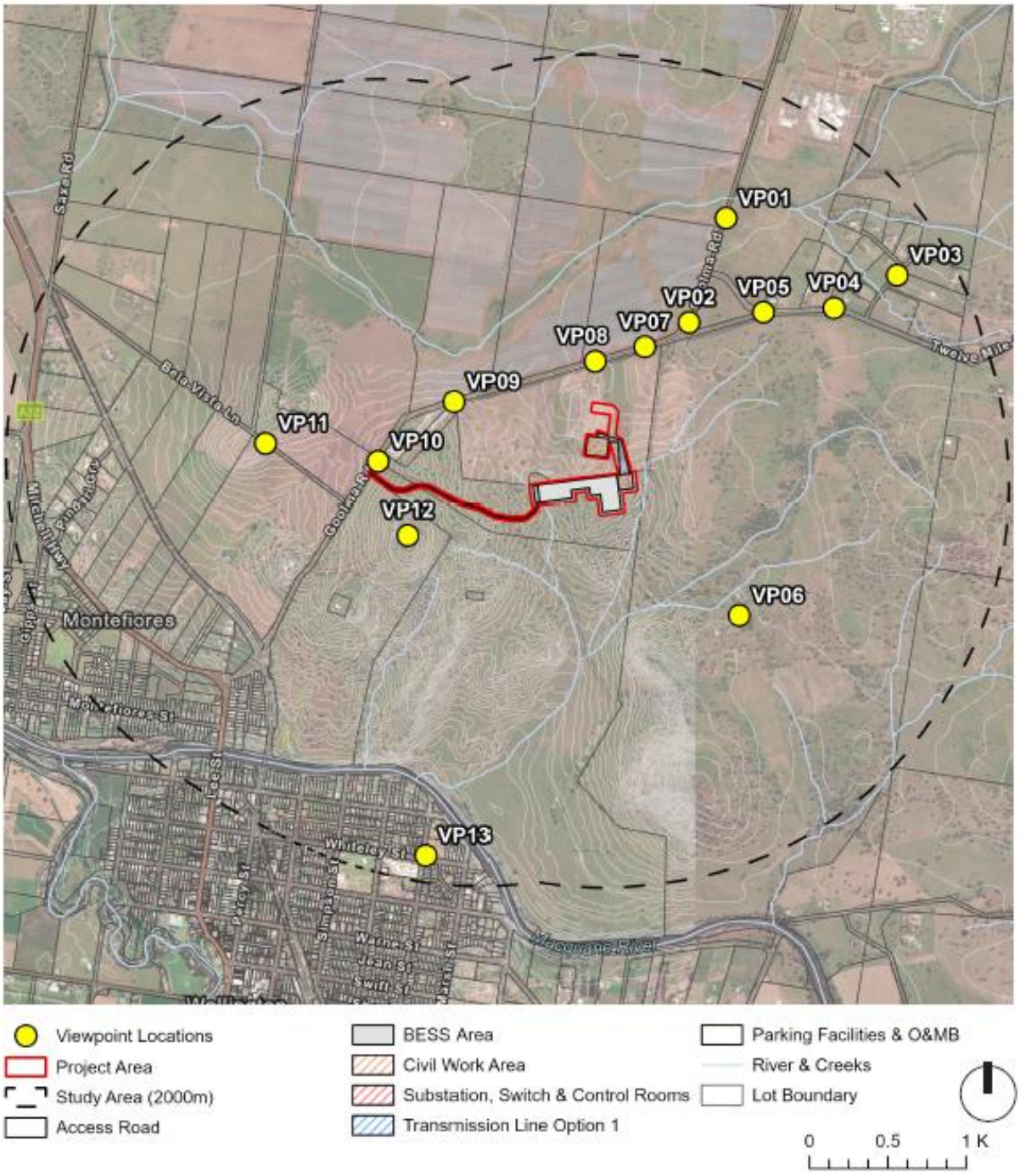


Figure 6-19 Viewpoint assessment locations

Table 6-16 Viewpoint analysis

Viewpoint	Public or private	Visual sensitivity	Visual Magnitude	Potential Visual Impact (Without mitigation)	Potential Visual Impact (With mitigation)
VP01	Public	Very Low	Very Low	Very Low	Very Low
VP02	Public	Very Low	Low	Very Low	Very Low
VP03	Public	Low	Very Low	Very Low	Very Low
VP04	Public	Low	Very Low	Very Low	Very Low
VP05	Public	Low	Very Low	Very Low	Very Low
VP06	Private (R2)	Moderate	Very Low	Very Low	Very Low
VP07	Public	Very Low	Moderate	Low	Very Low
VP08	Public	Very Low	Low	Low	Very Low
VP09	Public	Very Low	Very Low	Very Low	Very Low
VP10	Public	Very Low	Very Low	Very Low	Very Low
VP11	Public	Low	Very Low	Very Low	Very Low
VP12	Private (R1)	Moderate	Low	Low	Very Low
VP13	Public	Moderate	Very Low	Low	Very Low

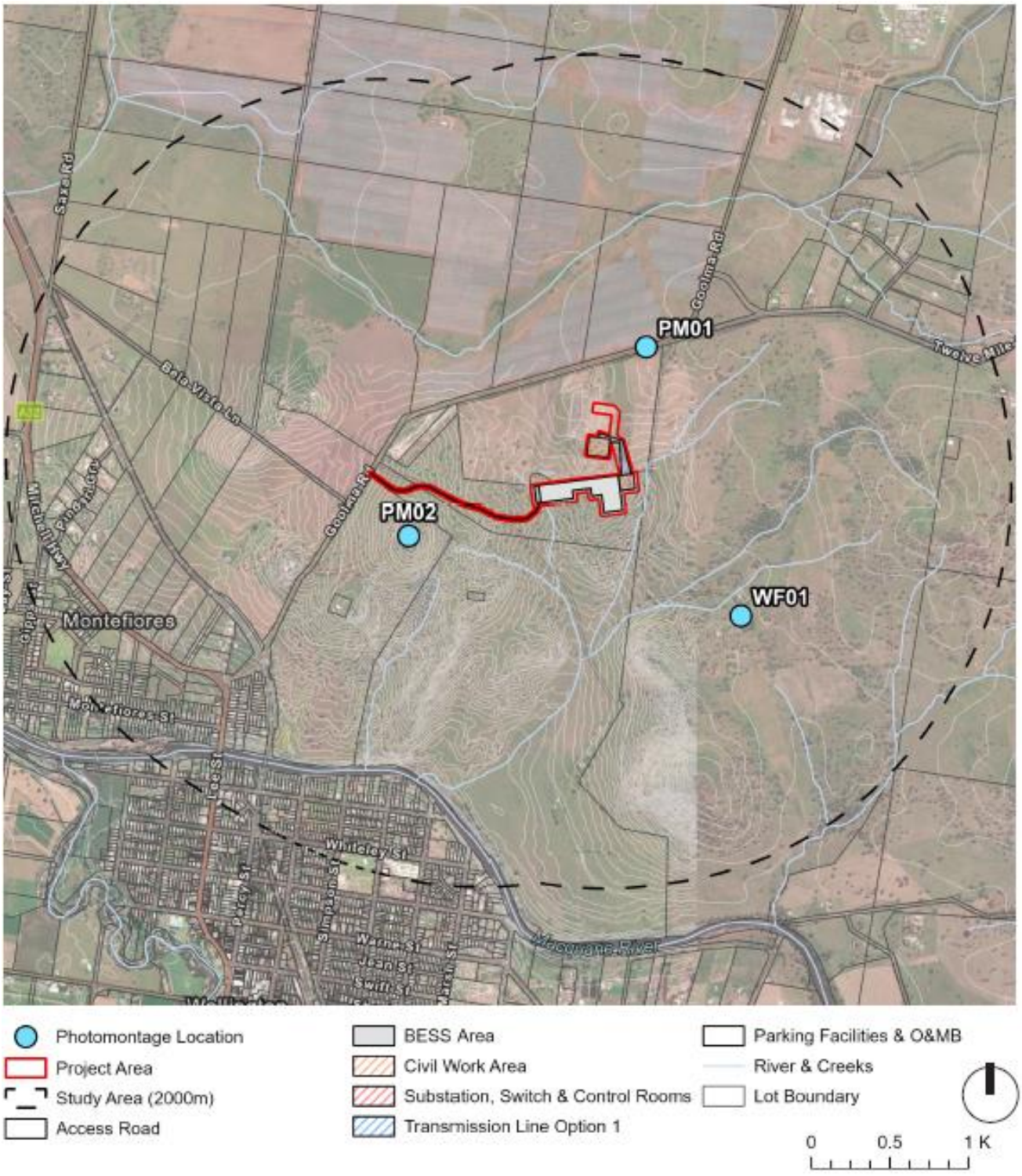


Figure 6-20 Photomontage and wireframe locations

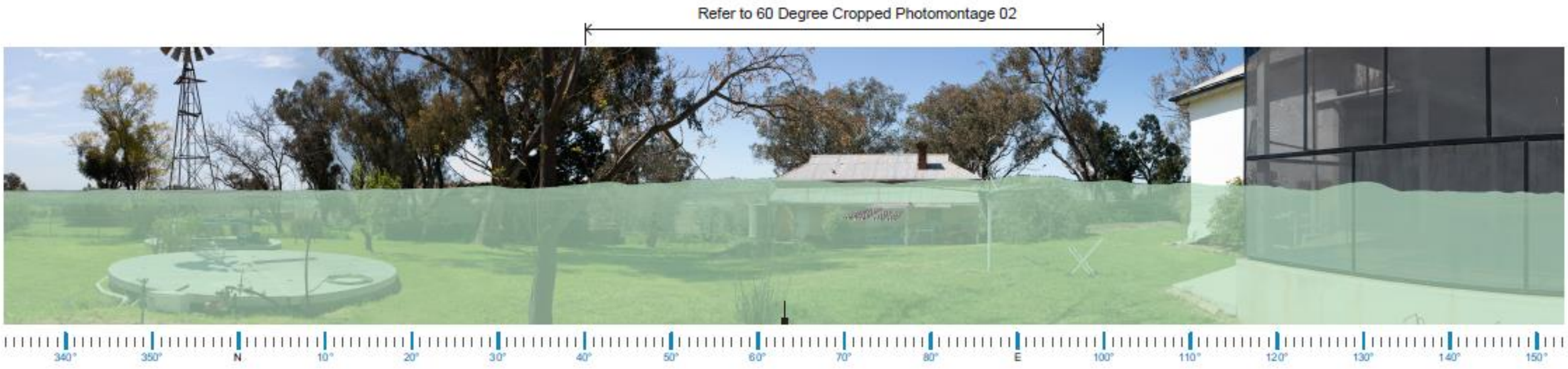
PM01 Photomontage 01 - VP07 (Public Viewpoint)

180° Existing View

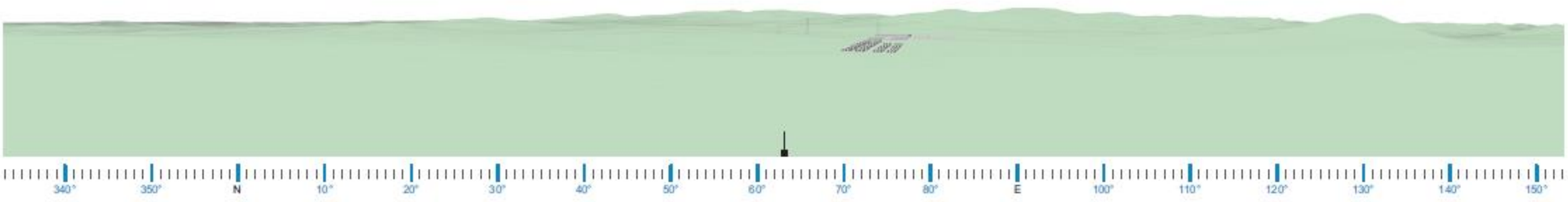
180° Proposed View

Photomontage representing a massing model of the Project with shapefiles provided by NGH. Refer to EIS Report for all component finishes and details.

Figure 6-21 Photomontage from PM01



180° Proposed View



Wireframe Diagram

Photomontage representing a massing model of the Project with shapefiles provided by NGH. Refer to EIS Report for all component finishes and details.

60° Cropped Proposed View

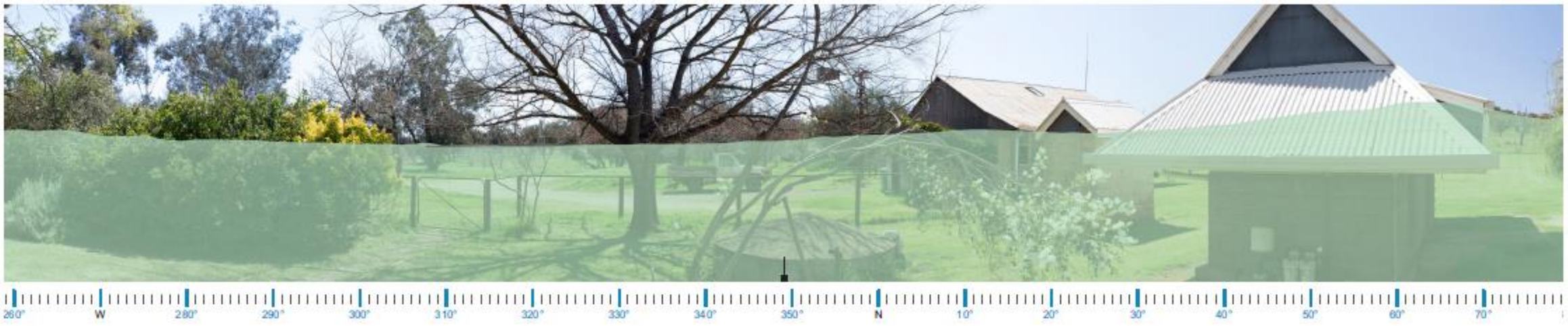
Photomontage representing a massing model of the Project with shapefiles provided by NGH. Refer to EIS Report for all component finishes and details.

Figure 6-22 Photomontage PM02 (with wireframe overlay)

WF01 Wireframe 01 - VP06 (Private Viewpoint)

Refer to 60 Degree Cropped Wireframe 01

180° Proposed View



Wireframe Diagram

Photomontage representing a massing model of the Project with shapefiles provided by NGH. Refer to EIS Report for all component finishes and details.

60º Cropped Proposed View

Photomontage representing a massing model of the Project with shapefiles provided by NGH. Refer to EIS Report for all component finishes and details.

Figure 6-23 Wireframe from WF01

Visual impacts from public land

The Project would result in a an overall low to very low modification to the existing visual landscape character, as the Project is consistent with the existing infrastructure present within the landscape. There are limited opportunities to view the Project from publicly accessible land outside Goolma Road.

VP13 was selected as a representative viewpoint from the township of Wellington, where the visual magnitude is very low as the vegetation along the Macquarie River screens views of the Project.

The highest level of visual impact would be experienced when viewing along Goolma Road. However, the duration of change is minimal as most individuals viewing from these locations along Goolma Road would be in vehicular transport, making the Project difficult to distinguish within the existing landscape. This also includes the associated infrastructure and overhead transmission line proposed.

Generally, the Project is not visible from publicly accessible land due to topographic conditions and existing vegetation. Views may be available in areas where there is a break in vegetation, as shown in PM01 (Figure 6-21), however, the visible infrastructure is in keeping with the existing character of the landscape.

Visual impacts from receivers

For the purposes of this assessment, nine Non-associated Receivers have been identified within two kilometres of the Project. R1 and R2 were identified as the key Non-associated Receivers and were visited in September 2022. The remaining receivers assessed have been completed using desktop assessment tools including ZVI, topographic maps, aerial imagery and representative viewpoints. The impact from receivers is assessed giving regard to the following factors:

- Distances to site
- Type of views
- Direction of the view
- Extent of visibility
- Scale of change
- Degree of contrast
- Duration of change
- Mitigation options.

Of the nine receivers, eight have been identified as having a very low visual impact as the Project would not be visible due to the combination of intervening topography or existing vegetation (refer to Table 6-17.

One receiver, identified as R1, located at a higher elevation, and has been rated as a low visual impact. The BESS is not likely visible from within the curtilage of the dwelling. Views towards the proposed transmission towers may be available from outside of the curtilage of the dwelling, where breaks in vegetation occur. However, views toward infrastructure already occur within the landscape and this would be in keeping with the existing character of the view from this location.

Impacts and parameters from each Non-associated Receiver are summarised below in Table 6-17. A more detailed version of this table can be located in the VIA in Appendix E.5.

Table 6-17 Receiver visual impact table

Receiver ID	Elevation	Distance to Development Footprint	Visual impact rating	Mitigation measures	Visual impact rating
R1	371 m	0.69 km	Low	Refer to Section 6.6.4.	Negligible
R2	344 m	0.88 km	Very Low	Nil	N/A
R3	373 m	1.04 km	Very Low	Nil	N/A
R4	351 m	1.25 km	Very Low	Nil	N/A
R5	355 m	1.33 km	Very Low	Nil	N/A
R6	340 m	1.36 km	Very Low	Nil	N/A
R7	373 m	1.22 km	Very Low	Nil	N/A
R8	351 m	1.38 km	Very Low	Nil	N/A
R10	374 m	1.38 km	Very Low	Nil	N/A

Night lighting

Due to the location of the Project, few existing sources of light (e.g., dwellings and vehicle lights) are currently present in the night-time landscape.

The requirements for night lighting on Ancillary Infrastructure is generally limited to security lighting to the Substation and within the operations and maintenance facility. The light sources are limited to low-level lighting for security, night time maintenance and emergency purposes. There would be no permanently illuminated lighting installed. The proposed ancillary infrastructure has been carefully sited to minimise visibility from existing residences and publicly accessible viewpoints. It is unlikely the proposed night lighting associated with the ancillary infrastructure would create a noticeable impact on the existing night time landscape.

It is likely there would be limited or no visual impacts resulting from night lighting of Ancillary Structures due to light design recommendations below that would be implemented. Any night lighting would be designed with refence to the following recommendations that have been developed with reference to *The Dark Sky Planning Guidelines* (DPE, 2016) (relevant to the Project as it is within 200km of the Siding Spring Observatory) and the *Australian Government Department of the Environment and Energy, National Light Pollution Guidelines for Wildlife* (DEE, 2020).

1. **Control the level of lighting**

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

2. **Lighting design**

- Use the lowest intensity required for the job
- Use energy efficient bulbs and warm colours
- Direct light downwards to eliminate
- Ensure lights are not directed at reflective surfaces
- Use non-reflective dark coloured surfaces to reduce reflection of lighting (Figure 6-24)
- Keep lights close to the ground and / or directed downwards (Figure 6-25)
- Use light shield fittings to avoid light spill (refer to Figure 6-26).

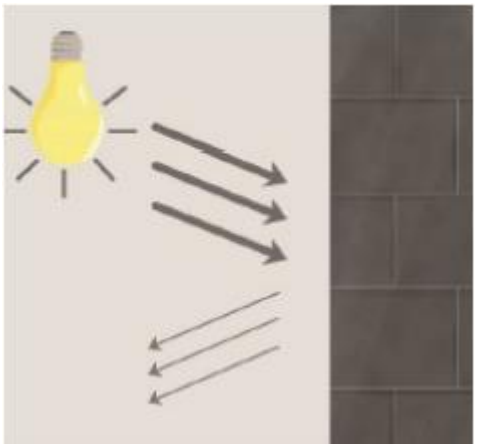


Figure 6-24 Surface reflectivity (DEE, 2020)

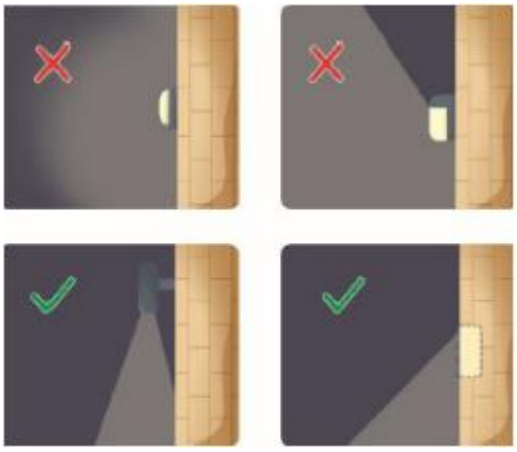


Figure 6-25 Downward lighting (DEE, 2020)

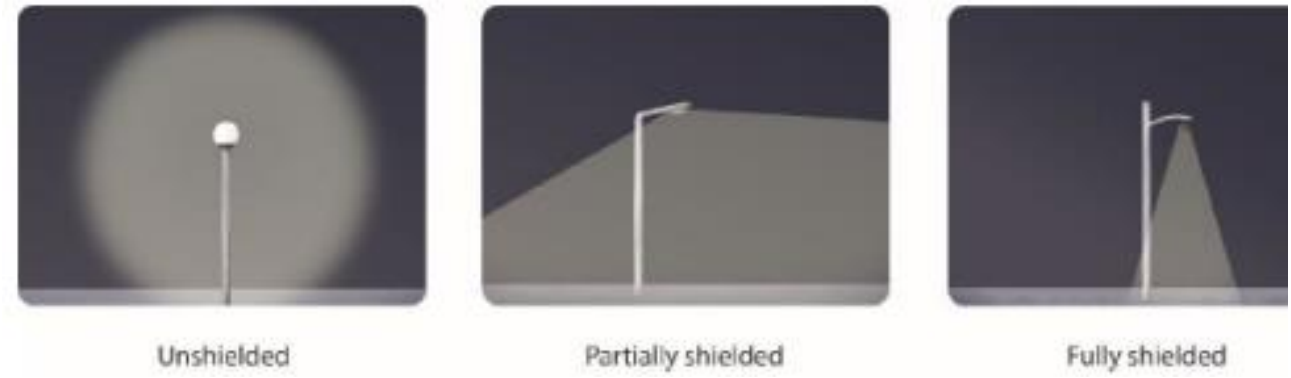


Figure 6-26 Light shielding (DEE, 2020)

6.6.4 Mitigation measures

Overall, the Project has been assessed to have not greater than low visual impacts. However, there is potential to further reduce the level of impact through incorporating specific vegetation planting into the Project design. This is a commitment of the Project and details would be developed in tandem with the final Infrastructure Layout of the Project.

Table 6-18 Visual mitigation measures

Mitigation number	Mitigation measure	Project stage
V1	A Landscape Management Plan (LMP) will be developed for the Project to minimise views of infrastructure including: • Plant screening of native vegetation typical to the area along areas of Goolma Road lacking existing vegetation to further reduce impact of the Project • Planting layout should avoid screening views of the broader landscape or increasing bush fire risk	Design Construction

Mitigation number	Mitigation measure	Project stage
	• Avoid impacts on of existing vegetation outside of the Development Footprint.	
V2	Consult with landowner at R1 where landscaping has been proposed, in order to receive their feedback and adjust the mitigation measures accordingly.	Design
V3	Consideration will be given to the colours, type and height of the facility to ensure minimal contrast and to help blend into the surrounding landscape to the extent practicable.	Design
V4	External lighting shall be installed to comply with Australian/New Zealand Standard AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting, or its latest version.	Design

6.7 Noise and vibration

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Noise:

An assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;

Renzo Tonin & Associates prepared a Noise and Vibration Assessment (NVA) of the impacts from the construction and operation phases of the Project. The NVA is included in full in Appendix E.6 and is summarised in this EIS. The assessment addresses the SEARs outlined above and was conducted in accordance with the following policies, guidelines and standards:

- *'Interim Construction Noise Guideline'* (ICNG) (DECC, 2009)
- *'Noise Policy for Industry'* (NPfI) (NSW EPA, 2017)
- *'Assessing Vibration: A Technical Guideline'* (DECC, 2006)
- *'Road Noise Policy'* (RNP) (DECCW, 2011).

6.7.1 Existing noise environment

The Subject Land is immediately adjacent to the existing Transgrid 330 kV zone substation and the Wellington solar farm (constructed). The approved Wellington North solar farm is also located in the area and construction is anticipated to be completed by July 2024. The assessment for the proposed Wellington South Battery Energy Storage System, 300m east of the Subject Land, is currently underway. The Subject Land comprises privately owned farmland, and the BESS

Development Footprint would be subdivided and purchased by the Applicant. The access road and network connection infrastructure would be subject to an easement for the life of the Project.

The identified receivers surrounding the Subject Land are all classified as rural under NPfI guidelines. A total of ten sensitive receivers were identified as relevant to the Project; all of which are residential (see Figure 6-27 for locations).

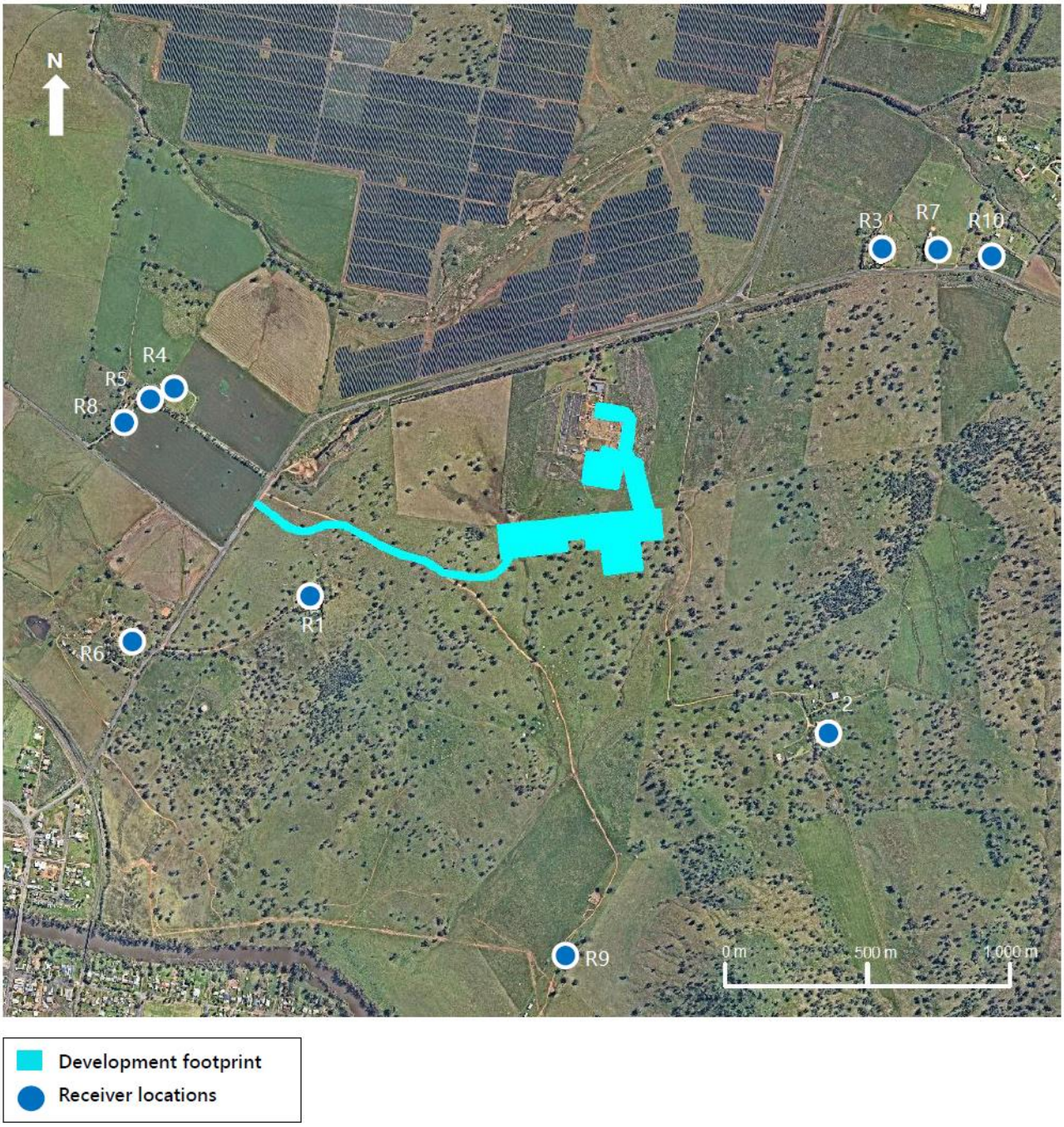


Figure 6-27 Sensitive receivers in relation to the Project (Renzo & Tonin NVA, Appendix E.6)

6.7.2 Construction noise assessment

Approach

The NVA was conducted on a conservative approach, assuming the minimum Rating Background Level (RBL) intrusiveness levels as given in Table 2.1 in the NPfI (EPA, 2017). A quantitative assessment was undertaken in accordance with the ICNG requirements due to the proposed construction period. The NVA considered the possible sources, potential level and feasible mitigation measures for environmental noise occurring because of the Project. The sound power levels for the various construction activities are based on maximum levels given in the *Australian Standard 2436 - 2010 'Guide to Noise Control on Construction, Demolition and Maintenance Sites'*, the ICNG, information from past projects and/or information held in the Renzo Tonin & Associates database. These details are available in Appendix E.6.

Noise emissions were predicted by modelling the noise sources, receiver locations, topographical features of the intervening area, and possible noise control treatments using the CadnaA (version 2021 MR 1) noise modelling computer program. The program calculates the contribution of each noise source at each specified receptor point and allows for the prediction of the total noise from a site. The noise prediction models takes into account:

- Location of noise sources and receiver locations
- Height of sources and receivers
- Separation distances between sources and receivers
- Ground type between sources and receivers
- Attenuation from barriers (natural and purpose built).

Noise levels at any receptors resulting from construction would depend on the above and the type and duration of construction being undertaken. Furthermore, noise levels at receivers would vary substantially over the total construction program due to the transient nature and large range of plant and equipment that could be used. The modelled noise levels represent a scenario where the three loudest plant and equipment are operating concurrently and at a location closest to the corresponding receiver location. This scenario would not typically occur on site.

Potential impacts

The results of the construction noise model for each sensitive receiver identified in Figure 6-27 are given in Table 6-19. Based on the predicted construction noise levels presented, the construction noise management level would be exceeded for Receiver R1 by up to 3 dB(A) when works are conducted at the closest proximity and when the three noisiest plant items are operating concurrently (such as a crane, drum roller, and wheeled loader). To reiterate, the modelled scenario – and the exceedance for Receiver R1 – is based on the three loudest plant and equipment operating concurrently and at a location closest to the corresponding receiver location. This scenario would not typically occur on site. Predicted construction noise levels at all other receivers would comply with the construction noise management levels. Furthermore, construction noise levels at all receivers are predicted to be below the highly noise affected level of 75 dB(A).

For Receiver R1, it is expected that the exceedance of the noise management level would likely occur when the construction works are conducted within approximately 700m of the dwelling / building. Construction works conducted within approximately 700m of the dwelling / building would typically be completed over two to three days. Construction works conducted beyond 700m of the

dwelling / building of Receiver R1 would comply with the noise management level. In light of the short duration of predicted noise exceedances, it is recommended that a feasible and reasonable approach towards noise management measures be applied, in consultation with the potentially affected resident(s).

Table 6-19 Predicted construction noise levels for identified sensitive receivers (adapted from Table 4.4 of the NVA)

ID	Address	Land use	Noise management level (dB(A))	Predicted Construction Noise Level (dB(A)) with up to 3 noisiest plant operating concurrently
R1	7009 Goolma Road, Montefiores	Residential	45	<20-**48**
R2	6773 Goolma Road, Wuuluman	Residential	45	<20-36
R3	59 Twelve Mile Road, Wuuluman	Residential	45	<20-33
R4	6938 Goolma Road, Montefiores – Dwelling 2	Residential	45	<20-42
R5	6938 Goolma Road, Montefiores – Dwelling 1	Residential	45	<20-41
R6	7009 Goolma Road, Montefiores	Residential	45	<20-38
R7	79 Twelve Mile Road, Wuuluman	Residential	45	<20-32
R8	60 Bela Vista Lane, Montefiores	Residential	45	<20-30
R9	6945 Goolma Road, Wuuluman	Residential	45	<20-31
R10	7 Cadonia Drive, Wuuluman	Residential	45	<20-30

*Note: **Bold** font denotes predicted exceedance of construction noise management level where the three loudest plant and equipment operating concurrently and at a location closest to the receiver location.*

Further, despite the broad compliance that is predicted for all other receivers, it is recommended that a feasible and reasonable approach towards noise management measures be applied to maintain noise compliance at the nearest affected receivers.

6.7.3 Operational noise assessment

Approach

The operational component of the NVA examined potential impacts from intrusive noise impacts in the long-term for residences and maintaining noise level amenity for residences and other nearby land uses. The Project amenity noise levels for different time periods of day are determined in accordance with Section 2.4 of the NPfI. The NPfI recommends amenity noise levels for various receivers including residential, commercial, industrial receivers and sensitive receivers such as schools, hotels, hospitals, churches, and parks.

The plant and equipment likely to be used for the operation of the proposed BESS includes battery stacks (Powin S750 – 2660 in total), inverters (WD3s – 140 in total), and transformers (Generic – 70 in total). The sound power levels of these items are contained at Table 5.4 of the NVA.

In accordance with the NPfI, where the character of the noise is assessed as particularly annoying (i.e. if it has an inherently tonal, low frequency, impulsive or intermittent characteristic), then an adjustment of 5 dB(A) for each annoyance aspect, up to a total of 10 dB(A), is to be added to the predicted value to penalise the noise for its potential increase in annoyance. For the assessment of the BESS, the noise from the inverters and transformers are considered to be tonal in nature. Therefore, a 5 dB(A) penalty has been applied to the predicted noise contributions from the inverters and transformers.

Noise emissions were predicted by modelling the noise sources, receiver locations and topographical features of the intervening area using the CadnaA (version 2021 MR 1) noise modelling computer program. This is the same as explained above.

Furthermore, in accordance with Fact Sheet D, Table D.1 of the NPfI, noise predictions were prepared for the following standard and noise-enhancing meteorological conditions:

1. Standard meteorological conditions – 0.5m/s wind velocity at 10m from ground level between each noise source and each noise receiver. Wind direction was based on wind travelling from the source to the receiver.
2. Slight to gentle breeze – 3m/s wind velocity at 10m from ground level between each noise source and each noise receiver (as per NPfI default wind conditions). Wind direction was based on wind travelling from the source to the receiver.
3. Moderate temperature inversion – applicable for noise predictions during night-time periods only.

To assess the likelihood of sleep disturbance, the potential for maximum noise level events from the Project during the night-time period were considered. The operational noise sources would be expected to operate in a continuous and steady-state manner with no potential for high peak noise level events. The predicted operational noise levels are below the nominated sleep disturbance criteria given in the NPfI. The full results of these assessments are both available in Appendix E.6.

Potential impacts

The results given in Table 6-20 show that the predicted operational noise levels comply with the Project noise trigger levels for all time periods and meteorological conditions for all identified sensitive receivers. Therefore, no further reasonable and feasible noise mitigation measures would be required or are proposed for the operational phase of the Project.

Table 6-20 Predicted operational noise levels at sensitive receiver locations (adapted from Table 5.5 of the NVA)

ID	Address	Projected noise trigger levels dB(A) dB(A) LAeq, 15min			Predicted operational noise levels dB(A) dB(A) LAeq, 15min			Comply?
		Day	Evening	Night	Calm and isothermal conditions	Slight to gentle breeze	Moderate temperature inversion	
R1	7009 Goolma Road, Montefiores	40	35	35	32	33	33	Yes
R2	6773 Goolma Road, Wuuluman	40	35	35	30	31	31	Yes
R3	59 Twelve Mile Road, Wuuluman	40	35	35	29	29	29	Yes
R4	6938 Goolma Road, Montefiores – Dwelling 2	40	35	35	27	27	27	Yes
R5	6938 Goolma Road, Montefiores – Dwelling 1	40	35	35	27	27	27	Yes
R6	7009 Goolma Road, Montefiores	40	35	35	<20	<20	<20	Yes

ID	Address	Projected noise trigger levels dB(A) dB(A) LAeq, 15min			Predicted operational noise levels dB(A) dB(A) LAeq, 15min			Comply?
		Day	Evening	Night	Calm and isothermal conditions	Slight to gentle breeze	Moderate temperature inversion	
R7	79 Twelve Mile Road, Wuuluman	40	35	35	27	28	28	Yes
R8	60 Bela Vista Lane, Montefiores	40	35	35	23	24	24	Yes
R9	6945 Goolma Road, Wuuluman	40	35	35	31	32	32	Yes
R10	7 Cadonia Drive, Wuuluman	40	35	35	26	26	26	Yes

Cumulative Operation Noise Assessment

It is likely that the Wellington Solar Farm would be operating concurrently with the Orana BESS. Therefore, cumulative noise impacts at the nearest affected receivers due to both sites operating have been considered. Noise values have been sourced from the Wellington Solar Farm noise impact assessment (Renzo Tonin & Associates, 2017).

An assessment of the cumulative operational noise from the Orana BESS and the Wellington Solar Farm has been quantified for the receivers that have been identified as being the nearest affected receiver for both sites (i.e. Receivers R3 and R4). The cumulative noise levels are presented in Table 5.6 for the applicable meteorological conditions.

ID	Address	Projected noise trigger levels dB(A) dB(A) LAeq, 15min			Predicted operational noise levels dB(A) LAeq, 15min			Comply?
		Day	Evening	Night	Calm and isothermal conditions	Slight to gentle breeze	Moderate temperature inversion	
R3	59 Twelve Mile Road, Wuuluman	40	35	35	Wellington Solar Farm 31	Wellington Solar Farm 35	Wellington Solar Farm 35	**No**

ID	Address	Projected noise trigger levels dB(A) dB(A) LAeq, 15min			Predicted operational noise levels dB(A) LAeq, 15min			Comply?
		Day	Evening	Night	Calm and isothermal conditions	Slight to gentle breeze	Moderate temperature inversion	
					Orana BESS: 29 **Cumulative:** 33	Orana BESS: 29 **Cumulative: 36**	Orana BESS: 29 **Cumulative:36**	
R4	6938 Goolma Road, Montefiores – Dwelling 2	40	35	35	Wellington Solar Farm 25 Orana BESS: 27 **Cumulative:** 29	Wellington Solar Farm 31 Orana BESS: 27 **Cumulative:** 32	Wellington Solar Farm 351 Orana BESS: 27 **Cumulative:** 31	Yes

Under noise enhancing weather conditions, the predicted cumulative noise levels at Receiver R3 exceed the criterion by 1 dB(A) during adverse weather conditions. The exceedance at R3 is mainly attributed to the noise emissions from the Wellington Solar Farm, which predicts noise levels equal to the evening and night time Project Noise Trigger Levels of 35 dB(A).

In accordance with Table 4.1 and Table 4.2 of the NPfI, a 1 dB(A) exceedance is considered to be negligible as a 1 dB(A) change in noise level is not discernible or noticeable to the average person. Therefore, the predicted noise levels at Receiver R3 are determined to be acceptable in accordance with the NPfI and no further reasonable and feasible noise mitigation measures are required.

6.7.4 Vibration assessment

Approach

Assessment of potential disturbance from vibration on human occupants of buildings was made in accordance with the EPA's *'Assessing Vibration; a technical guideline'* (DECC, 2006). The guideline provides criteria which are based on British Standard BS 6472-1992 *'Evaluation of human exposure to vibration in buildings (1-80Hz)'*. Sources of vibration are defined as either 'Continuous', 'Impulsive' or 'Intermittent'.

Potential impacts

Vibration generating activities would occur only during the construction phase of the Project. There would be no vibration generating activities expected during the operational phase. As the nearest identified receivers are more than 235m from the Development Footprint, structural damage due to vibration would not be expected.

Based on the proposed plant and equipment items, the potential for adverse comments to vibration impacts during the construction works was determined to be very low due to the large distances between the receiver locations and the construction activities. Therefore, additional vibration mitigation measures and vibration monitoring are not required or proposed at the identified receiver locations during construction works associated with the Project. The full results of these assessments are available in Appendix E.6.

6.7.5 Road noise assessment

Approach

The RNP sets out criteria to be applied to particular types of road and land uses. These noise criteria are to be applied when assessing noise impact and determining mitigation measures for sensitive receivers that would potentially be affected by road traffic noise associated with the construction and operation of the Project, with the aim of preserving the amenity appropriate to the land use. Based on information provided by the client, the peak vehicle movements during the construction stage of the Project were assessed. It was noted as part of the NVA that vehicle movements would only occur during the day-time period when construction works occur.

During the operational stage, vehicle access to the site would be maintenance vans or delivery trucks which would occur on an irregular basis from Monday to Friday. Traffic noise impacts during the operational stage of the Project would therefore be minimal and insignificant; no further assessment was undertaken.

Access to the Subject Land is directly off Goolma Road. Based on functionality, Goolma Road is categorised as an arterial road and thus was assessed with the RNP criteria for arterial roads.

Potential impacts

Traffic noise levels because of the construction works for the Project would not adversely contribute to the existing traffic noise levels at the most affected residences along the surrounding roads (additional traffic impacts are assessed in Section 6.3). The NVA noted that the predicted noise levels only represent the traffic noise contribution from vehicle movements associated with the construction works and does not take into account existing traffic noise levels due to existing general traffic flows, as existing traffic volumes along Goolma Road are unknown.

Road traffic noise level contributions from the vehicle movements associated with the construction works would be within (at least 7 dB(A) below) the applicable noise criteria based on dwellings being approximately 20m from the road. Given that residences are located within a rural environment, distances between the road and the dwellings may be likely to be significantly greater than 20m.

Furthermore, as the predicted levels are 7 dB(A) less than the traffic noise criterion, it is not expected that the traffic noise contribution from the construction vehicles would result in an exceedance of the traffic noise criterion and/or increase the existing traffic noise levels by more than 2 dB(A). The full results of these assessments are available in Appendix E.6.

6.7.6 Mitigation measures

Table 6-21 Noise and vibration mitigation measures

Mitigation number	Mitigation measure	Project stage
N1	A Noise Management Plan (NMP) would be developed as part of the CEMP. The plan would include, but not be limited to: • Use less noisy plant and equipment where feasible and reasonable. • Plant and equipment will be properly maintained. • Use and maintain 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended. • Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel. • Avoid any unnecessary noise when carrying out manual operations and when operating plant. • Any equipment not in use for extended periods during construction work will be switched off • Implement a complaints procedure to manage noise complaints that may arise from construction activities. Each complaint will need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits. • Establish good relations with people living in the vicinity of the site at the beginning of Project. Keep people informed, deal with complaints seriously and expeditiously. The community liaison member of staff should be adequately experienced.	Construction
N2	Manage potential noise impacts of construction works within approximately 700m of the dwelling / building of Receiver R1 by implementing feasible and reasonable time restrictions and/or providing periods of repose for the resident. For example, between 10am and 3pm (with one-hour break for lunch), noisy activities could occur with no noise level restrictions over a limited period. Allowing the construction activities to proceed despite the noise exceedance may be preferred for works to be completed expeditiously, with exceedances occurring over only 2-3 days. Residents would be consulted to determine appropriate respite periods and notified of the potential noise impacts so that they can organise their day around these noisy periods.	Construction Decommissioning

6.8 Water resources and flooding

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

- **Water:**
  - **An assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources traversing the site and surrounding watercourses, drainage channels, wetlands, riparian land, farm dams, groundwater dependent ecosystems and acid sulfate soils, related infrastructure, adjacent licensed water users and basic landholder rights, and measures proposed to monitor, reduce and mitigate these impacts;**
  - **Details of water requirements and supply arrangements for construction and operation; and**
  - **A description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004).**

6.8.1 Assessment approach

NGH prepared the assessment of likely impacts from desktop information and a site inspection (August 2022). A peer review by Southeast Engineering and Environmental Pty Ltd (Appendix E.7) was then undertaken to ensure specialist surface water risk advice would be incorporated into design and management measures.

6.8.2 Existing environment

Surface water and terrain

Site slopes average around 10-15% with flatter slopes of 3 to 5% to the north of the site, steepening at the top of catchments on higher land (360 to 400m AHD) and around drainage lines to the west and east. Site soils over the proposed development area are predominantly the upper slopes of the Nanima soil landscape from the Oakdale and other volcanic geologies. Soils are generally shallow loams over sandy loams and clays on the upper slopes, with loams to clay loams on the mid slopes above well-structured red clays with possible limestone outcropping. Soils are generally slightly to moderately erodible. Southeast Engineering and Environmental have mapped the relevant catchments in Figure 6-32.

There is one unnamed waterway that traverse the Development Footprint. The waterway is an ephemeral 1st (Strahler) order stream and flows south into Macquarie River, which is a major 9th order stream approximately 1.7km southwest of the site. The Dubbo Regional LEP does not identify the Development Footprint within its flood planning area Other than Macquarie River, the Development Footprint is not within the vicinity of any waterways defined as 'key fish habitat' which typically encompass Strahler stream orders greater than three.

The Development Footprint is within land mapped as having groundwater vulnerability as per the Dubbo Regional LEP.

There is one bore located adjacent to but not within the Development Footprint, currently used for cattle grazing purposes It would be outside of the subdivision boundary for the BESS and therefore would not be impacted or controlled by the Applicant. The Development Site includes an additional 2nd order unnamed waterway to the east of the Development Footprint. This waterway is about 41m from the Development Footprint (refer to Figure 6-28).

All watercourses within the Development Site would be described as ephemeral and would only contain flowing water during and shortly after rainfall events. There is one artificial dam in the Development Site located south of the Transgrid substation. As for the bore, it would be outside of the subdivision boundary for the BESS and therefore would not be impacted or controlled by the Applicant.

During site visits in August 2022, streams were observed following periods of significant rainfall where flooding was active along the Macquarie River to the south. The 1st order waterway was observed and described as being boggy, but without a define drainage channel. Flows were not able to be directly observed at the 1st order waterway. In the 2nd order waterway the channel was better defined. A clear flow was observed. The 2nd order waterway did not overtop its bank in this event as waters flowed to the south. The condition of both surface water areas are provided in Figure 6-28.

Water entitlements

The relevant Water Sharing Plan (WSP) in the region is the *Water Sharing Plan for the Macquarie and Cudgegong Regulated Rivers Water Source 2016* (NSW Government , 2016). Water within the Subject Land specifically within the landowner lots that comprise the land "Cadia" utilise water from the Macquarie and Cudgegong Regulated Rivers Water Source. To date water used on the land has been for the purpose of irrigation under a WaterNSW work approval for Water Supply Works And Water Use (approval: 80CA702354). The work approval is facilitated under Water Access Licence (WAL) 41638 and 10939. The WAL has a total water share component of **400ML/y** under the regulated river (general security) licence category.

The Macquarie and Cudgegong Regulated Rivers Water Source's 'regulated river (general security)' access licence category has a total of 653 WALs as of 8 November 2022, with a total value of water made available to WAL holders of 632,466.1ML. In the 2021/22 financial year 487,001.1ML were made available from the water source and 144,049.3ML were used representing 29.6% of all water made available that year. The WAL (41638 and 10939) active over the Subject Land allows for a water take of **400ML** which in 2021/22 would account for only a small fraction of water used. During times of drought however such as the period between 2017 through to the end of the 2020 financial year the access licence category has been overdrawn by WAL holders.

The associated landowner also holds a 400ML/y bore licence on nearby Lot 1 DP1103197 – reference WAL 35105 that supplied water for the Wellington Solar Farm Project.

The Development Site has one active bore within the Development Site (State bore ID GW016601) (refer to Figure 6-29). The bore is used for stock and domestic purposes. The bore depth is 9.1m; it is not located in the Development Footprint and would not be impacted.

Dubbo Regional Council offers water filling stations throughout the LGA. These water filling stations provide access for contractors, water carters and rural customers to access drinking water (Dubbo Regional Council , 2022). The water filling stations provide potable drinking water only.

Figure 6-28 Unnamed ephemeral watercourses (Strahler stream order 1 *upper* and 2 *lower*)

Groundwater Vulnerability and Groundwater Dependant Ecosystems (GDEs)

The assessment of likelihood of groundwater dependent ecosystems in the locality is based on the Bureau of Meteorology Groundwater Dependent Ecosystems Atlas. Groundwater Dependent Ecosystems (GDEs) include ecosystems which may rely on the surface expression of groundwater (including surface water ecosystems that may have a groundwater component) and ecosystems which may rely on the subsurface presence of groundwater (including vegetation ecosystems).

Low potential terrestrial GDE's are mapped across most of the Development Footprint refer to Figure 6-30. There are no mapped wetlands located within or nearby the Development Site.

The Development Site is entirely mapped as having groundwater vulnerability. Areas that exhibit groundwater vulnerability may be vulnerable to pollution entering aquifers. Groundwater vulnerability is included in the Dubbo LEP (section 7.5) and requires developers and planners to consider:

- If on-site storage or disposal of solid or liquid waste chemicals, would cause groundwater contamination or an adverse effect on groundwater dependent ecosystems
- The cumulative impact on nearby groundwater extraction for potable water supply or stock water supply, of the development and other existing development on groundwater.

The Orana BESS Project has considered and mitigated these risks.

Pollutants

A search for acid sulphate soils was undertaken on 8 November 2022, via NSW Government online databases (NSW Planning Portal and eSPADE). The Development Site is not mapped within a known area of acid sulphate soils and the probability of encountering acid sulphate soils within this locality is extremely low as a result.

A search Naturally Occurring Asbestos (NOA) was undertaken on 8 November 2022 NSW Government online databases. There is a section of the Development Site that is mapped within a known area of NOA. The area is mapped as having a low potential for having naturally occurring asbestos (refer to Figure 6-31).

A search for salinity was undertaken on the 8 November 2022, via NSW Government online databases (NSW Planning Portal and eSPADE). The Development Site is not mapped in the NSW salinity map.

Figure 6-29 Surface water and bores

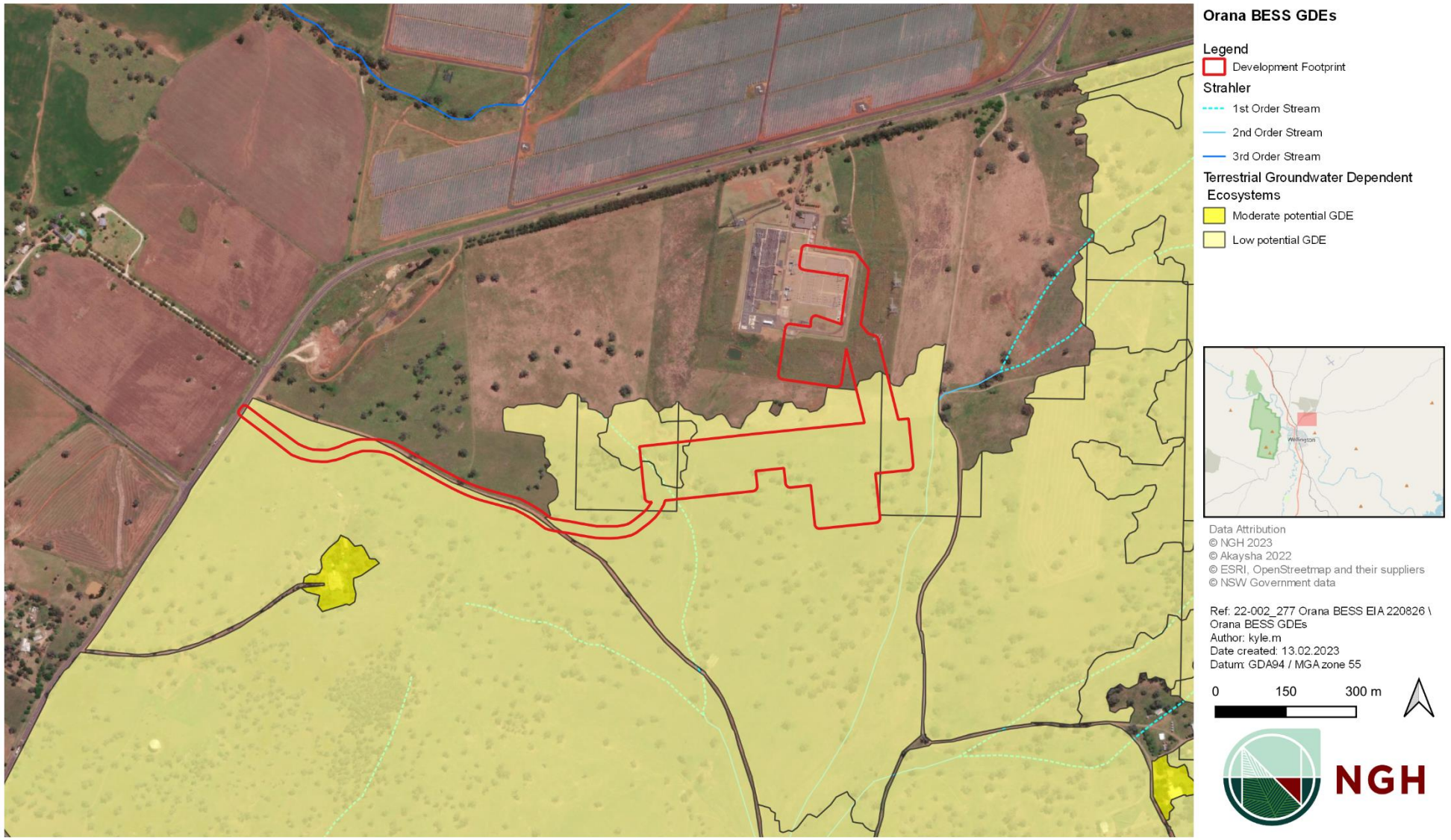


Figure 6-30 Ground water dependent ecosystem mapping

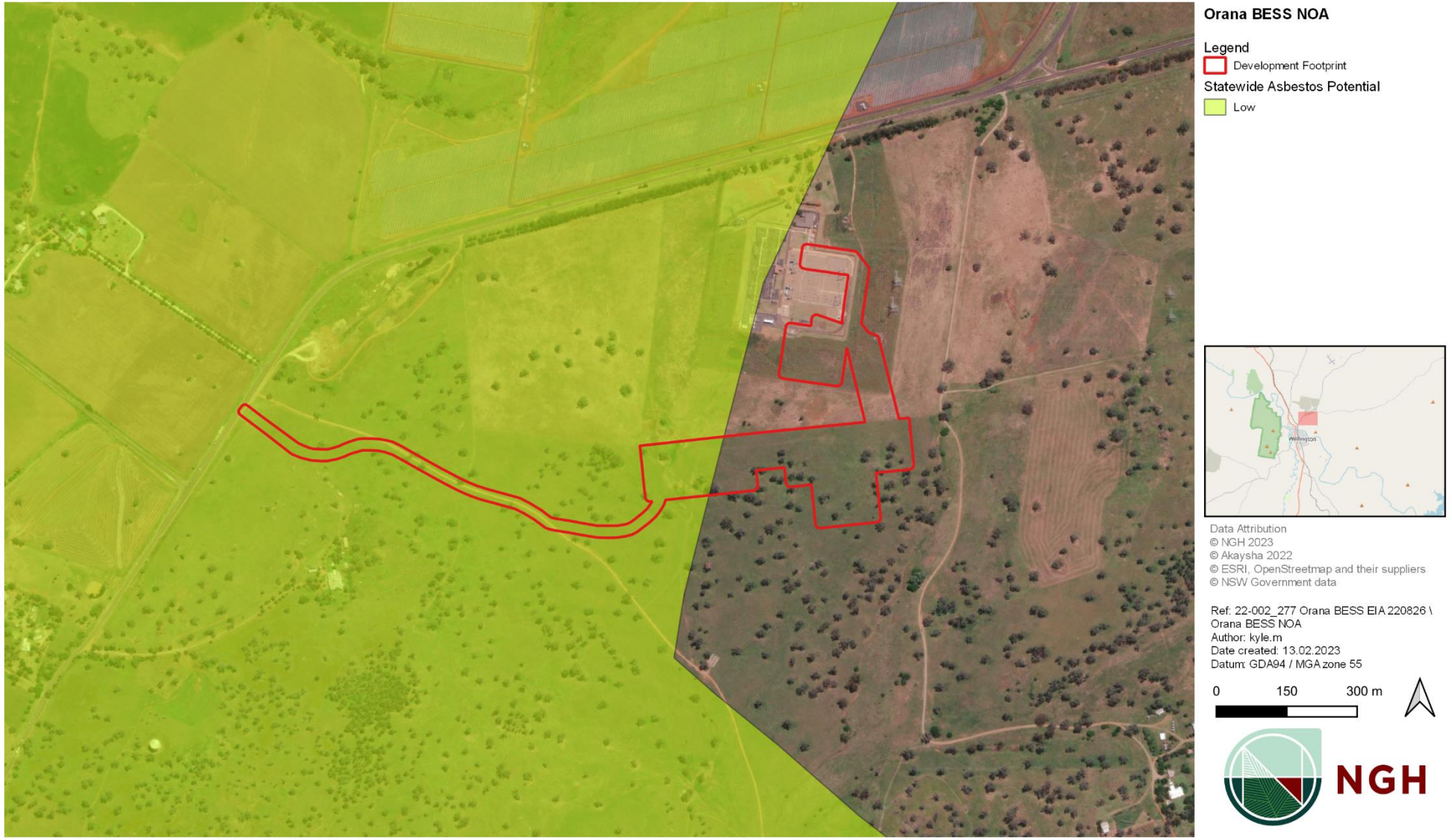


Figure 6-31 Naturally occurring asbestos potential

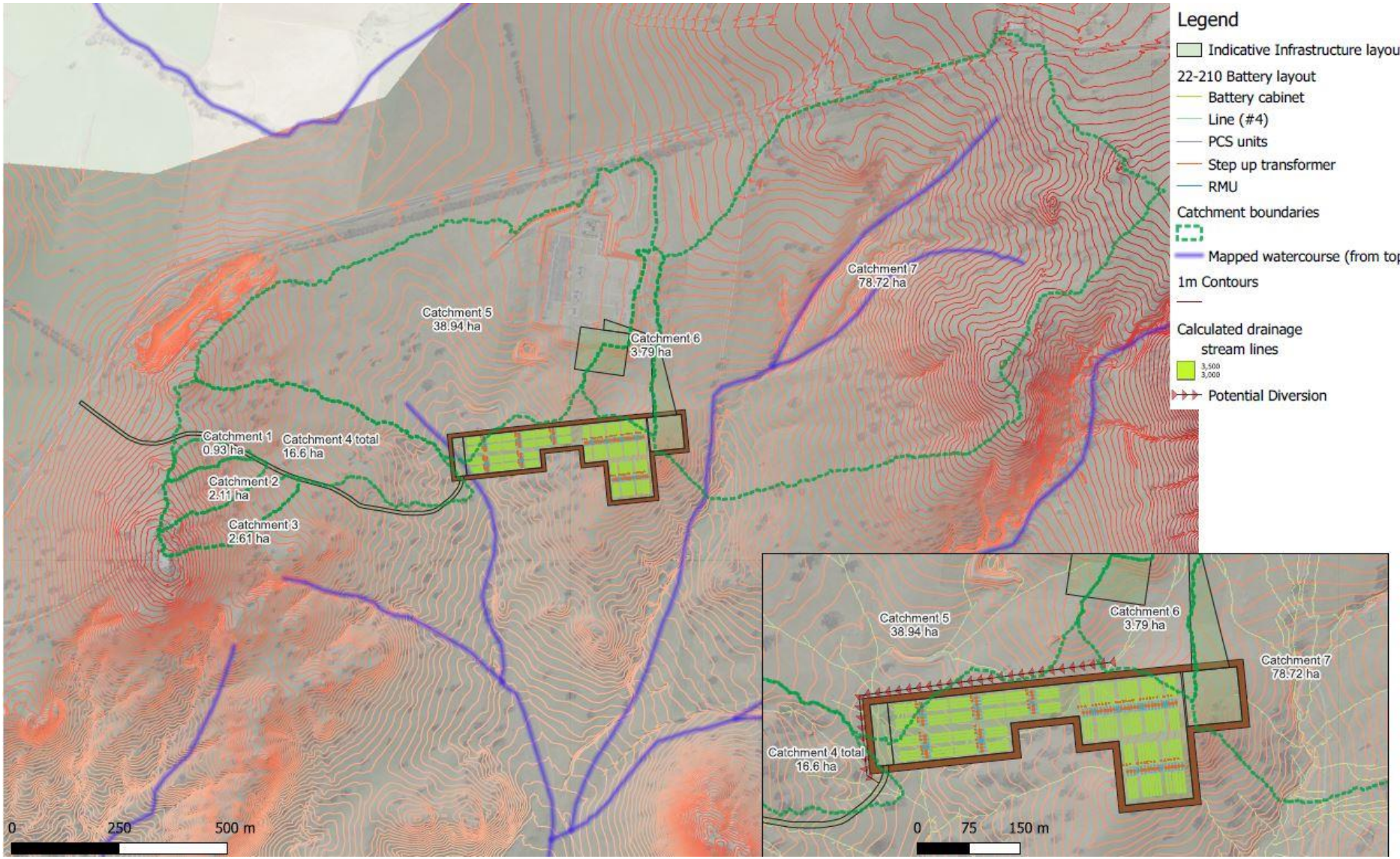


Figure 6-32 Site topography and hydrology (Southeast Engineering and Environmental Pty Ltd (Appendix E.7))

6.8.3 Potential impacts

Construction and decommissioning

Surface water risks

The construction phase has potential to impact water quality and quantity. Construction of the BESS would disturb soils and potentially lead to sediment or other pollutants being present in runoff, mobilising and entering local waterways, adversely impacting on water quality. Activities that may contribute to this include:

- Excavations for the construction of internal roads and associated drainage, parking areas, footings for onsite substation, inverters, battery containers, maintenance building and footings for temporary staff amenities and offices during construction.
- Trenching for underground cable installation.
- Redirection of the onsite 1st order waterway to an area west of the proposed parking and O&M building where it would cross the access road via a culvert (refer to indicative diversion path in Figure 6-32). The redirected water would then re-enter the existing 1st order waterway south of the BESS.
- Construction of hardstand areas and access tracks would result in soil compaction, consequently reducing soil permeability, increasing surface water runoff and the potential for concentrated flows.

Associated soil and water quality risks include:

- Hydrocarbon spill risk from use and re-fuelling of construction vehicles and machinery.
- On-site concreting for building and equipment foundations.
- Wash off from curing asphalt pavement and road seal within the Goolma Road corridor.
- Storage and use of paints, cleaning solvents and other chemicals.
- Pesticide and herbicide storage and use.
- Fertilisers used for revegetation.
- Runoff from waste materials.

During construction, physical disturbance would be confined to the Development Footprint; a small percentage of the site and the only area the Applicant can legally access. Groundcover would only be removed within the BESS facility area and to establish the access track. Concrete footings would be discrete with the majority of the BESS footprint being composed of compacted gravel. Groundcover would be retained beneath the transmission line in accordance with Transgrid easement guidelines.

Soils are slightly to moderately erodible, however, significant bulk earthworks, in particular for the BESS and substation area, may require extensive cut and fill within and upstream of flow paths. This extent and proximity to drainage presents a high risk of the development on downstream water quality and the construction program, without mitigation. A detailed Soil and Water Management Plan would be necessary for the construction phase of the development. This is captured in the Project's environmental safeguards below.

If present, naturally occurring asbestos could present a hazard for construction workers during excavation. Soil surveys undertaken prior to construction would be undertaken to confirm the presence of asbestos in the soil profile. If present an Asbestos Management Plan would be implemented. This is captured in the Project's environmental safeguards below.

During the decommission stage, the potential impacts on water quality and quantity would be similar to construction. It is likely the risk and area of disturbance during decommissioning would be less than construction due the existing access tracks and reduced ground disturbance required, as footings and cables greater than 500mm would remain in place.

Activities with the potential for adverse water quality impacts would be managed through the development of site-specific sediment control plans and spill control plans. Additionally, impacts to local water quality can be minimised by ensuring erosion and sediment control plans include measures to ensure 'Blue Book' (Landcom, 2004) criteria are met prior to discharge of water offsite.

Ground water risks and water sharing / water licences

During construction, the water requirements would total 2.5ML, for a period of approximately 12 - 18 months (peaking during the initial 6 months), refer to Table 6-22.

Table 6-22 Estimated resources required for civil component construction

Resource	Estimated quantity	Sources
Non-potable water for road construction and dust suppression for the construction period	2ML	Truck delivery Harvestable rights from landowner agreements
Potable water for the construction period	0.5ML	Dubbo regional councils water filling stations Bottled water

Potable water would be imported to the site during the construction period. Drinking water required for construction could be purchased directly from Dubbo Regional Council via a water filling station. The potable water supply would be augmented by rainwater collected in tanks installed beside site buildings as constructed. Any requirement for potable water would be limited and confined to the construction phase and would not place pressure on local drinking water supplies. Water for concreting and on-site amenities requires potable water and this would arrive embedded in the premixed concrete or via truck from a potable water source.

The landowners WAL water source allocation would be the primary option for unpotable water sourcing. The total unpotable water required during the 12 month construction period would be 2ML which represents 0.5% of the associated landholder 400ML WAL allocation. This represents a very small fraction of the total water available from the Macquarie and Cudgegong Regulated Rivers Water Source.

Under the EP&A Act section 4.41(g), SSDs do not require a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the Water Management Act 2000. No new aquifers interference would be required for the Project.

The estimates in Table 6-22 are upper limits that take into account drought conditions, where water use may increase particularly with increased requirement for dust management and track construction. Given the construction period of 12 months and minimal water use required for construction, this is considered a low risk. If water becomes hard to source during such periods, polymer dust suppression can be used as an alternative to water trucks but is not preferred by the Applicant. Impacts on water use during decommissioning would be similar in nature but of a lesser volume to those during construction. They are considered low risk and manageable.

Groundwater resources could be impacted by excavations, and it is noted that local ground water is considered vulnerable. Minimal excavation is proposed for slab footings, and the excavation depths, determined during detailed design with further geotechnical information to be collected to inform this, would aim to avoid physical impacts to the groundwater resource. Similarly, contamination of groundwater with chemicals and fuels would be highly unlikely, subject to appropriate storage and handling, and formal spill procedures (spill management is captured in mitigation measures in Section 6.8.4).

Subject to the implementation of the Blue Book measures in the Soil and Water Management Plan, the proposed works are not considered likely to significantly affect surface water quality at or downstream of the site, or groundwater quality.

Clearing of trees can impact on groundwater; saline groundwater can move up through the soil profile if there is a reduction in water uptake and transpiration by trees in the landscape. The clearing proposed during construction is very minor in this context. Most trees on the site would be retained and no significant forest or woodland stands would be removed.

Impacts on groundwater during decommissioning would be similar or less than construction. These works are also considered low risk.

Flooding

The operational footprint would alter surface water drainage patterns and concentration, given the increase in impervious areas of the site. Southeast Engineering and Environmental verified that the access road traverses a number of small drainage depressions from approximately 0.9 to 2.6 ha (Catchments 1, 2 and 3). Flows from these catchments can be managed with standard culvert road crossings. Management of flows in this area is low risk and can be managed with standard unsealed road design and road culvert designs.

The western end of the BESS area sits across a mapped first order watercourse, intercepting a catchment of about 43ha (Catchments 5 and 6) as well as the lower end of a 16.6ha catchment to the east (Catchment 4). Diversion of flows up to the critical design event would be necessary to provide flood protection for the BESS area and to transfer catchment flows in a stable manner to the existing natural watercourse below the site. The Regional Flood Frequency Estimation Model (RFFE) estimates the median 1% AEP flow for combined catchments 5 and 6 at 11.3m^3/s, and for combined catchments 4, 5 and 6 at 15.5m^3/s.

The BESS area intercepts natural drainage from significant catchments that generate significant flows. Flooding and runoff from this area presents a high risk of impact to the development, both during construction and during operation. Detailed hydrologic and hydraulic analysis of these

catchments would be necessary prior to final design, along with the design and integration of a diversion structure with the BESS platform design to provide long term flood protection for the BESS and to transfer catchment flows in a stable fashion to the natural watercourse below the BESS site. An appropriate freeboard for all infrastructure above the 1% AEP flood event, incorporating future climate change intensity estimates should be provided. This is captured in the Project's environmental safeguards below.

A second order watercourse runs to the east of the site draining a catchment of 78.7ha (Catchment 7). The site is at least 5m above the watercourse in this area. The Regional Flood Frequency Estimation Model (RFFE) estimates the median 1% AEP[4] flow for this catchment at 19.6m3/s. Channel grade is approximately 2%. Using a simple Mannings equation (a measure of surface roughness) approach, flow depth for this flowrate in this watercourse is about 1m deep, suggesting that the BESS area would be well above the 1% AEP flood level.

Although in close proximity, there is significant vertical distance between the watercourse to the east and the BESS and substation area. This watercourse presents a low to medium risk to the development. The BESS and substation level should be designed against flood levels within this watercourse and demonstrate that an appropriate freeboard is achieved from this watercourse. This is captured in the Project's environmental safeguards below.

Operation

Ground water risks and water sharing / water licences

During operation, it is estimated that approximately 30,000L per year of non-potable water may be required for general cleaning, landscaping and for bathroom facilities at the O&M building. It is expected that some of this would be obtained from rain water tanks and dams on the site and some would likely be imported. Water for bush fire mitigation is proposed to include a 20,000L non-potable water tank for firefighting purposes.

There are no forecasted potable water requirements during operation.

6.8.4 Mitigation measures

Design measures would be implemented to manage flooding and erosion risks. Soil and water management protocols would be developed to guide construction, operation and decommissioning works. With the implementation of the following measures in Table 6-23, which form commitments of the Project, the impacts are considered manageable.

Table 6-23 Water resources and flooding mitigation measures

Mitigation number	Mitigation measure	Project stage
W1	General • Excavation to be confined to the Development Footprint.	Design

[4] Annual Exceedance Probability; a 1% AEP has a one in a hundred chance of being exceeded in any year. Currently, the 1% AEP event is designated as having an 'acceptable' risk for planning purposes nearly everywhere in Australia).

Mitigation number	Mitigation measure	Project stage
	• Excavation depths to be informed during detailed design by further geotechnical information plus; works must avoid physical impacts to the groundwater resource. Buildings and structures • Finished floor level of all buildings would be designed to ensure an appropriate freeboard above the 1%AEP flood level and outside flood hazard areas, incorporating future climate change intensity estimates should be provided. This is to be informed by further hydrologic and hydraulic analysis in the catchments studied. Electrical infrastructure • All electrical infrastructure including power conversion stations and substation located above the 1% AEP flood level *plus* an appropriate freeboard. Works in waterways • Designed to minimise any hydraulic impact in accord with Laying Pipes and Cable in Watercourses on Waterfront Land (Office of Water, 2010) • Design in accordance with the Guidelines for controlled activities on waterfront land Riparian corridors (NRAR, 2018) Access roads • Floodplain – keep as close to natural ground levels as possible. • Surface treatment – give regard to velocity of floodwaters to minimise potential for souring during flood events.	
W2	Detailed construction Soil and Water Management Plan (SWMP), and construction Erosion and Sediment Control Plan (ESCP), based on soil surveys and geotechnical surveys to be completed in alignment with the Blue Book (Landcom 2004), to include: Detailed understanding of soil properties across the	Pre-construction

Mitigation number	Mitigation measure	Project stage
	site • Construction sequencing strategy • Management of upslope flows • Detailed erosion and sediment controls, including sediment basins in accordance with relevant standards.	
W3	Erosion and sediment controls during construction could include but will not be limited to the following: **General** • Additional erosion and sediment control measures must be implemented and a revised ESCP must be prepared in the event that site conditions or Project design change significantly. • The construction schedule must aim to minimise the duration that any and all areas of soil are exposed to the erosive effects of wind, rain and surface water. • Land-disturbing activities must not cause unnecessary soil disturbance if an alternative construction process is available that achieves the same or equivalent outcomes at an equivalent cost. **Site access** • All site access points will be stabilised in accordance with SD 6-14 or a cattle grid installed. • The primary site access point exiting onto Goolma Road will be monitored for sedimentation, particularly after rainfall. Any sedimentation on sealed, public roads must be removed via sweeping or washing into an installed sedimentation control. **Clearing and groundcover removal** • Clearing is to be delayed as long as possible prior to the commencement of works, particularly within 50m of drainage lines. • All reasonable and practicable efforts must be taken to delay the removal of, or disturbance to, existing groundcover (organic or inorganic) prior to the commencement of works. • Groundcover removal and clearing is to be	Pre construction Construction

Mitigation number	Mitigation measure	Project stage
	staged in a way that minimises ground exposure timeframes. • Where practicable, clearing and grubbing must be immediately followed by specified temporary stabilisation measures prior to commencement of construction. • Sedimentation controls must be installed, where practicable, prior to the commencement of clearing and grubbing. **Erosion control** • Prevention of erosion will be prioritised above sediment control at all times. • Dust suppression will occur when visible dust is sited. Sediment-laden runoff from dust suppression must not run off site, cause a traffic hazard or environmental issues. • All temporary earth bunds and flow diversion systems must be machine-compacted and, if in place for the lifetime of the Project, stabilised with polymer or landscaping techniques (seeding, hydromulch etc.). • Where ground is disturbed and works are not likely to commence within 20 days, or less if a significant rainfall event is forecast, polymer spray (P-47 or similar) should be applied at 5% dilution. Alternate groundcover materials may be utilised for areas not within site drainage lines or adjacent banks. • Where initial disturbance reflects final levels and access is not required for adjacent construction works, landscaping should occur as soon as practicable. **Sediment control** • All reasonable and practicable measures must be taken to prevent the release of sediment from the site. • Suitable access must be provided to all sediment control devices for maintenance purposes. • Sediment control devices must be de-silted and made fully operational as soon as reasonable and practicable after a sediment-producing event. • Dirty water sumps will be dewatered as soon	

Mitigation number	Mitigation measure	Project stage
	as practicable following a rain event, with water to be utilised as dust suppression as first preference. If water is to be discharged into a drainage line or waterway it must comply with water quality parameters outlined in the SWMP. **Stockpile management** • Stockpiling on site is to be limited where practicable and no stockpiling is to be sited within or adjacent drainage lines. • All stockpiles must have sediment controls (earth bund, sediment fence) installed on the downslope side immediately following material placement, unless they are of a temporary nature (<5 days) and no rain is forecast. • All stockpiles must have flow diversion controls (earth bund or similar) installed on the upslope side to minimise erosion of material unless they are of a temporary nature (<5 days) and no rain is forecast. • All stockpiles of erodible material, particularly topsoil and general fill, will be stabilised with polymer spray, rock or similar if material is not to be disturbed for >10 days. • Handling of topsoil shall be undertaken when the topsoil is moist (not wet or dry) to avoid structural decline and avoid stockpiles greater than 2 m in height to prevent structural decline. It shall be stripped and stockpiled separately. Stockpiles shall be stabilised with a groundcover (i.e., geo-textile or similar) if stockpiling is required for more than 6 weeks. **Waterway protection** • If temporary waterway crossings are required, they will be constructed with hard, sound, durable rock free of fine particles and not contaminated with foreign materials. Crossings will be constructed in accordance with SD 5-1. • All chemicals, including fuel, will be stored outside of the drainage lines. If any chemicals or fuels are required within the work area they will be stored in an impervious, bunded container and removed and covered prior to rainfall. Drip trays will be used for refuelling. • Clean water diversions will be implemented	

Mitigation number	Mitigation measure	Project stage
	along the boundary of the BESS area to divert clean water from up-gradient around the site and into the 1st order waterway via a controlled discharge point, downstream of the site. **Landscaping** • No completed earthwork surface will remain exposed for longer than 20 days. • The type of groundcover applied to completed earthworks will be compatible with the anticipated long-term land use, environmental risk and site rehabilitation measures. • A minimum of 70% ground cover must be achieved within 20-30 days of topsoiling. **Site maintenance** • All erosion and sediment control measures, including drainage control measures, must be maintained in proper working order at all times during their operational lives. • All drainage, erosion and sediment controls must be inspected: i. at least daily (when work is occurring on site); ii. at least weekly (when work is not occurring on site); iii. within 24 hours of expected rainfall; and within 18 hours of a rainfall event of sufficient intensity and duration to cause runoff on site.	
W4	Asbestos Management Plan to be prepared and implemented if soil surveys confirm its presence in excavation areas.	Pre construction
W5	An Emergency Response Plan incorporating a Flood Response Plan would be prepared prior to construction covering all phases of the proposal. In relation to flooding the plan will: • Detail who would be responsible for monitoring the flood threat and how this is to be done. • Detail specific response measures to ensure site safety and environmental protection. • Outline a process for removing any necessary equipment and materials offsite and out of flood	Construction Operation Decommissioning

Mitigation number	Mitigation measure	Project stage
	risk areas (i.e. rotate array modules to provide maximum clearance of the predicted flood level). • Consider site access in the event that some tracks become flooded. • Consider appropriate vehicles used to transport staff to and from site, with 4WDs being the preferred vehicle. • Establish an evacuation point. • Define communication protocols with emergency services agencies.	

6.9 Land use compatibility

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Land including:

A detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, permissibility, strategic context and existing site constraints;

An assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including:

- **Agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights;**
- **A soil survey to determine the soil characteristics and consider the potential for erosion to occur; and**
- **A cumulative impact assessment of nearby developments;**

An assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including:

- **Consideration of the zoning provisions applying to the land, including subdivision (if required); and**
- **Completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and**
- **Assessment of the impact on agricultural resources and agricultural production on the site and region.**

6.9.1 Existing environment

Land use

The Development Footprint is zoned as predominantly SP2 Infrastructure under the Dubbo LEP, which energy generation / storage being a special use zone reserved for energy production. Under the Dubbo LEP the objectives of the zone are to provide for infrastructure and related uses and prevent development that is not compatible with or that may detract from the provision of infrastructure. The site was also previously approved in 2009 for a Gas Power Station (refer to Section **Error! Reference source not found.**. Along the westernmost end of the access track w here it crosses into the southern landholder owned lot, the land is zoned as RU1 Primary Production (refer to Figure 1-3).

There are three existing land use activities relevant to the Subject Land, these are:

- Electricity substations and transmission (0.04 ha within the Development Footprint)
- Grazing modified pastures (10.8 ha within the Development Footprint)
- Grazing native vegetation (1.8 ha within the Development Footprint)
- Residential subdivision.

Land use classifications within the region are shown below. It should be noted that the Goolma Road corridor is mapped as grazing native vegetation by the NSW Landuse 2017 v1.2 data managed by Data.NSW (NSW Government , 2022). Detailed investigation of affected road corridor vegetation is included in the BDAR (Appendix E.1) and summarised in Section 6.1. This report suggests that the state government-maintained Goolma Road corridor may be more appropriately classified as a road under the land use mapping.

The main land use on site based on mapping is grazing modified vegetation which in conjunction with Electricity substations and transmission would account for the highest income per hectare on the site. The landowners two property lots (Cadia) are both used for cattle grazing and cover an area of 292.4ha.

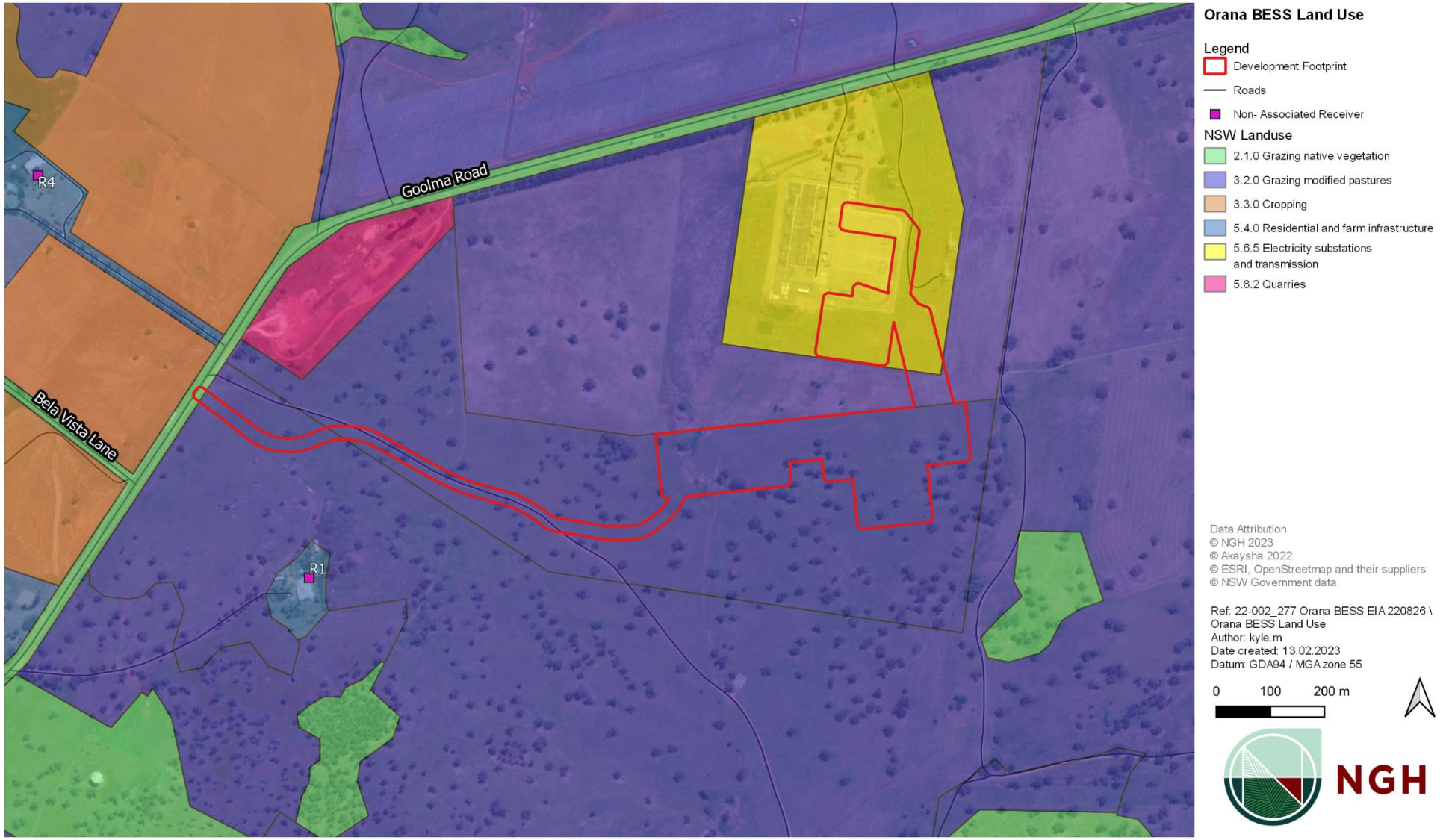


Figure 6-33 Land use within the Development Footprint and surrounds

There are ten residences within 1.5km of the BESS, which includes one Associated Receiver (R9). Surrounding properties are a mix of agriculture including cropping and grazing with large patches of remanent vegetation distributed across the landscape typical of NSW regional areas. Other land uses within the locality of the Project, other than agriculture and residential uses, are outlined in Table 6-24.

Table 6-24 Surrounding land uses of the Project

Land use	Description
Reserves	Mount Arthur Reserve is a Crown Reserve west of Wellington and about 3km west of the Development Footprint. The reserve has been protected since 1911 and is used for public recreation and provides important flora and fauna species habitat (Visit Dubbo, 2022).
Renewable energy projects.	Within the immediate locality and broader region, which is within the Central-West Orana REZ, there are several renewable projects proposed or operating, including (refer to Section 1.4.1 and Figure 1-1): • Wellington South Battery Energy Storage System • Uungula Wind Farm • Wellington North Solar Farm • Wellington Solar Farm • Burrendong Wind Farm • Mumbil Solar Farm • Suntop Solar Farm • Suntop Stage 2 Solar Farm • Maryvale Solar Farm • South Keswick Solar Farm (Dubbo Solar Hub) • 47R Wellington Road Solar Farm.
Industry and commercial use	Transgrid's 330kV zone substation is located directly north of the BESS site and would be directly accessed via a transmission line easement within the Development Footprint. Connection of the BESS so close to a substation means that stored energy would not be lost to the grid through extensive transmission line installations. A small quarry is located north west of the Development Footprint. Its usage is limited to minor council-based operations.
Crown land and paper roads	There is no Crown Land in the form of paper roads associated with the Development Footprint.
Exploration licences and mining leases	The Development Footprint lies within the exploration and mining title (EL6178, Mining Act) of Magmatic Resources Pty Ltd. The title expires

Land use	Description
	on January 19, 2027.

Agricultural use: Land and soil capability

The Development Footprint is located within the Far West and Orana region in which Agriculture occupies 27,461,776ha about 81% of the region (ABARES, 2022). Grazing native vegetation is the most common land use within the region occupying 24,830,169ha or 73% of the region.

Based on gross value of agricultural production, the top three agricultural commodities in in the region are wheat ($944.6m commodity value in the region), cattle and calves ($331.8m commodity value in the region) and Sheep and lambs ($259.9m commodity value in the region). These three commodities contributed 62% of the total value of agricultural production in the region, which is valued at $2,473m.

As of 24 February 2023, there was 2,647 farms within the region, making up 11% of all farm businesses in NSW with grain sheep or grain-beef cattle farms being the most common type of farm.

The Development Footprint is comprised mostly of grazed agricultural pastures and patches of remnant woodland, the proposed transmission line tracks over existing an existing Transgrid asset lot which does not include grazing.

Biophysical Strategic Agricultural Land (BSAL) is land that is considered to be of high agriculture value capable of sustaining high levels of productivity. The Development Footprint includes two areas of BSAL. These areas include the transmission line and civil works area in the Transgrid owned substation lot and a section of land in the west of the site nearby the site access point (refer to Class 3 land in the mapping below); within the Development Footprint these total 3.2ha. The NSW Department of Primary Industries Draft State Significant Agricultural Land Map was also revised and shows a small segment of SSAL in associated with the BSAL area at the site access point, which is part of the adjacent Nanima heritage property estate and is not active agricultural land).

The Land and Soil Capability Assessment Scheme provides land and soil capability (LSC) classes useful for broad-scale assessment of land capability (OEH, 2012). The eight classes describe land capability ranging from extremely high capability land (class 1) to extremely low capability land (class 8). A pre-determined set of biophysical land and soil features including landform position, slope gradient, drainage, climate, soil type and soil characteristics are used to determine potential land and soil hazards. These classes are used to inform long term land management practices with the aim of ensuring degradation to soil, land, air and water resources does not occur.

The BESS component of the Development Footprint is entirely located on land mapped LSC class 6 (low capability land). The transmission line/civil works area in the Transgrid lot and Goolma Road access point is located within class 3 (high capability land). The current activities onsite do generally align with class 6 land which includes low grazing pressure with rotational grazing preferred (OEH, 2012) (refer to Table 6-25 and Figure 6-34).

Table 6-25 Land and Soil Capability Class definitions (OEH, 2012)

Class	Category	Definition	Limitations	Area (ha) and percentage within the Development Footprint
Class 3	High capability land	Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.	Land can be subject to sheet, rill and gully erosion, but is generally considered easily controlled with standard erosion management practices. Salinity and acidity can be moderate hazards.	1.4 11%
Class 6	Low capability land	Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation	Soil erosion can be very severe without adequate erosion control measures. Salinity and acidity can be severe hazards.	11.2 89%

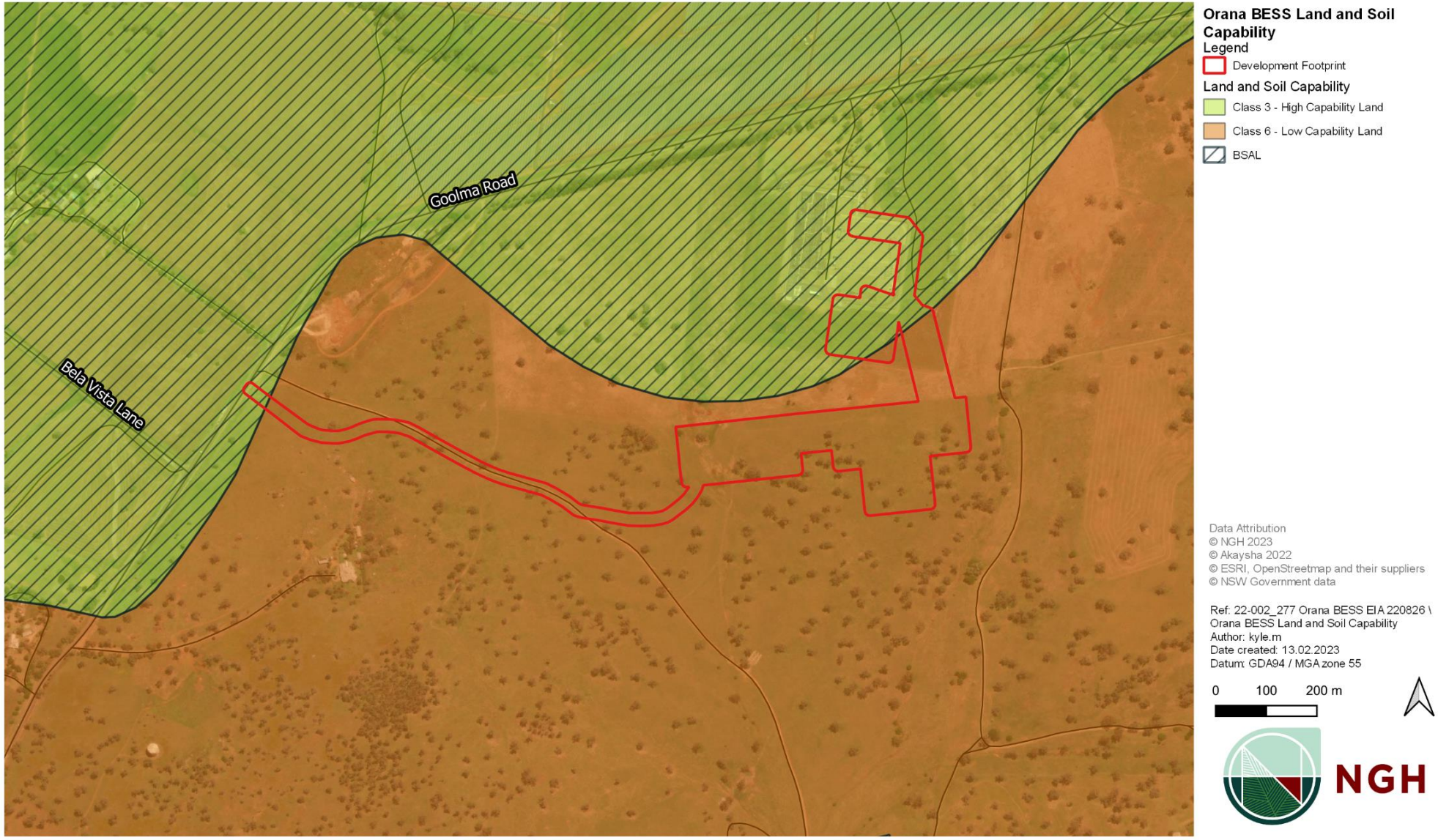


Figure 6-34 Land and Soil Capability

6.9.2 Potential impacts

Current and potential future uses

Key land use impacts relevant to the Project include:

- Construction
    - Land use conflict with existing or adjacent activities – primarily due to noise, visual and traffic impacts associated with earthworks.
    - Land degradation, through physical impacts such as erosion or contamination risks.
- Operation
    - Land use conflict with existing or adjacent activities
    - Land degradation, through physical impacts such as weed ingress or contamination risks.

Compatibility and conflicts: Land Use Conflict Risk Assessment (LUCRA)

A Land Use Conflict Risk Assessment (LUCRA) has been applied to analyse the compatibility of a change in land use as a result of the Orana BESS. A LUCRA has been carried out in accordance with the DPI *Land Use Conflict Risk Assessment Guide* (DPI, 2011). The LUCRA assessment primarily is used focus on agricultural developments but can be used to assess other primary industry such as mining or forestry (DPI, 2011). Given some of the surrounding land uses are different to the proposed BESS, specifically agriculture, this assessment aims to identify and rank potential land use conflicts to ensure they are adequately managed. Where expected conflicts are adequately managed, the rights of the existing and proposed land uses can be protected.

The risk ranking in Table 6-27 has been determined using the risk ranking matrix shown in Table 6-26 , and in accordance with the probability table and measure consequence table in Department of Primary Industries Land Use Conflict Risk Assessment Guide (DPI, 2011). The matrix ranks the risk of impacts according to the probability of occurrence and the consequence of the impact. Probability ‘A’ is described as ‘almost certain’ to probability ‘E’, which is described as ‘rare’. The level of consequence starts at 1 – Severe to 5 – Negligible. The risk ranking from 1 to 25 is a result of the probability and consequence. For example, a risk ranking of 25 is the highest magnitude of risk.

Table 6-26 LUCRA Risk Ranking Matrix

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

Probability	A	B	C	D	E
5	11	7	4	2	1

Potential impacts of the Project are assessed against the land use conflict risk assessment table from the Land Use Conflict Risk Assessment Guide (DPI 2011) in Table 6-27.

Table 6-27 LUCRA assessment for Orana BESS

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
Agriculture and residents					
Agricultural expansion (land opportunities)	C5	4	• The Project would result in the loss of a small proportion of active grazed land (about 6.9ha within the fenced area of the BESS) • All areas outside the BESS could be grazed as the landholder wishes in the remaining area of the 333.3ha Cadia landholding.	C4	8
Contaminated surface water runoff	B3	17	Implementation of a soil and water management plan and an erosion and sediment control plan would minimise the potential impact.	D4	5
Dust	B3	17	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.	C4	8
Fire/ Bushfire	C1	22	Implementation of a Bushfire Management Plan and a minimum 10m APZ would significantly reduce the probability of BESS operation starting a fire or a bushfire damaging the BESS infrastructure.	D3	9
Visual amenity	C3	13	Existing vegetation and topography within the area would screen the Project as identified would substantially mitigate expected impact on visual amenity. Additional planting would be undertaken in accordance with mitigation measures.	C5	4

Identified Potential Conflict	Risk Ranking		Management Strategy	Revised Risk Ranking	
Noise	B3	17	Noise generated during construction and decommissioning stages would be minimised through the implementation of mitigation measures. Where regular maintenance practices are incorporated into operation, noise is not expected to generate a land use conflict.	C4	8
Traffic generation and disruption	B3	17	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 6.3). Traffic is not expected to generate a land use conflict during operation.	C4	8
Weed and pest control	A3	20	Implementation of pest and weed management plan during construction and operation phases.	D4	5
Resource extraction/exploration					
Mining land use	D5	2	The Project would temporarily remove the Development Footprint from exploration and mining activities for the life of the BESS. One mineral exploration title exists over the Development Footprint. After decommissioning, the BESS infrastructure would be removed, and the site made available for alternate land uses including for mining purposes, if desirable.	D5	2

Construction and operation

The range of scores in the mitigated risk rating were medium to low, demonstrating that the proposed construction and operation of the BESS would have minimal impact on the surrounding land uses and is considered manageable with implementation of mitigation measures, which are summarised in Appendix D.

The potential impacts of the Project during construction and operation are discussed in detail below.

Agriculture

The potential impacts of the Project on agriculture are detailed below with respect to *Primefact 1063: Infrastructure proposals on rural land* (DPI, 2013). During operation, the Development footprint would change from agricultural land use to energy storage.

Resource loss and fragmentation

- Agricultural activities would temporarily cease upon commencement of construction in areas within the Development Footprint and areas involved with primary access to the site. However, upon operation, only the fenced area around the BESS would be excluded from agricultural activity.
- The Project would result in the temporary loss of about 6.8ha (BESS fenced area) of agricultural land for the life of the BESS (approximately 35 years. and does not significantly reduce the availability of land for primary production in the region.
- The Project is not placed on land that is of higher quality Land and Soil Capability than the surrounding lands and where there is BSAL land it is not currently under use for agriculture. (refer to Figure 6-34). As such there would be no losses of uniquely high value land to the locality during the construction and operation of the BESS.
- The Infrastructure Layout avoids remnant forest stands and TEC's present on site as much as practicable (Section 6.1).
- Connection to the national grid requires new power lines that would be installed on Transgrid operated land. The lines would not intersect any land which is currently being used for agriculture.

Impacts on farming operations and livestock

- Grazing and agricultural activities would continue within the landowners 'Cadia' property, outside the BESS footprint. The existing landowner is going to continue using the remaining land for production.
- The Project would not affect access or agricultural land uses on surrounding properties during the operation phase. The existing surrounding land uses are known, and the BESS is not considered to be an incompatible land use with a potential to create land use conflicts.
- Best practice waste and wastewater management, fuel storage and re-fuelling and chemical handling would be stringently applied to prevent soil and water pollution.
- Impacts on soils and erosion risk are assessed in Section 6.10, impacts on downstream water quality are assessed in Section 6.8 and impacts on local air quality are assessed in Section 7.2. These assessments conclude that the Project would not be likely to adversely affect land uses or activities on neighbouring properties or elsewhere in the locality, subject to identified mitigation measures.

Biosecurity risks – pests, diseases and weeds

- The increased movement of vehicles, machinery and people to within the Development Footprint, particularly during construction and decommissioning poses the largest risk to biosecurity. Weed seeds can be transported via the tyres and undercarriages of vehicles and clothing of staff resulting in a risk of spreading weeds. Confining vehicles and

machinery movements to formed access tracks during all phases and implementing a wash down procedure for vehicle entering the site would mitigate potential risk of seed dispersal.

- Risk of increasing pest animals (cats and foxes) at the site during operation would be managed by ensuring waste from rubbish bins containing food are covered and regularly removed. Targeted pest management during the operational phase of the Project would control rabbit and fox numbers. Resources and cover for pest species would be reduced grazing pressure and reduced plant matter.
- Preparation of a Weed Management Plan for the construction and decommissioning phases based on Dubbo Regional Council and NSW Weed wise requirements would assist in the management of weeds.
- A temporary construction site compound would be established with the aim of reducing pest animals at the BESS.
- Prior to commencement of construction, representative soil samples would be gathered as part of a specialist soil survey in order to establish baseline data on the existing agronomic characteristic of the soil. The survey would include sampling for soil texture and structure, nutrients, acidity and organic matter.

Residential

Residences located near the site or along the access route may experience temporary noise, dust and traffic during construction. During operation there is a very low likely likelihood for potential visual impacts. Traffic and activities onsite during operation would be minimal compared to construction and are unlikely to generate substantial noise and dust. These potential impacts to residences during construction and operation are best managed through consultation and mitigation measures outlined for each specific issue outlined in Section 6.3, Section 6.7 and Section 7.2.

Exploration licences

There is one mineral exploration licence associated with the Development Footprint. The exploration licence is under title EL6178 held by Magmatic Resources Pty Ltd. The title expires on 19 January 2027. During construction and operation, extraction of any resources within the Development Footprint would not be possible, potentially affecting exploration licence holder. Given the small impact footprint of the Project, the impact to the exploration licence is not considered significant. The relevant exploration licence holders have been notified of these restrictions.

There are no mining leases over the Development Footprint.

Other land uses

During construction and operation of the BESS, there is unlikely to be any impacts on other land uses including:

- Industry and commercial use (transmission line) – minimal impact is anticipated during construction to the existing 132kV transmission line onsite, consultation with Transgrid would be undertaken. All works would be undertaken within land that is zoned for electricity infrastructure.
- Crown Land – there is no Crown land intersecting the Development Footprint.

It is unlikely that any potential mining activities or other land uses would impact on the BESS development.

Decommissioning

The potential impacts of the Project during decommissioning on surrounding land uses is considered to be manageable with the implementation of the mitigation measures presented in this EIS. The Project is considered reversible given the relatively low impact on the soil surface. Following decommissioning, rehabilitation of the site would be undertaken to restore the site to its pre-existing condition. All above ground infrastructure would be removed upon decommissioning and alternate land uses including agriculture and mining could resume.

Potential impacts to surrounding land uses are most relevant to agricultural activities. Existing agricultural land uses, or future agricultural land uses on the Development Footprint or adjacent land are not anticipated to be impacted due to the reversible nature of the Project. The construction of the BESS hardstand and transmission line would not require substantive soil disturbance or extensive excavation. The transmission line occurs over land that is not actively grazed under the ownership of Transgrid. BESS infrastructure would be removed from the compacted gravel hardstand surrounding the site. The hardstand areas would be removed in consultation with the landowner. Following the removal of the hardstand, topsoil would be reinstated, and the area could be revegetated.

A Rehabilitation Plan associated with decommissioning activities would be developed and implemented with the objectives of:

- Returning the land to its pre-solar capability and improving the current state of the land.
- Soil resource management.
- Landform and land use areas.
- Development of completion criteria and monitoring reporting.

The plan would be informed by soil information derived from a soil survey using the Australian Soil and Land Survey Field Handbook (CSIRO, 2009) and The Australian Soil Classification (Isbell, 2021) and the Guidelines for Surveying Soil and Land Resources (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008). Section 6.10 provides a desktop assessment of soils.

Impacts during decommissioning for the other surrounding land uses would be similar to construction and operation, as discussed above.

Cumulative impacts

Cumulative impacts relating to Land compatibility have been assessed in Section 7.3.

6.9.3 Mitigation measures

Table 6-28 Land compatibility mitigation measures

Mitigation number	Mitigation measure	Project stage
L1	A Rehabilitation and Decommissioning Management Plan is to be prepared in consultation with NSW Department of Primary Industries	Design

Mitigation number	Mitigation measure	Project stage
	prior to decommissioning. The Rehabilitation and Decommissioning Management Plan is to include: • Removal of all above ground infrastructure • Reverse any compaction by mechanical ripping. • Verification of a safe, stable and non-polluting site.	Decommissioning

6.10 Soils

This section is a desktop assessment as the site is not considered high risk for soil erosion or considered high value agricultural land (except for sections of the Transgrid lot noted as class 3 land, however this land is not used for grazing). Following approval soil surveys would be carried out following the Australian Soil and Land Survey Field Handbook (CSIRO, 2009) and The Australian Soil Classification (Isbell, 2021) and the Guidelines for Surveying Soil and Land Resources (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008). The soil survey would be used to determine any site species erosion, sediment controls and/or contamination treatments required during construction. The survey would also determine the baseline soil condition which would be referenced when rehabilitating the site.

6.10.1 Existing environment

Water influence summary

The Development footprint is located on generally flat land that falls from 360m to 320m Australian Height Datum (AHD) over the site. There is one 1st order waterway that intersects the Development Footprint.

Further analysis of surface and groundwater is discussed in Section 6.8. There is one groundwater bore within the Development Footprint drilled to a depth of 9.1m, however the bore does not measure water level or salinity.

(GW036380.1.3) with a standing water level (SWL) measurement is located approximately 2.2km to the south west of site. This bore and its measurements are managed by WaterNSW This bore had SWLs of between 10m and 11m from 1980 to 2017 only dropping below 10m once in that period during 2011 (BOM, 2023). Groundwater salinity readings to the south west of site from GW036385.1.1, GW039385.1.1 place salinity in the range of 428µS/cm - 675µS/cm between the years of 1979 and 1987. These levels align with more recent readings from GW273124.1.1 south of Wellington from 2010 with a reading of 604µS/cm. Earlier readings taken at GW025296.1.1 north west of the site from 1968 noted salinity levels around 1723µS/cm and up to 2100µS/cm at bore GW014993.1.1 in a similar location in 1964 (about 1.6km north west of the site). The Development footprint is located in an area mapped as having groundwater vulnerability under the Dubbo LEP. Most of the Development Footprint is mapped as a potential area for terrestrial GDE (refer to Section 6.8. The Development Footprint does not occur on Flood Prone Land.

Soils and geology

The Development Footprint is located within the upper slopes of the South Western Slopes Bioregion. This area is comprised of a large range of rock types which are influenced by topographic variation and rainfall gradients which decrease toward the west. The bioregion lies entirely on the Lachlan Ford Belt consisting of a series of folded bodies. The Wellington 1:100,000 geological sheet places the Development Footprint within Ordovician formations of the Cabonne Group and Silurian formations of the Mumbil Group. Both groups include volcaniclastic sedimentary rocks ranging through sandstone, conglomerate and siltstone. There is also potential for intrusions of basalt, andesite and latite in the geology group.

The soils at the Development Footprint are consistent with the geology described above. The site is within the Nanima S15504na system characterised by rolling low hills of gentle to moderate incline (5-20%) and local relief of 80-150m with moderate fertility, friable surface soils and moderate to high water-holding capacity. Limitations to the soil landscape include steep slopes with rock outcrops, very high erosion hazard under cultivation. A small section of the site around the Transgrid substation is classified under the Bodangora (bz) soil landscape. Both soil profiles are classified as slightly to moderately erodible.

Over the Development Footprint the mean slope is approximately 3.2% based on the 5m Digital Elevation Model (DEM). Isolated sections of the site exhibit slopes up to 10%; this occurs through the access route and the south eastern corner of the BESS footprint. The soil type is expected to be alluvial and may have poor drainage in low-lying areas and poor trafficability when wet.

Exposed soils on the site are limited, and only notable along the internal gravel access road. Within the 1st order waterway it was noted on site, following a period of wet weather in September 2022, that soils were exposed due to trampling of soft soils; this is evident in Figure 6-37. No further notable erosion features have been observed on site to date.

Figure 6-35 Development Footprint's stable pasture cover, showing little active erosion

Figure 6-36 Wooded area within the broader Development Site

Figure 6-37 Livestock disturbance

Acid sulphate soils

See Section 6.8; the Development Footprint is not mapped as having acid sulphate soil potential.

Contamination

A search of section 58 of the NSW *Contaminated Land Management Act 1997* (CLM Act) on 27 February 2023 indicated that the suburbs of Wellington and Wuuluman has not been registered on the Record of Notices. There are six notified sites under section 60 of the CLM Act with regards to the Duty to Report Contamination. The closest section 60 contaminated site is Woolworths petrol located 2.3km southwest of the Development Footprint which would not affect the Project.

It is noted that the site has a history of agricultural land use and as such, agricultural sites may contain buried rubbish including contaminants, such as herbicides, that may be encountered during excavation. No visual indications of potential sources of contamination were identified during the site assessment.

6.10.2 Potential impacts

Construction

The proposed disturbance area for the Development Footprint is approximately 14.8ha. Construction activities that may adversely impact soils include the use of equipment and earthworks.

The construction of the BESS would disturb soils through the following activities:

- Compaction during construction of the access track and APZ area
- Construction of perimeter security fencing
- Hardstand foundations for the BESS container footings, substation and office
- Establishment of temporary staff amenities and offices for construction
- Civil works association with option 1 overhead transmission line connection to the Transgrid substation/alternatively option 2 would disturb soils through underground trench works
- Localised areas of earth work (cut and fill, grading and compacting) may be required in areas where there are sudden, significant changes in ground slope.
- Excavation of cable trenches 600mm to 900mm wide and 1m deep
- Vegetation clearance (up to 14.8ha).

The soil disturbance has the potential to result in the following impacts:

- Reduce soil stability and increased susceptibility to erosion due to vegetation removal or soil exposure, especially if the subsoil is dispersive
- Loss of topsoil and impacts on waterways due to increased erosion and sedimentation hazard
- Reduced soil permeability and increased run-off as a result of soil compaction for internal access roads and hardstand areas
- Risk of exposing buried contaminant (pesticides and hydrocarbons).

Ground cover would be maintained where possible during the pre-construction and construction stages of the Project and would be rehabilitated upon decommissioning.

Erosion and sedimentation impacts that may arise as a result of construction and decommissioning works can be minimised by carrying out the activities in accordance with the provisions of the *Managing Urban Stormwater: Soils and Construction "Blue book"* (Landcom, 2004).

Site specific erosion and sediment control requirements would be informed by a post approval soil survey prior to construction using the Australian Soil and Land Survey Field Handbook (CSIRO, 2009) and The Australian Soil Classification (Isbell, 2021) and the Guidelines for Surveying Soil and Land Resources (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008). This survey would also validate the absence or presence of soil contamination and present remediation requirements if needed.

Operation

Activities associated with the operation stage would be mostly confined to formalised access tracks. Vehicle access would be infrequent and limited to the access track and parking area.

Soil disturbance would be minimised by rehabilitation measures undertaken during construction and establishment of groundcover following soil disturbance activities. The risk to soil impacts is considered low with the implementation of appropriate mitigation measures.

During operation, the primary land use would transition from agricultural land use to energy storage however this would be limited only to the relatively small (about 6.9ha) fenced area of the Project.

Decommissioning

When the BESS is decommissioned, all above ground infrastructure, with the possible exception of the 132kV substation, would be removed and decommissioning and rehabilitation of the site would commence. All buildings would be removed, including all battery components and their associated footprints. Cabling would be removed where practical and recycled. Any cabling greater than 500mm below the ground may be left in place since this would not impact on future agricultural activities on the site once the restoration is complete.

Following decommissioning, rehabilitation of the site would be undertaken to restore the site to its to a standard that could facilitate the existing land use (cattle grazing), this would be informed by the soil survey for baseline soil conditions and a Rehabilitation Plan.

6.10.3 Mitigation measures

Table 6-29 Land compatibility mitigation measures

Mitigation number	Mitigation measure	Project stage
S1	A construction Erosion and Sediment Control Plan (ESCP) shall be prepared for the Project in accordance with Landcom's *Soils and Construction: Managing Urban Stormwater* (2004).	Construction
S2	The design, construction and decommissioning of the Project shall minimise the extent and duration of ground disturbance and avoid ground disturbance near waterways.	Construction Decommissioning
S3	Where ground disturbance is required the vegetation (organic matter) shall be retained and reused during rehabilitation where possible.	Construction Decommissioning
S4	Handling of topsoil shall be undertaken when the topsoil is moist (not wet or dry) to avoid structural decline and avoid stockpiles greater than 2 m in height to prevent structural decline. It shall be stripped and stockpiled separately. Stockpiles shall be stabilised with a groundcover (i.e., geo-textile or similar) if stockpiling is required for more than 6 weeks.	Construction Decommissioning
S5	A Revegetation Plan (operation) and Rehabilitation Plan (decommissioning) shall be prepared and include stabilisation and topsoil amelioration (e.g., incorporation of organic matter to	Construction Operation

Mitigation number	Mitigation measure	Project stage
	improve soil structure or gypsum to improve structure, reduce hard-setting surfaces and reduce soil dispersion).	Decommissioning
S6	Subsoils disturbed during construction and with an exchangeable sodium percentage above 6% shall be treated with gypsum to increase the levels of calcium and magnesium, and thus lowering the exchangeable sodium percentage and the dispersiveness of the soil.	Construction Decommissioning
S7	Avoid altering the groundwater and surface water regime to prevent mobilisation of any salt stores, however low, in the soil.	Construction
S8	Complete a soil survey according to the Australian Soil and Land Survey Field Handbook (CSIRO, 2009) and The Australian Soil Classification (Isbell, 2021) and the *Guidelines for Surveying Soil and Land Resources* (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008) and reference it in the ESCP, SWMP and when rehabilitating the site.	Pre-construction

6.11 Non-Aboriginal heritage

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Heritage:

Assess the impact to historic heritage having regard to the NSW Heritage Manual.

This chapter provides an assessment of the non-Aboriginal heritage undertaken by NGH within or adjacent to the Project and determines whether there are any impacts to non-Aboriginal heritage.

6.11.1 Approach

The Heritage Impact Assessment was prepared in accordance with the following guidelines and publications:

- *Assessing Heritage Significance* (NSW Heritage Office, July 2001)
- *The NSW Heritage Manual*
- *The Burra Charter – The Australia International Council on Monuments and Sites (ICOMOS) Charter for Places of Cultural Significance* (ICOMOS, 1999).

The primary piece of State legislation protecting environmental heritage items in NSW is the NSW *Heritage Act 1977.* Items of environmental heritage under the Act are listed on the NSW State Heritage Register and are afforded automatic protection against any activities that may damage an

item or its significance under the Act. Under Section 170 of the Heritage Act, State agencies and authorities in NSW are required to keep a register of heritage places for which they are responsible.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to those items which are of World, Commonwealth or National heritage significance.

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land use planning and development consent process, with local heritage items being listed under their relevant Local Environmental Plans.

6.11.2 Existing environment

The Subject Land is associated with the pastoral industry in the Wellington/Dubbo/local region.

There has been relatively minimal disturbance to the Subject Land other than from previous pastoral activities. The Wellington region was subject to European settlement from the 1820s. The Development Site was part of the Nanima Estate that was a large pastoral and agricultural property originally owned by J B Montefiore who acquired the Nanima Estate in the 1830s. The Subject Land is also associated with gold mining or prospecting as it was within both the Stony Creek and Ironbarks goldfields (at the northern part of the site) and the Macquarie River Gold field (in the south). Gold prospecting took place in this area from approximately the 1880s to 1900 (County of Bligh, Parish of Nanima Sheet 1 Edition 1 1886 map). Historic maps also show that a Council gravel pit (to the west of the Subject Land) was established after 1925 on Goolma Road (County of Bligh, Parish of Nanima Sheet 1 Edition 6 1924 Map). Parish maps also reveal that the area was identified as an animal and bird sanctuary (proclaimed on January 11th,1946), with a transmission line easement running through the Subject Land. The Wellington substation is also marked on the 1956 Parish Map (County of Bligh, Parish of Nanima Sheet 1 Edition 8 1956 map).

The area to the north of the Subject Land (which includes the Wellington substation) was also largely cleared prior to the construction of the substation. Historic aerial photographs show that other than vehicle tracks there is little evidence of significant change within the Subject Land from the second half of the twentieth century, with most extant trees/vegetation areas in the Subject Land visible in aerial imagery from the 1960s to the present. The drainage line on the eastern edge of the Subject Land is visible in past aerial imagery, but the central drainage line is not.

While the above sources reveal some non-Aboriginal use of the site, the history of the Subject Land since the 1820s (using aerial imagery and parish maps as the primary documentary sources) indicates that the historic archaeological potential of the site is low. Any unexpected find within the Subject Land would, if found, likely relate to the previous pastoral history and could include roads and tracks, fences, gates and metal items, for example nails and structural fittings, horseshoes and accessories.

Desktop Review

A desktop review of the following heritage registers was completed on 23 January 2023:

- The State Heritage Register
- Dubbo Regional Council LEP 2022
- Section 170 State Agency Heritage and Conservation Registers (State Heritage Inventory)

- Commonwealth Heritage List
- National Heritage List
- World Heritage List, and
- The Register of the National Estate.

The results of the Australian Heritage Database search reveal that:

- There are no sites on the World Heritage List within or near the Development Site.
- There is one site on the National Heritage List within the Dubbo Regional LGA, being the Wellington Caves on the Mitchell Highway. The Wellington Caves are not located in or near the Subject Land.
- There is a single site on the Commonwealth Heritage List within the Dubbo LGA: the Wellington Post Office. The Wellington Post Office is not within or near the Subject Land.
- There are 43 sites on the Register of the National Estate (a non-statutory archive) that are located within the Dubbo Regional LGA. None of the 43 sites on the RNE are located within the Subject Land. One item is located near the Subject Land: Nanima Homestead is located to the immediate south-west of the Subject Land.

The results of the NSW SHI database search reveal that:

- There are fifteen (15) previously recorded heritage sites listed on the State Heritage Register within the Dubbo Regional LGA. Four SHR-listed sites are in Wellington, but none are located within or adjacent to the Subject Land.

There are 414 previously recorded heritage sites listed on the LEP within the Dubbo Regional LGA, of which 64 sites are located in Wellington. While none of the recorded heritage sites are located within the Subject Land, there are two adjacent heritage-listed homesteads located in proximity to the Subject Land as shown in Figure 6-38.

The desktop review identified two listed non-Aboriginal heritage items within one kilometre of the Subject Land. These are described in Table 6-30.

Table 6-30 Non-Aboriginal Heritage Items within one kilometre of the Subject Land

Item	ID	Significance	Address	Distance from project / direction
Nanima Homestead	I51	Dubbo Regional LEP 2022	7009 Goolma Road Montefiores, NSW 2820	The closest part of the curtilage is adjacent to the south-west of the Subject Land and adjoins the Development Site boundary for approximately 540m
Keston Homestead	I50	Dubbo Regional LEP 2022	6938 Goolma Road Montefiores, NSW 2820	The curtilage lies to the north-west of the Subject Land on the far side of Goolma Road adjacent to a potential road upgrade area and adjoins the Development Site boundary for

Item	ID	Significance	Address	Distance from project / direction
				approximately 420m

No other known previously recorded heritage sites are located within or adjacent to the Subject Land.

Site Inspection

A site inspection was completed on 24 November 2022. The Subject Land was traversed methodically across the full site. During the site inspection, the closest surrounding items of listed heritage significance – the shared boundaries with LEP I50 and I51, Nanima Homestead and Keston Homestead - were inspected from the Subject Land to assess any visual impact of the proposed works on the views to and from each homestead. While access to each homestead was not possible and the view was assessed at the boundary to the adjacent properties, the view from each homestead was considered and it was possible to ascertain sight lines, vegetation and topography from the property boundary.

A summary of the items of heritage significance adjacent to the Subject Land is shown in Table 6-31.

Table 6-31 Heritage items in or near the Subject Land (showing distance, topography and vegetation between the Subject Land and the adjacent homesteads)

Item	Description	Photograph
Nanima Homestead I51 Dubbo Regional LEP 2022	One of the most socially interesting, unusually designed and intact Edwardian rural homesteads in New South Wales. The interior is distinguished by the extent of original decoration and the large top-lit central living hall. The house is still in the possession of the Barton family (2012) but for sale, the forbears having built it. The site is threatened by the proposed gas fired power station on an adjoining site where the emission noise threatens to make the residence uninhabitable (OEH 2022).	

Item	Description	Photograph
Keston Homestead I50 Dubbo Regional LEP 2022	The residence is historically significant due to its aesthetic qualities as a good example of the Victorian Italianate style and its connection to the financial development of Wellington and district. Historically, Keston was the home of Henry Nancarrow who was prominent in the political life of Wellington and its early industrial development. The house has a connection with the financial and industrial development of the town and district. Keston is an aesthetically attractive house with a prominent position on the brow of a hill allowing views to and from the site (OEH 2022).	

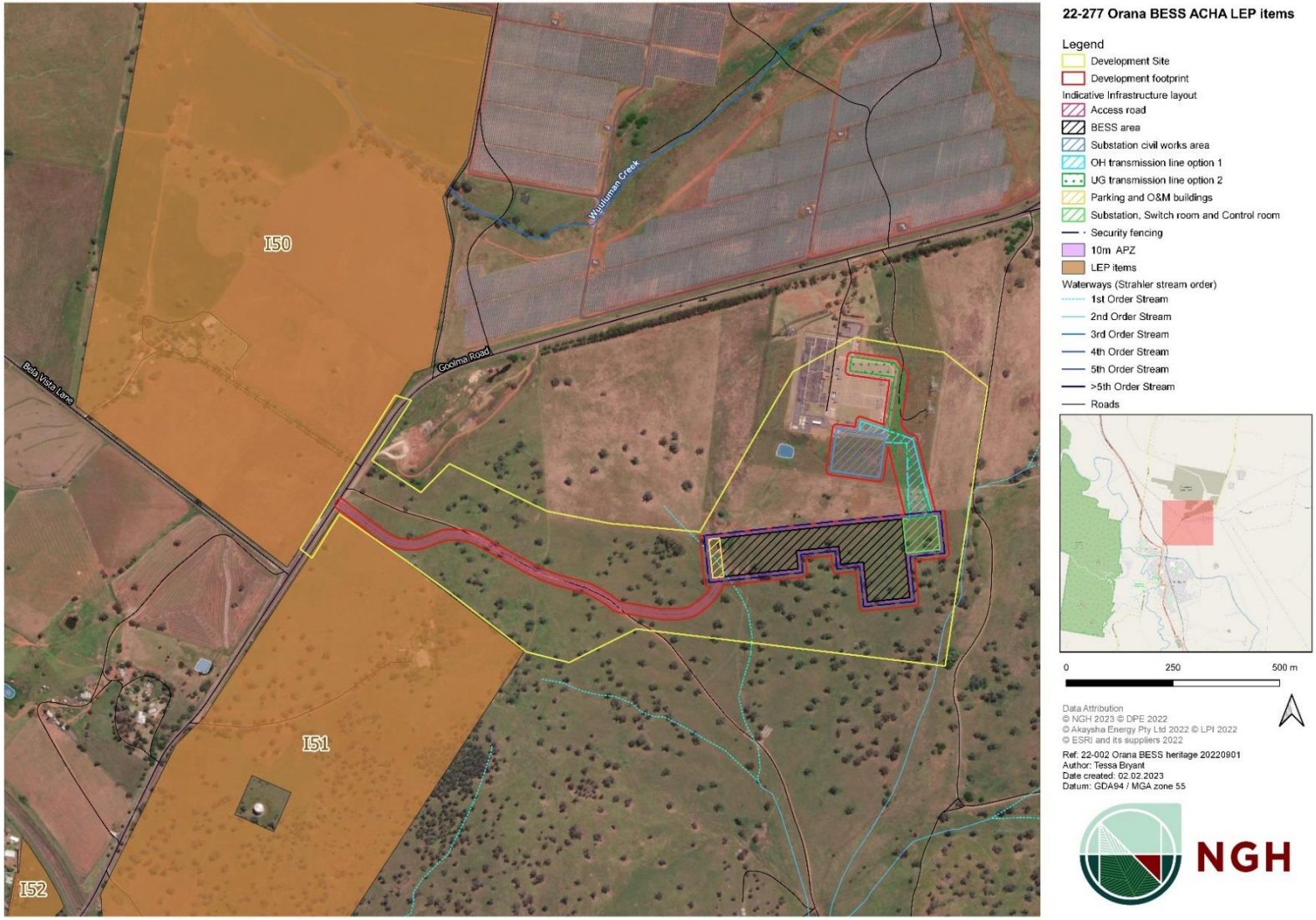


Figure 6-38 Non-Aboriginal Heritage items within proximity of the Subject Land

6.11.3 Potential Impacts

Construction of the Project would not result in impacts to listed Commonwealth, State or local heritage items.

The Project would be developed on a parcel of land located adjacent to existing electrical infrastructure (Wellington 330kv substation). There is little likelihood of impacts to the two LEP-listed local heritage items from the construction activities. Despite the curtilage of the listed area extending to the property boundary adjoining the Subject Land boundary, the Nanima Homestead and its associated outbuildings are all some distance from the proposed BESS (approximately 640m) and approximately 200m from the proposed access track at its closest approach.

The view to Nanima Homestead (I51) from the Subject Land is largely occluded by mature plantings surrounding this item. Visual impact measures are considered in Section 6.6. The Keston Homestead (I50) is located even further from the Subject Land (more than 1 kilometre away).

Following a site inspection and documentary research, it is assessed that any potential impacts to the heritage values of the two locally listed heritage items (I50 and I51) is negligible and may involve a minor visual impact (the Subject Land being visible from the curtilage of Nanima Homestead). Therefore, no further heritage assessment is recommended.

Operation and Decommission of the Project is not likely to result in impacts the listed items or any other Non-Aboriginal heritage aspects.

6.11.4 Mitigation measures

Table 6-32 Non-Aboriginal heritage mitigation measures

Mitigation number	Mitigation measure	Project stage
NAH1	Should an item of historic heritage be identified, the Heritage NSW would be contacted prior to further work being carried out in the vicinity in accordance with the Non-Aboriginal heritage unexpected finds procedure in Section 6.11.4 of the EIS.	Construction Operation Decommissioning

Non-Aboriginal heritage unexpected finds procedure

An unexpected heritage item means any unanticipated discovery of an actual or potential heritage item, for which the Proponent does not have prior approval to disturb or does not have a safeguard in place to manage the disturbance.

These discoveries are categorised as either:

a) Aboriginal objects
b) Historic/non-Aboriginal heritage items
c) Human skeletal remains.

This procedure relates specifically to Historic/non-Aboriginal heritage items. For Aboriginal objects and Human skeletal remains refer to the ACHA.

If suspected Historic/non-Aboriginal heritage items are discovered on site then the following procedure should take place:

1. all work should cease in that area and notify a Project Manager or Supervisor immediately of the find,
2. A 'no-go' zone should be established around the find, using visibility fencing (where applicable),
3. Inform all on-site personnel and staff of the find and the demarcated 'no-go' zone,
4. Contact a qualified archaeologist/heritage consultant to inspect the find and provide recommendations.
5. In the event that human remains are identified, follow the ACHA protocol
6. Once clearance of the site has been given by the qualified archaeologist/heritage consultant then works may proceed within the 'no-go' zone UNLESS specifically instructed by the professional that no further works can be completed.

6.12 Social and economic impacts

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Social impact:

Including an assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPIE, Nov 2021);

Economic:

Including an assessment of the economic impacts or benefits of the project for the region and the State as a whole;

A Social Impact Assessment (SIA) was prepared by a suitably qualified NGH Environmental Consultant specialising in social impact, in accordance with DPE's *Social Impact Assessment Guidelines 2021*, to consider potential socio-economic impacts presented by the Project. The SIA aims to identify, predict and evaluate the likely social impacts arising from the Project, and to propose appropriate responses to mitigate and manage negative impacts and enhance positive benefits. The assessment addresses the SEARs outlined above and is summarised below and appended in full in Appendix E.8.

6.12.1 Approach

This SIA has been undertaken in line with the Social Impact Assessment Guideline (DPIE, 2021b) and accompanying Technical Supplement. Key steps included:

1. **Impact scoping**. This involved an initial identification and preliminary assessment of the likely social impacts of the Project. Informing this was Project information, engagement findings from the Project Scoping process, comparative studies, and other relevant work completed to date.

   Social impacts and opportunities were identified across the following eight domains: way of life, community, accessibility, culture, health and wellbeing, surroundings, livelihoods and decision-making systems. In this, direct, indirect and cumulative impacts were accounted for.

Through this process, impact scoping set the social locality, and framed the scale and depth of the SIA. Considered judgements - based on the extent of cumulative impacts and the degree of material social impact - were then made regarding the type and level of further assessment to be undertaken for each potential impact.

2. **Characterisation of the social baseline**. The baseline provides a snapshot of existing social conditions within the social locality, establishing a base case against which potential impacts can be assessed. Data was obtained from desktop research of publicly available information (e.g., from the Australian Bureau of Statistics, New South Wales Government and local government websites), a review of the stakeholder and community engagement reports, and SIA specific consultation.
3. **Targeted SIA consultation**. To inform and validate the social baseline and assessment of social impacts, eight telephone interviews were carried out with key stakeholders from local government, industry and community. These interviews were supplemented by input into, and review of findings from, the stakeholder engagement team's online information sessions and online surveys.
4. **Evaluation of social impacts**. This built on the impact scoping, and involved further review of relevant inputs e.g., relevant EIS technical reports, stakeholder and community engagement findings, and comparative studies. An assessment was then carried out to determine the likely significance of each potential impact, based on its predicted magnitude and likelihood.
5. **Identification of management, mitigation, and enhancement measures**. Measures to avoid, minimise or mitigate potential negative impacts and enhance positive benefits have been developed to address impacts identified as being of medium or higher significance. A brief assessment of residual impacts post-application of mitigation measures was then undertaken.

This SIA was informed by the principles of best practice as outlined in the Social Impact Assessment Guideline (DPIE, 2021b), ensuring that the SIA is evidence-based, precautionary and responsive to the local context.

6.12.2 Existing environment

Social baseline

Socio-economic planning context

Land-use planning at the regional level is guided by the *Central West and Orana Regional Plan 2041* (the Regional Plan) (DPE, 2022a). The Plan is strongly focused on the transition of the regional economy, driven by the Activation Precinct, Inland Rail and the REZ. The location of the Project within a REZ is the key driver of its need for the NEM.

At the local level, socio-economic strategic planning is guided by the *Towards 2040 Community Strategic Plan* (DRC, 2022b). This plan supports the Regional Plan's position regarding renewable energy development, stating:

> *Investment in renewable energy opportunities is encouraged and supported.*

Housing is also recognised as a key social issue; key objectives are outlined that address both housing affordability and availability. There is also a focus on ensuring local realisation of economic opportunities from the development boom.

Community past experiences with renewable energy projects

The Wellington community has recent experiences with renewable energy developments in their area, and these projects have not always left favourable impressions on the community. Consultation highlighted that in particular, the community 'lost heart' with the Wellington Solar Farm due to a range of factors including:

- Relationships - perceptions that the Applicant didn't treat the community with respect
- Local employment – there was very limited local employment in the construction phase
- Engagement – 'people were not kept in the loop'
- Visual impact – the Wellington Solar Farm is highly visible
- Housing and accommodation – there were large increases in rents during the construction phase
- Agricultural land – perception that the Project was situated on what was good farming country, and that much damage was done to the landscape in its construction (i.e., the land was heavily graded and much imported material was brought in).

Including regard for other recent renewable energy projects, the influxes of construction workers into Wellington have caused noticeable impacts – both positive and negative – for the community. When construction workers moved into Wellington for several months at a time for the construction phases of various projects, these were boom times for some local businesses. Consultation indicated that pubs, clubs, motels, and hotels 'did a roaring trade', as did some landlords, who increased rental prices during these periods. On the other hand, some negative experiences include increases in rents for community members (which contributed to community discontent), temporary accommodation was rented out to capacity and become overcrowded with construction workers, Community discontent – e.g., during COVID lockdowns, construction workers were allowed to travel between their homes and Wellington, yet residents couldn't travel. This upset the community, disruption to people's way of life – residents sometimes felt 'put out' by the change to their way of life, e.g., it become hard to book a table at a dining venue, change in community feel of the town.

Consultation strongly indicated that the community highly values the community benefit schemes and participatory processes of some of the other local projects (e.g., the Uungula and Bodangora Wind Farm). The community would like to see more benefit spread from such schemes.

Population and demographics

The population of Dubbo LGA in 2021 was estimated to be 54,992 people. At that time, Wellington had an estimated population of 4,581 people. Over the 20 years 2021-2041, Dubbo LGA's population is expected to grow by 0.8% (low compared to NSW's projection of 21%); most of this growth would be in the older and younger age groups (DPE, 2022c). The Wellington and Montefiores areas are predicted to have little to no growth over this time (Remplan, 2023).

Wellington has a slighter older population profile (median age 41 years) than does Dubbo (median age 36 years).

In terms of cultural diversity, the town of Wellington has a large Aboriginal and Torres Strait Islander population. There are 1,253 First Nations people living in Wellington, who together make up 27% of the population (compared to 17% for Dubbo and 3% for NSW). Both Wellington (79%) and Dubbo LGA (82%) have higher proportions of Australian-born residents than does NSW (65%), and low proportions of non-English languages being spoken at home.

There are many people who live alone in Wellington (36% of all households) as compared to Dubbo (27%) and NSW (25%). As such, Wellington has a lower proportion of family households (62%) than does Dubbo (70%) and NSW (71%). Of those family households, there is a higher proportion of single parent families and lower proportion of couple families with children in Wellington than in Dubbo or NSW.

Housing and accommodation

Most of the housing stock in Wellington and Dubbo is separate houses (90% and 83% of total dwellings). Thirty-six percent of homes in Wellington are owned outright (higher than Dubbo 30% and NSW 32%). Twenty-six percent of homes are mortgaged (slightly less than Dubbo 34% and NSW 33%).

Housing is relatively cheaper in Wellington; median mortgage repayments are significantly less than Dubbo and NSW medians, as are median rents. Rates of households in mortgage stress are significantly lower in Wellington and Dubbo than in NSW. Dubbo has a lower rate of households in rental stress (26%) than both Wellington (33%) and NSW (36%).

Like many areas in NSW, housing affordability and availability are key issues in Wellington and the Dubbo region. In the LGA broadly, increased development activity coupled with increased migration resulting from the COVID-19 pandemic has strongly lifted local housing demand (DRC, 2022). In Wellington in particular, previous influxes of construction workers hugely affected the housing market. Increased demand, exacerbated by the ability of contractors to pay higher prices to house their staff, pushed up rental prices. One stakeholder noted that these conditions 'more than doubled the rental price market', as rents 'went from $300 per week to $700-$900 per week' during construction'. Some locals became 'priced out' in the changed rental market, which led to difficulties for some local people, including families.

Since 2016, within the Central West broadly, there has been a rapid growth in short-term rental accommodation in the region, catering primarily to tourists and providing accommodation for seasonal or temporary workers. Within Wellington, consultation highlighted that at times of workforce influxes, hotels and motels were rented out to capacity. In a general sense within the region, this is known to impact on the visitor economy as tourists seek accommodation outside the region (DPE, 2022a). In terms of short-term accommodation, there are many hotels, motels and caravan parks in Wellington and Dubbo and surrounding areas.

As well as impacting on the local community's cost of living, limited housing and accommodation can also be a critical barrier to delivering the REZs on time and within budget (OECC, 2022b). These issues are well recognised by local and state government. In particular, the Regional Plan has a strong focus on the current context of housing and accommodation shortages. There is also a Regional Housing Taskforce which is coordinating regional housing policy and action. There is common understanding of the need to ensure adequate accommodation is available to residents and non-resident workers, while also supporting the tourism industry (DPE2022a).

Employment and industry

The Central West Orana's (CWO) economy is strong and diverse. In particular, the region has solid agribusiness, mining and construction sectors and a fast-growing renewable energy sector (DPE, 2022a).

Consultation highlighted that the Dubbo area is experiencing much growth in housing and population, amid much development activity. Wellington was noted as a town that has experienced less prosperity. Some stakeholders noted that Wellington 'is a bit of a ghost town' and that the 'main street is really struggling'.

Median weekly incomes in the Dubbo region ($1,597) were below the NSW average ($1,829), and considerably lower in Wellington ($1,060). Wellington also had a significantly higher unemployment rate (8% as compared to 4% for Dubbo and 5% for NSW). Socio-economic indexes of advantage and disadvantage (SEIFA) developed from the 2016 Census showed that the Wellington area was relatively disadvantaged compared to the broader region. On a decile scale where 1 indicates greater relative disadvantage and 10 indicates greater relative advantage, Wellington had a SEIFA decile of 1, compared to 5 for the Dubbo LGA (ABS, 2018).

Consultation confirmed that there is a concentration of intergenerational disadvantage and related to this, people who have been long-term unemployed, in Wellington. Despite this, it was noted that with all the development activity in recent years, some long term unemployed have been taking up some work opportunities.

The Wellington area has a significantly lower proportion of people (9%) who have attained University level higher education than NSW (28%). In terms of those with Certificate or Diploma level qualifications, Wellington is on par with the NSW average (24%), and slightly less than Dubbo LGA (27%).

The main industries in the LGA are health, retail, and education and training. Other key industries include government services, tourism, manufacturing, construction, agriculture, business services and transport (DRC, 2022). In 2021, the largest industry of employment in both the LGA and Wellington was health care and social assistance (19% and 16% respectively). Construction, retail trade, accommodation and food services, education and training, and public administration and safety were other key drivers of jobs growth (ABS, 2021). The LGA is also home to several large-scale renewable energy projects and is seeing greater investment in this area (DPE, 2022b).

As with many, the region is experiencing key skills shortages which pose a real challenge for the renewable energy developments in the area (OECC, 2022). Existing regional workforce shortages are expected to be exacerbated by the construction of major development projects over the coming years (e.g., the Inland Rail near Narromine, water infrastructure projects and the New Dubbo Bridge) (OECC, 2022b). This was a key point raised during SIA consultation; there is a very tight labour market in the area and very low unemployment in the Dubbo region.

Land tenure, use, and local agricultural production and trends

Agriculture has been a mainstay, along with mining and manufacturing, of the CWO's economy (DPE, 2022a). Agricultural production in the CWO is diverse and includes irrigated cotton, lucerne, winter cereals, horticulture as well as extensive areas of dryland cropping, livestock grazing (beef, sheep and wool), and timber production (DPE, 2022a). Agriculture, farming and fishing contributed $2,113m to the regional economy in 2016, and agriculture supports an extensive local value chain (DPE, 2022a).

The area surrounding the Subject Land has seen much change in recent years, changing from farmland to more industrial use. The Subject Land itself is zoned for infrastructure (electricity supply). The site is immediately adjacent to the existing Transgrid substation and is proximal to a

number of other renewable energy developments. The site was previously intended as the site for a gas-fired power station; however, these plans were withdrawn with the rise of renewable energy. The Uungula Wind Farm, Wellington Solar Farm and the correctional centres are also co-located on Goolma Road.

Health and wellbeing

Levels of individual and community health and wellbeing are closely related to the social environment and circumstances. Factors such as conditions of employment, housing, social services and support, and socioeconomic position are known as the social determinants of health, and are shaped by political, social, and economic forces (AIHW, 2020). These factors have a strong bearing on health and wellbeing in Wellington.

Much health data is only available for high-level regional areas, in this case, the NSW Far West region, which encompasses all of western NSW. A recent health needs assessment (FWNSWPHN, 2022) shows a region dealing with the health impacts of disadvantage and remoteness. Key health characteristics of the region included:

- Low levels of health literacy in vulnerable groups
- Low rate of self-reported good health
- High rates of acute and chronic potentially preventable hospitalisations
- High rate of pregnancy in young mothers
- Alcohol and drug abuse are important concerns for the community
- Mental health is the single most important health concern for the community.

In terms of service delivery, the region experiences serious challenges due to its regional and remote nature and its complex social and cultural contexts (FWNSWPHN, 2022). More locally, some health data is available. This data suggests that Wellington has a slightly higher rate of mental health conditions (11%) than does Dubbo (10%) and NSW (8%), and a higher proportion of people with long-term health conditions. Consultation confirmed that there is entrenched intergenerational disadvantage present within the Wellington community. Related to this, the town has struggled with social issues over recent years; drug use and high crime rates have characterised the town at times (ABC, 2015; Wellington Times, 2017). It was reported that some families move to Wellington to be near relatives who are incarcerated in the correctional centres.

Social infrastructure and services

General health facilities in Wellington include Wellington Hospital, Wellington Health Service, and GP and allied health services. Consultation feedback reported that there is pressure on local health services, and that it was difficult to obtain an appointment to see a GP. There have been ongoing issues with a doctor shortage and staffing at the Wellington Hospital that were exacerbated by state border lockdowns during the Covid-19 pandemic and the soaring costs of using Fly in Fly Out doctors. Higher order health services and facilities are available in Dubbo, including Dubbo Base Hospital.

Local schools in Wellington include Wellington Public School, Wellington High School and St Mary's Catholic School. At the tertiary level, Wellington TAFE offers Certificate courses while Dubbo TAFE offers Advanced Diplomas and Diplomas, and Charles Sturt University's Dubbo campus offers a range of higher education courses. However, recent research in the CWO REZ noted stakeholder feedback suggesting that the courses currently offered by local educational facilities do not align with the opportunities presented by the REZ in terms of direct skills (Briggs et al., 2022; NSW Treasury, 2022). VERTO is a Registered Training Organisation (RTO) that

provides services in both Wellington and Dubbo. Joblink Plus provides intensive, pre-employment support for youth ages 15-21 years.

The Wellington Information and Neighbourhood Centre provides a hub for the community, offering a range of services, information and resources that are available at different times. A range of child and family, youth community, and housing and homelessness services are available in Wellington and Dubbo. Youth services are also available through Dubbo Regional Council.

There are several community organisations, businesses and government agencies that provide direct employment, training and social support and services to local Aboriginal people and communities in Wellington and Dubbo, including the Wellington Aboriginal Corporation Health Service, Wellington Local Aboriginal Land Council (LALC), and the Wiradjuri Wellington Aboriginal Town Common Aboriginal Corporation.

Community culture, values and decision-making

The Community Strategic Plan, which is grounded in community consultation, outlines a vision for an innovative, resilient, and sustainable region that provides a high quality of life and opportunities to grow. People in the region value affordable housing, lifestyle, good urban infrastructure, environment and sustainability, a thriving economy, culture and heritage, collaboration, and transparency from their council.

Wellington is known for its rich history and natural beauty (Visit Wellington, 2022). Key recreational and tourist assets include Lake Burrendong, the Burrendong Botanic Garden and Arboretum, Mount Arthur Reserve, and the Wellington Caves.

Consultation inducted that Wellington is a small tight-knit community where everyone knows each other and looks out for each other.

Dubbo Regional Council (DRC) is the principal decision-making authority at the local government level. The Council was established in 2016 through the amalgamation of Wellington LGA and Dubbo LGA, and consultation indicated that there is still a cultural divide between the two towns.

Aboriginal communities in the region retain a strong link with country (OECC, 2022), and there remains a strong Aboriginal community in Wellington. The Wellington Local Aboriginal Land Council (LALC) as well as other local support and health services (i.e., the Wiradjuri Wellington Aboriginal Town Common Aboriginal Corporation and Wellington Aboriginal Corporation Health Services) provide places of support and coordination for the local Aboriginal community.

Responding to the REZ, the Central West Orana Working Group is a newly formed active group of government and non-government agencies and local people who are focused on leveraging opportunities and benefits for local Aboriginal people.

SIA stakeholder engagement findings

Interviews reiterated the findings from the EIS engagement program as summarised below. A sense of neutrality towards the Project due to people neither supporting nor opposing was observed. Consultation also revealed that a commonly held perception held by many of the SIA interviewees was that many local people wouldn’t yet know about the Project.

Given the relatively small size of the Project amid much development activity, most of what was discussed related to experiences with previous projects (i.e., Wellington Solar Farm, Suntop Solar Farm, Bodangora Solar Farm) and to the REZ more broadly. Very little SIA feedback related to specific concerns about this Project. Despite this, suggestions were received about future

engagement that Akaysha could undertake relating to this Project, skills and training, local employment and community benefits.

The following key themes emerged from the interviews:

- There are so many projects in and around Wellington at the moment.
- The region is experiencing severe housing and rental market pressures, as well as skills shortages.
- The Wellington SF negatively impacted on the local landscape.
- The influx of non-resident workers from past projects into Wellington dramatically impacted housing and rental markets.
- The construction of Wellington Solar Farm didn't create local workforce opportunities and this impeded social acceptance.
- There is a strong need to have a highly visible and locally relevant community benefit scheme for this Project.
- There is a strong need to ensure that local employment and business opportunities are secured for this Project, including for the local Aboriginal community.

6.12.3 Potential impacts

Potential impacts were identified through stakeholder and community engagement and from comparative studies. The significance of these impacts were assessed using the risk matrix taking into consideration the likelihood and magnitude of impacts. The key themes of the SIA impact assessment include how the Project would impact on:

1. Livelihoods
2. Accessibility
3. Way of life
4. Surroundings
5. Community and culture
6. Health and wellbeing
7. Project engagement and decision-making
8. Cumulative impacts.

Table 6-33 presents a summary of potential social impacts and response measures. The stakeholder significance rating has been determined by the perceived importance of the issue to the affected stakeholder group, their sensitivity to the impact, and the frequency that the issue was raised by the group during the consultation and engagement processes. The significance rating (unmitigated) further considers the issue in light of additional information drawn from the technical assessments and comparative studies. The residual impact significance rating represents the likely significance of an issue once the proposed mitigation/enhancement measure/s have been successfully implemented. These impacts are presented by Project phase, with construction impacts listed first.

Table 6-33 Summary of social impacts

Social impact category	Project phase	Potential impact (unmitigated)	Affected stakeholder group	Stakeholder significance (perceived)	Significance rating (unmitigated)	Overview of mitigations / enhancement measures	Residual impact significance	Positive / negative
Access	Cons	Pressure on rental housing (Wellington, Dubbo, and region) due to non-resident construction workforce demand, affecting availability and affordability	Residents Local businesses	Very high	High (A3)	Community engagement as per the **CSES**. Develop an Accommodation and Employment Strategy **(AES)** (working closely with DRC and key stakeholders in Wellington and Dubbo). Consult with accommodation providers to utilise short-term accommodation where possible, to minimise negative impacts on tourists and other users, and reduce pressure on the rental market. Consider alternative accommodation options (such as temporary worker accommodation) in collaboration with other projects in the region.	Medium (C3)	Negative
		Pressure on short-term accommodation (Wellington, Dubbo, and region) due to non-resident construction workforce demand, affecting availability	Tourists, visitors Vulnerable populations in short-term accommodation	High	High (A3)		Medium (C3)	Negative
Livelihoods	Cons	Local employment, training and upskilling opportunities Commercial benefit through procurement opportunities for local business and service providers	Job seekers Local/regional employment and training providers Local/regional businesses, contractors, suppliers Local government Broader community	High	Medium (C2)	Develop **AES** and **Local Procurement Policy (LPP)** as part of **IPP** in consultation with local stakeholders. Utilise existing networks (e.g., Wellington TAFE, ICN, RDA, VERTO) to establish training and employment processes and pathways ahead of construction. First Nations Participation Plan (FNPP) co-developed with Aboriginal stakeholders. **CSES** - Open, transparent, timely and accessible communication of Project	High (B2)	Positive

Social impact category	Project phase	Potential impact (unmitigated)	Affected stakeholder group	Stakeholder significance (perceived)	Significance rating (unmitigated)	Overview of mitigations / enhancement measures	Residual impact significance	Positive / negative
						information, including mechanisms for local industry and community to learn more about the Project and register interest		
Livelihoods	Cons	Increase in economic activity resulting from increased demand for goods and services, and increased income and spending of construction workers	Local/regional businesses, contractors, suppliers Local accommodation providers Local government Broader community	High	Medium (C2)	Develop **AES** and **LPP** as part of **IPP** in consultation with local stakeholders. Communicate strategies clearly to community as per **CSES.**	Medium (B2)	Positive
Access	Cons	Pressure on social infrastructure due to an influx of non-resident workers	Broader community Local government Service providers	Medium	Medium (C2)	Community engagement as per the **CSES.** Development of an **AES**, working closely with DRC and key stakeholders in Wellington and Dubbo.	Low (C1)	Negative
Way of life Community	Cons	Disruption to the local community (way they live) from influx of construction workers	Broader community	Low	Medium (C2)	**AES**, including workforce management component.	Low (C1)	Negative
Way of life Access Livelihoods	Cons	Way of life, social amenity, road access and safety impacts due to increased traffic during construction	Near neighbours Local residents Agricultural producers	High	High (B3)	**Construction Traffic Management Plan (CTMP)** to minimise safety risks, road damage, and disruption. Limiting hours for heavy vehicle movements and Driver Code of Conduct as part of	Medium (B2)	Negative

Social impact category	Project phase	Potential impact (unmitigated)	Affected stakeholder group	Stakeholder significance (perceived)	Significance rating (unmitigated)	Overview of mitigations / enhancement measures	Residual impact significance	Positive / negative
			Local businesses Residents along the haulage route Road users Tourists and visitors			this. **Noise Management Plan (NMP)** measures as part of **Construction Environmental Management Plan (CEMP)** **CSES** to highlight open, transparent, timely and accessible communication of Project information. Throughout construction, regular consultation with sensitive receivers. Develop accessible, adequate and responsive grievance and remedy mechanisms.		
Way of life	Cons	Noise and air quality impacts, impacts on quiet enjoyment during construction	Near neighbours	High	High (A3)	**NMP** measures as part of **CEMP** **CSES** to highlight open, transparent, timely and accessible communication of Project information. Throughout construction, regular consultation with sensitive receivers. Develop accessible, adequate and responsive grievance and remedy mechanisms.	Medium (A2)	Negative
Surroundings	Cons Op	Changes to the landscape affecting people's visual amenity, the rural character, and aesthetic values	Some near neighbours	Medium	High (A3)	Screening vegetation around the perimeter of the site as outlined within **VIA** Ongoing consultation with individual neighbouring landholders re specific mitigation options, as per **CSES**	Medium (B2)	Negative
			Broader community	Low	Low (C1)		Low (C1)	Negative
Surroundings	Cons Op	Public safety and hazard risks, i.e., grass fires, BESS	Host & some neighbours	Medium	Low (D2)	**Bushfire Emergency Management** and **Operations Plan** in consultation	Low (D1)	Negative

Social impact category	Project phase	Potential impact (unmitigated)	Affected stakeholder group	Stakeholder significance (perceived)	Significance rating (unmitigated)	Overview of mitigations / enhancement measures	Residual impact significance	Positive / negative
		fire	Local community Emergency services Environmental/ community groups Broader community			with the RFS Communicate strategies clearly to community as per **CSES**		
Livelihoods	Cons Op	Disruption to agricultural practices and changes to land use	Host landholders Near neighbours Broader community	Low	Low (D2)	**CSES** - open, transparent, timely and accessible communication of Project information, with the aim of minimising uncertainty and to address concerns	Low (D2)	Negative
Livelihoods	Cons Op	Decrease in property values and pool of potential buyers due to proximity to Project and associated visual impacts	Near neighbours	High	Medium (C2)	**CSES** - Open, transparent, timely and accessible communication of Project information, with the aim of minimising uncertainty and to address concerns	Low (D2)	Negative
Culture	Cons Op	Impacts on Aboriginal cultural heritage	Aboriginal community	Low	Low (B1)	Mitigation measures outlined in **Aboriginal Cultural Heritage Assessment (ACHA)**	Low (B1)	Negative
Communities	Op	Increased community investment	Broader community Some community and /or environmental groups	Very high	Medium (B2)	Development and implementation of the **Community Enhancement Fund (CEF**) with DRC in consultation with a broad range of stakeholders. Provide ongoing opportunities for people to be involved in decision-making processes.	High (B3)	Positive

Social impact category	Project phase	Potential impact (unmitigated)	Affected stakeholder group	Stakeholder significance (perceived)	Significance rating (unmitigated)	Overview of mitigations / enhancement measures	Residual impact significance	Positive / negative
Health and wellbeing	Op	Impacts to physical health as the result of Project impacts, e.g., sleep disturbance caused by night-time BESS operation and security lighting	Some near neighbours	Very high	High (A3)	Measures outlined within the **VIA** and **NVA** **CSES** - open, transparent, timely and accessible communication of Project information, with the aim of minimising uncertainty	Low (D1)	Negative
Community	All stages	Impacts on community cohesion at the local level	Near neighbours Local community	Medium	Low (D2)	Robust community engagement as per the **CSES**	Low (D2)	Negative
Health and wellbeing	All stages	Psychological stress due to anxiety/uncertainty related to the Project and changes to people's surroundings; associated fears about property values and financial implications	Some near neighbours	High	Medium (B2)	Robust community engagement as per **CSES**. Open, transparent, timely and accessible communication of Project information, with the aim of minimising uncertainty	Low (D2)	Negative
Decision-making systems	All stages	Impacts on people's ability to participate and have a say in decisions that affect their lives	Near neighbours Broader community	Low	High (B3)	**CSES** - Open, transparent, timely and accessible communication of Project information. Understand the ways in which local communities prefer to access information in the local area (e.g., media, social media, internet, bulletin boards, community associations and newsletters) and utilise these to advertise Project information and engagement opportunities. Provide multiple Project contact options and feedback mechanisms for the community and stakeholders	Low (D2)	Negative

6.12.4 Safeguards and mitigation measures

The mitigation measures outlined below directly respond to the potential positive and negative social impacts associated with the Project. These measures have been identified through consideration of Project impacts, along with stakeholder and community consultation.

Key elements of the social impact management framework include:

1. Community and Stakeholder Engagement Strategy
2. Industry Participation Plan
3. Community Benefit Sharing Program.

These are summarised below and detailed in Appendix E.8 and they form commitments of the Project.

Community and Stakeholder Engagement Strategy

The CSES would be developed and implemented in line with DPIE's *Undertaking engagement guidelines for State Significant Projects* (DPIE, 2021c), and be guided by the SIA Guidelines and relevant frameworks (e.g. the International Association for Public Participation (IAP2) *Spectrum of Public Participation* (IAP2, 2018)).

During the exhibition and pre-construction periods, the CSES would:

- Have a focus on increasing general community awareness about the Project.
- Providing clear updates on Project progress and next steps to reduce uncertainty about the Project.
- Seek wider community feedback about and input into the Industry Participation Plan and Community Benefit Sharing Program.
- Increase community awareness about work opportunities related to the Project (as per IPP)
- Deliver targeted engagement activity to address the ongoing concerns expressed by some stakeholders within this SIA. This would include addressing near neighbour concerns about noise, way of life, visual and traffic impacts, and property value concerns.
- Continue to engage with Council to discuss and adaptively respond to any emerging community and business concerns.
- Participate in any coordinated planning efforts that may be undertaken in the region that bring applicants (or similar) together to collectively manage cumulative impacts and optimise community benefits.

More broadly, over the longer term, the objectives of the CSES would be to:

- Ensure proactive, transparent, and meaningful engagement, using effective, appropriate, and inclusive techniques. In particular, during construction, maintain regular consultation with sensitive receivers.
- Build trust and relationships with those who are directly impacted, other key stakeholders and the community.
- Keep the community and stakeholders informed about the Project through the provision of accurate and factual Project information.
- Identify effective methods to inform the community about the Project through building an understanding of community preferences for accessing and receiving information.

- Provide accessible and understandable content, delivered in a range of easy-to-digest multimedia and multi-device forms.
- Provide opportunities for people to collaborate on relevant Project design matters and provide input into preferred solutions.
- Ensure people know how their input and views have been considered, and what strategies would be put in place to address their concerns.
- Identify and address community and stakeholder concerns and maintain transparency in Project design, implementation, and ongoing operations.
- Adaptively respond to emerging community concerns and changes in the social environment.
- Ensure provision of accessible, adequate, and responsive grievance and remedy mechanisms in the event of complaints. This would be particularly important during construction.
- Actively promote the positive benefits of the Project.

Industry Participation Plan (IPP)

The Project would prioritise local jobs and businesses wherever possible. Given widespread skills shortages and a disadvantaged local population, a very active approach is needed to achieve positive local employment and business outcomes for this Project. The IPP would articulate the measures that Akaysha would put in place to achieve these goals.

The IPP would:

- Encompass considerations regarding

  i) local employment and procurement (with a specific focus on First Nations participation), and

  ii) the accommodation of the construction workforce.

- Be targeted towards the people and businesses within Wellington and surrounds, the Dubbo Regional LGA, and the wider regional area.
- Be developed in partnership with key local and regional stakeholders, such as:
  - Dubbo Regional Council
  - Dubbo and Wellington Business Chambers
  - Economic development and industry support agencies (e.g., Regional Development Australia, Industry Capability Network)
  - Training and employment support agencies (e.g., TAFE NSW, Verto, Joblink Plus)
  - First Nations stakeholders (including the Central West Orana Working Group)
  - Other local social service or support agencies, and accommodation providers.
- Outline mechanisms that would be used to ensure that local people and businesses are given full, fair, and reasonable opportunity to participate in the Project. Consider specific opportunities for Aboriginal people and businesses, women, and young people.

Specifically, the Plan would include two key components that interrelate. These are:

- A Local Procurement Policy (LPP).
- An Accommodation and Employment Strategy (AES).

As part of the AES, specific focus should be on ensuring First Nations participation within the Project. This can be articulated through a First Nations Participation Plan (FNPP), which would specifically outline training, employment and support mechanisms to maximise First Nations employment. This is in alignment with the *CWO REZ First Nations Guidelines* (OECC, 2022).

Community Benefit Sharing Program

Community benefit sharing programs can assist in delivering positive, tangible, and long-term social and economic outcomes for local and regional host communities impacted by large-scale solar development. Community benefit sharing involves initiatives that benefit the community as a whole. Community benefit sharing might include:

- Providing funding (e.g., grants, sponsorships, or scholarships)
- Establishing partnerships with important local groups or projects
- Providing in-kind support or developing education and tourism initiatives
- Local jobs, training and procurement
- Innovative options for financing (e.g., community co-investment) or innovative products (e.g., energy retailing options)
- Compensation for impacted residents that is allocated in a structured manner (Lane & Hicks, 2019).

In recognition of this, Akaysha has developed a community benefit sharing program that is tailored to the local context, to maximise local benefits and designed to have a positive and lasting impact for the local community. The program has been informed by consultation with the community and key stakeholders. The program consists of the following elements:

- Local jobs and procurement (outlined above in the IPP)
- The Community Enhancement Fund (described below).

Visible positive benefits for both these elements are integral to garnering long-term community acceptance and support for this Project.

Community Enhancement Fund

The intention of the Community Enhancement Fund (CEF) is to support very localised and meaningful community and environmental initiatives that have strong resident and broader community support, throughout the life of the Project.

Development of this fund has been informed by consultation with key stakeholders; however, there is still a need for further program development in partnership with the community and key stakeholders. Details regarding the Community Enhancement Fund are still under consideration, however one key concept that is currently being explored is to make a contribution to the development of a mountain bike facility at Mount Arthur Reserve, just outside Wellington.

This concept has been discussed with Council and further discussion would be required to determine the governance arrangements applied to this. The concept needs to be further tested with the local community, to garner their input as part of the CSES during the exhibition and pre-construction phases.

It is recommended that the governance structure of the CEF, and the associated administration processes, are developed and designed through a participatory approach with residents and the broader community. The CEF should provide ongoing opportunities for people to be involved in its decision-making processes.

Table 6-34 Socio-economic impact safeguards and mitigation measures

Mitigation Number	Mitigation measures	Project stage
E1	The existing Community and Stakeholder Engagement Strategy (CSES) shall be developed and implemented in line with DPIE's *Undertaking engagement guidelines for State Significant Projects* (DPIE, 2021), and be guided by the SIA Guidelines and relevant frameworks (e.g. the International Association for Public Participation (IAP2) *Spectrum of Public Participation* (IAP2, 2018)).	Pre approval
E2	An Industry Participation Plan shall be developed to ensure a focus on maximising the involvement of local people and businesses in the Proposal, as set out in the SIA, Appendix E.8. It will include a: • Local Procurement Policy (LPP). • Accommodation and Employment Strategy (AES).	Pre construction
E3	A Community Enhancement Fund to support very localised and meaningful community and environmental initiatives that have strong resident and broader community support, throughout the life of the Project would be developed as set out in the SIA, Appendix E.8.	Pre construction

7. Assessment of additional issues

7.1 Resource use and waste generation

SECRETARY'S REQUIREMENTS

The EIS must also address the following specific issues:

Waste:

Identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.

A desktop assessment was undertaken to consider the resource use and waste generation impacts with potential to result from the Project. The key findings and mitigation strategies are set out below.

7.1.1 Existing environment

Statutory requirements

Legal requirements for the management of waste in NSW are governed by the NSW *Protection of the Environment Operations Act 1997* (POEO Act) and the Protection of the Environment Operations (Waste) Regulation 2014. Unlawful transportation and deposition of waste is an offence under Section 143 of the POEO Act.

The NSW *Waste Avoidance and Resource Recovery Act 2001* include waste minimisation and management objectives to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development. The Project's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

The NSW Waste Avoidance and Resource Recovery Strategy, the 'WARR Strategy', provides a framework for achieving these statutory objectives (NSW EPA, 2014).

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development.

Regional capabilities

The NetWaste voluntary regional waste group (VRWG) includes 26 member councils, including Dubbo, to provide collaborative approaches to waste and resource management. The 'NetWaste Regional Waste Strategy 2017-2021' (NetWaste and Impact Environmental, 2017) is the most recent strategy from the NetWaste VRWG and was developed in line with EPA guidelines and aims to achieve a coordinated approach to waste management based on the WARR Strategy key result areas.

In order to facilitate the logistics of waste disposal for remote areas of the NetWaste region, specific contracts have been set up with member councils to provide access services that overcome the economic and geographic constraints for these remote areas. The following regional contracts are currently in place (refer to Table 7-1) (source: https://www.netwaste.com.au/about-us/rethinking-waste-netwaste-strategic-waste-plan/).

Table 7-1 Potential waste streams and associated recycling services in the NetWaste region

Waste stream	Recycling service
Processing of garden organics and wood and timber contract	17 member NetWaste Councils participate in this regional contract which serves to chip garden organic material and produce a mulch product for Councils. The existing contract is with Ausshredding Pty Ltd and is a 2-year initial contract with possible extension options available. Since 2006, 667,825 m3 of garden organic and wood timber material has been chipped and diverted from landfill.
Dubbo – Narromine joint recycling contract	Dubbo City and Narromine Shire Councils commenced a joint recycling contract with JR Richards and Sons in 2010 for a 10-year term. The product is collected and delivered to a large Transfer Station in Dubbo, where it is transported to Sydney facility for sorting and recycling. Since the contract commenced, 17,905 tonnes of material has been recycled.
Collection of scrap metal	Scrap metal is a prominent waste type received by Councils to their landfills and waste transfer stations, which has significant reuse and recycling opportunities. 22 of the NetWaste Councils are part of a regional contract which sees a regular collection service for this material while receiving a price for the commodity. This was the first regional contract established by the group back in 2004. Since its commencement, 127,659 tonnes of scrap metal have been collected.
Collection of used motor oil	Following the installation of used oil collection units at a number of landfills and waste facilities across the region, NetWaste worked to establish a regional contract for the collection and recycling of this material. The current service contract is held by Cleanaway Pty Ltd. Since 2009 when the first contract was established, over 1,181 KL has been collected and recycled.

Current waste streams

The Development Footprint is utilised for agricultural practices, and therefore current waste streams pertain to agricultural products such as chemical disposal, machinery waste (e.g. batteries, tyres), and general waste.

7.1.2 Potential impacts

Construction

The material requirements of the Project are set out in Section 3 for construction, operation and decommissioning. Currently, both large-scale and small-scale construction Projects in Australia are being subjected to time delays due to shortages in raw materials (predominantly timber and iron ore) and high prices (Maddocks, 2021). The Project is considered to require minimal amounts of

these materials, with the majority of materials being required (Batteries, cabling and quarry materials) having adequate supply stores available for the Project. Where materials are required that are in short supply, alternative materials may be sought to meet timelines and reduce costs. In considering the volumes required, the Project is unlikely to place significant pressure on the availability of local or regional resources. The use of the required resources is considered reasonable in light of the benefits of supporting renewable electricity generation.

Wastes that are likely to be generated from the Project during construction include:

- Vegetation waste from cite clearing – this is expected to be minimal
- Surplus spoil from earthworks required for the Project – excess spoil would be reused on site to fill in trenches and stabilise slopes/cleared areas
- General construction waste e.g. concrete, steel, timber – this is expected to be minimal with quantities of building materials required to be accurately estimated
- Domestic wastes materials including plastics, packaging materials, putrescible waste generated by construction personnel
- Wastewater generated at construction compounds
- Waste from onsite amenities.

All waste would be transported and disposed of in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014) and the POEO Act.

The impact from waste generation, on regional waste facilities is assessed to be moderate without the implementation of any recycling or re-use measures. However, with the implementation of a Waste Management Plan and identification of recycling waste facilities in the LGA, the impacts from construction waste disposal on regional landfills, the biological environment and social environment is assessed to be minor.

Operation

The average life of the Li-ion PV solar batteries is assumed to be 10 years (Randell Environmental Consultancy, 2016) and the batteries may require replacement 1-2 times during the life of the BESS.

Li-ion batteries are classified as hazardous waste under the Commonwealth *Hazardous Waste Act 1989*, and Dangerous Goods under the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code). The code has a special provisions and packaging instructions for Li-ion batteries transported for disposal or recycling.

Presently, there are two B-Cycle accredited, EPA- permitted and licensed recycler of mixed batteries including Lithium-ion (Li-ion) batteries in Australia that are collecting, sorting and processing entirely onshore. These facilities are run by Ecobatt (Eco Batt – Your Battery Recycler) and Envirostream (envirostream – Innovative Resource Recovery). B-Cycle is a government backed scheme which is run by the Battery Stewardship Council and authorised by the ACCC to promote the safe use and disposal of batteries including Lithium-Ion Batteries (Australia's official battery stewardship scheme - B-cycle (bcycle.com.au).

Any spent batteries would be recycled at a B-Cycle accredited, EPA permitted and licensed recycler of Lithium-Ion Batteries. Batteries would be handled, stored, and transported according to manufacturer's guidelines and the ADG Code.

Given the rapid rise of Li-ion battery use in Australia, including in renewable energy Projects and electric cars, cost-effective local recycling may be available at the time of battery replacement or

decommissioning. AEMO (2015) predict strong growth in the consumption of Li-ion batteries for both electric vehicles and PV solar over the next 20 years. This growth would begin to significantly affect the waste stream from 2025 (Randell Environmental Consultancy, 2016).

Forecasting from the Commonwealth Science and Industrial Research Organisation (CSIRO) predicts that the Li-ion battery recycling sector could be valued from $603 million to $3.1billion (CSIRO, 2021). Currently, investment in the industry is low due to the mass needed for economically viable recycling are still in their first life as stationary storage or in the emerging electric vehicles (EV) market. While investment in Li-ion battery recycling is low it is growing in both the areas of research and development and facility building. Battery projects such as the Orana BESS have the potential to establish this industry in Australia into the future.

During operation, the solid waste streams would be associated with maintenance activities and presence of employees. Given the minimal number of moving parts and limited wear tear of equipment, the operational waste streams generated by the Project would be very low and impacts to regional waste disposal facilities would be minor. The primary waste stream would include sporadic office waste pickups and replacement of materials if damage occurs (e.g. disposal and replacement of a damaged fence).

Decommissioning

As during the construction phase, waste during decommissioning would be handled in line with the objectives of the relevant legislation, policies and strategies. Decommissioning of the BESS would involve the recycling or reuse of materials including:

- Metals from posts, cabling, fencing
- Li-Ion Batteries as discussed in the operational impacts section above
- Buildings and equipment such as the inverters, transformers and similar components.

Buildings and major electrical equipment would be removed for resale or reuse, or for recycling as scrap. The Li-ion batteries would be disposed in accordance with the hazardous waste policies active at the time of decommissioning.

Items that cannot be recycled or reused, would be disposed of at appropriate facilities in accordance with applicable regulations. All above ground infrastructure would be removed from the site during decommissioning. Any cabling (and buried infrastructure) more than 500mm underground would be installed with consideration of DPI Agriculture's '*Primefact: Infrastructure Projects on rural land*' (DPI, 2013) and in consultation with the landowner with the aim to return the land to is previous land use if the landowner wishes.

The majority of the Project components are recyclable and mitigation measures are in place to maximise reuse and recycling in accordance with resource management hierarchy principles.

7.1.3 Mitigation measures

Mitigation Number	Mitigation measures	Project stage
R1	A Waste Management Plan (WMP) would be developed to minimise waste, including: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy.	Construction/ Operation/ Decommissioning

Mitigation Number	Mitigation measures	Project stage
	• Quantification and classification of all waste streams. • Provision for recycling management on-site. • Provision of toilet facilities for on-site workers and identify that sullage would be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	
R2	A septic system would be installed and operated according to the Dubbo Regional Council regulations.	Construction/ Operation
R3	Where possible, waste would be removed on a daily basis, or as soon as reasonably practical, to maintain the Development Footprint being litter free.	Construction
R4	Lithium Ion Batteries would be kept, stored, managed and transported according to manufacturer's instructions and the ADG Code. Any spent batteries would be recycled at a B-Cycle accredited, EPA permitted and licensed recycler of Li-Ion batteries.	Construction/ Operation/ Decommissioning

7.2 Air quality and climate

7.2.1 Existing environment

The air quality across Dubbo Regional LGA is expected be typical of a regional landscape and limited number of industrial pollution sources present. A search of National Pollutant Inventory identified 16 facilities within Dubbo LGA that have a duty to report emissions The closest facility (Wellington Depot Petroleum Storage and Wholesaling) is located 3.8km southwest of the Development Site.

The proposed BESS is located on land zoned SP2 Infrastructure and RU1 Primary Production (intersecting the access track only). The land surrounding the Development Site is predominantly infrastructure development land and grazed agricultural land with low-density rural dwellings. There are no quarries or mining facilities within the proximity of the Project.

Existing sources of air pollution within the LGA include:

- Vehicle emissions – expected to be moderate for the site considering the traffic amounts along the Mitchell Highway (particularly heavy vehicles) in the vicinity of the site, however the land use is low intensity and low density of settlement.
- Dust during dry periods – expected to be higher in dry and windy weather, generated from traffic/agricultural machinery on unsealed roads and bare areas of ground.
- Agricultural activities, particularly ripping, stubble burning and harvests.

During colder months, there may be a small increase in air contaminants due to smoke emissions from the operation of solid fuel heating. As above, locally this would be negligible given the low density of settlement within the locality.

Climate data sourced from the Bureau of Meteorology's weather station at Wellington (D&J Rural) (station 065034) shows that the average and extreme temperature and rainfall data. With regard to solar yield, it is noted that the annual average solar exposure for the station is 15.1Jm^{-2} from 1990 to 2022. The highest average solar exposure occurs in December (26.8 MJm^{-2}) with the lowest average solar exposure experienced in (9.2 MJm^{-2}). Weather station data is summarised in Table 7-2.

Meteorology in the area surrounding the site is affected by multiple factors such as terrain and land use. Wind speed and direction are largely affected by topography at the small scale, while factors such as synoptic scale winds affect wind speed and direction on the larger scale. Wind speed and direction are of great importance while assessing potential air quality impacts, as they dictate the direction and distance air pollutant plumes travel.

Table 7-2 Wellington (D&J Rural) weather station data for 1991 - 2021 (BOM, 2023)

Aspect	Annual mean	Mean minimum range	Mean maximum range
Temperature[5]	24.6 °C maximum 9.7 °C minimum	18 °C (January) to 2.4 °C (July)	33.4 °C (January) to 15.8 °C (July)
Rainfall[6]	621.1mm	33.4mm (April)	69.5mm (December)
Wind[7]	NA	3.6km per hour (9am) (June) 7.1km per hour (3pm) (May)	7.8km per hour (9am) (November/December) 11.6km per hour (3pm) (November)

The context of climate change is relevant to rural locations. Climate change refers to the long-term shift in climate over many decades which may occur as a result of natural variations of human activities which causes change in the composition of the atmosphere.

In 2014, the NSW OEH published climate change projection snapshot reports for the NSW and ACT governments as part of the NSW and ACT Regional Climate Modelling (NARCliM) Project (refer to Figure 7-1). The study focused on Projections for two future 20-year time periods: 2020–2039 as the near future and 2060–2079 as the far future. The snapshot included the analysis of over 100 climate variables, including temperature, rainfall, and wind. Temperatures have been increasing since about 1950, with the largest increase in temperature experienced in recent decades.

[5] Based on data collected between 1991 – 2020.
[6] Based on data collected between 1991 -2020.
[7] Based on data collected between 1991-2020.

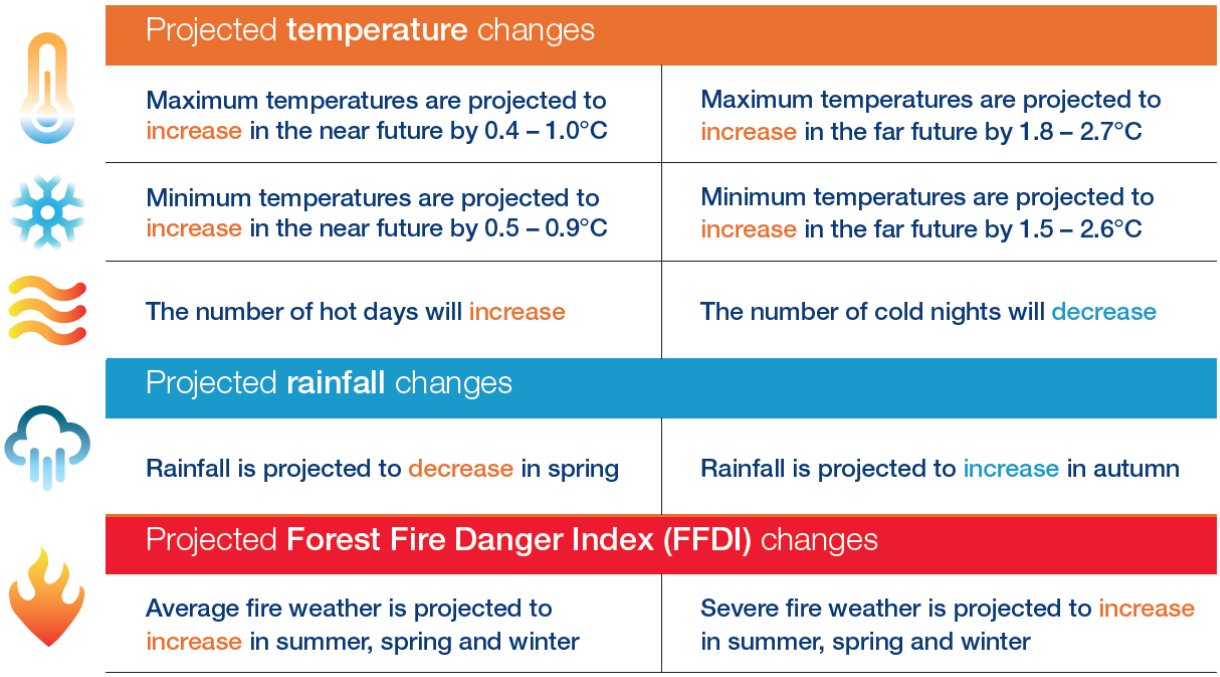


Figure 7-1 Projected climate change impacts for the central west region of NSW (source: (OEH, 2014)

7.2.2 Potential impacts

Construction and decommissioning

The Project would require minimal earthworks/excavation expected to be limited to ground-breaking, levelling (cutting and filling), and trenching. These works have the potential to adversely impact on local air quality through generation of dust and vehicle emissions.

The primary potential emission generated during the construction phase is dust. Dust emission from the Project, potentially from material handling including skid modules, battery storage and machinery, transport of batteries into the Development Footprint, sand, and other construction materials. Emission would occur when bulk material is transferred from loading vehicles to the Development Footprint. Overall, the potential impact on the air quality is not expected to be significant, nor impact on the nearby receivers with the recommended mitigations in place (refer to Section 7.2.3).

Other potential source of minor discharge into the air during construction phase would be the products of fuel combustion emitted as a result of transport and construction vehicle movements which include site personnel commute, delivery and removal of both construction and waste materials.

These would be short term, and most noticeable during the construction and decommissioning peaks, with peak construction expected six months into construction. Potential to impact local receivers is considered low given their distance from the Development Site. Standard safeguards and mitigation measures would minimise duration and scale of potential impacts.

Potential impacts would be similar during the decommissioning phase with the omission of clearing vegetation and earthworks that are required for construction. Therefore, air quality impacts during decommissioning would be minimal.

Operation

Air quality impacts during operation would be limited and likely less than existing industrial and agricultural operations. They would be limited to activities such as combustion emissions arising from light vehicles accessing site during maintenance periods and dust emissions arising from vehicle movements along unsealed roads. Large vehicles may occasionally be required to access site to deliver replacement parts or additional equipment. These vehicles and equipment operation would result in minor emission and dust generation.

Potential impacts on climate can be considered as:

1. Potential benefits to climate change effects, by assisting in the transition to renewable energy generation
2. Potential risks to local climate due to infrastructure placement; heat island effect.

7.2.3 Mitigation measures

This Project and BESS generally, can be seen to be at low risk of impacting air quality and climate adversely and have high proven ability to benefit broader climate change impacts. They are considered important part of the transition to a reduced emission future. Standard safeguards would be employed as set out below.

Table 7-3 Air and climate mitigation measures

Mitigation Number	Mitigation measures	Project stage
A1	Management protocols will include measures to minimise impacts on air quality including: • Identification of high-risk construction activities with potential to generate dust, and control measures for the activities • A process for monitoring dust on-site and weather conditions, as well as procedures for altering management measures where required • A map identifying locations of sensitive receivers • Notification of relevant stakeholders to hours of work and duration of work • An accessible complaints process with a timely response protocol.	All stages
A2	Dust generation by vehicles accessing the site and earthworks at the site will be suppressed using water applications or other means as required, using visual cues. • Covering dirt, sand, soil, or any lose material while in transport • Clean-up of any material spillage on the roads • Limiting construction vehicle speeds on unsealed roads • Checking of weather conditions (such as wind strength and direction) prior to major potential dust emitting activities	Construction/ decommissioning
A3	Stockpiles will be covered or stored in areas not subject to high winds, and vehicle loads of material which may create dust would be covered	Construction/ decommissioning

Mitigation Number	Mitigation measures	Project stage
	while using the public road system.	
A4	All vehicles and machinery used at the site will be in good condition, fitted with appropriate emission controls and comply with the requirements of the POEO Act, relevant Australian standards and manufacturer's operating recommendations. Plant will be operated efficiently and turned off when not in use.	All stages
A5	Fires and material burning is prohibited on site.	All stages
A6	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h).	Construction
A7	The use of renewable fuels/power sources for construction will be investigated and implemented where appropriate.	Construction
A8	Materials will be delivered as full loads, and local suppliers utilised where possible, to minimise haulage emissions.	Construction

7.3 Cumulative impacts

7.3.1 Assessment approach

Cumulative impacts are incremental environmental impacts caused by the combination of past, present, and reasonably foreseeable future actions. Cumulative impacts accumulate over time usually from one or more sources which can be both positive and negative. Whilst impacts may be significant impacts may occur when individual effects are considered in combination.

The assessment of cumulative impacts is focused on the proposed activity's interaction with other projects in the vicinity of the proposed activity, and where construction and/or operational timeframes are to be concurrent.

This section follows the NSW Government's *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE, 2022b).

The assessment considers the key foreseeable developments and breaks it down into strategic-level and project-level cumulative impact assessment (CIA).

A summary of each key impact assessed in this CIA include:

Strategic-level CIA – important beneficial cumulative impacts

- Alignment with federal and state regional renewable energy policies
- Alignment with regional and local land use plans
- Responds to the site's unique environmental and social context.
- Reduction of energy costs.

Project-level CIA – risks of exacerbating adverse impacts

Being located in the declared Central-West Orana Renewable Energy Zone, local cumulative impacts anticipated from several nearby utility scale renewable facilities include:

- Biodiversity impacts
- Visual and landscape character impacts
- Traffic impacts (construction only)
- Pressure on local facilities, goods and services.

7.3.2 Strategic-level CIA

Alignment with federal and state regional renewable energy policies

The proposed Orana BESS would have a positive cumulative impact in its contribution to the following eight federal and state regional energy policies and reduction targets.

Table 7-4 Contribution to renewable energy policies

Relevant policy	Target
Climate Change Bill 2022	The Project would assist in achieving emissions reduction target of 43 percent from 2005 levels by 2030, and net zero emissions by 2050 by providing reductions in Greenhouse Gas emission intensity generation in the National Energy Market (NEM).
Paris Agreement	The Project would contribute to Australia's target of reducing emissions by 26-28% below 2005 levels by 2030, through its contribution to electricity reliability and implementation of a large-scale BESS, storing up to 1600MWh of dispatchable energy. The Project provides flexibility into the grid, where the energy storage can help integrate more solar, wind and distributed energy sources. The Project would improve the efficiency of the grid by increasing the capacity factor of existing resources and offset the need for building new pollution-emitting power plants, increasing resilience and power stability.
Australian Government RET	The LRET of 30% (33,000GWh) target was met in September of 2019. However, the Project will assist in fulfilling the new obligations under the *Climate Change Bill 2022* to reach an overall target of a 43% reduction (below 2005 levels) in greenhouse gas emissions by 2050 as stated above.
Net Zero Plan	As detailed above, the Project would assist in meeting obligations under the Net Zero Plan of meeting net-zero emissions by 2050 and delivering a 50% cut in emissions by 2030 – a substantial increase from the proposed Paris Agreement.
Climate Change Fund	The Project would be a working example of a Project which showcases the transition to a net-zero emissions economy. The Project would proactively

Relevant policy	Target
Draft Strategic Plan	involve the local community as well as host landowners, spreading the financial and social benefits.
NSW Electricity Strategy	The Project would contribute to the NSW government's plan to achieve the objectives for the electricity system which include reliability, affordability and economic growth and sustainability. The contribution of the Project to local employment and economy is set out in detail in Section 6.12 of this Report.
NSW Renewable Energy Action Plan	The Project would contribute to NSW government's plan to achieve affordable and clean energy for future NSW, plan positions the state to increase from renewable sources by attracting investment, building community support, and growing expertise in renewable energy at the least cost.
NSW Electricity Infrastructure Roadmap	The Project would also contribute to the government's plan to help NSW towards its net-zero emissions target by 2050 and help reduce NSW energy emissions by 90 million tonnes by 2030. The Project would shift electricity closer to local consumption, thereby contributing to regional grid capacity enhancement as per The Roadmap.

The proposed Orana BESS would have a positive cumulative impact in its contribution to the following five regional and local land use plans.

Table 7-5 Project alignment with strategic plans

Relevant plan	Target
Draft Central West and Orana Regional Plan 2041	A major theme of the Draft Central West and Orana Regional Plan 2041 is *'the region's role in supporting the State's transition to net zero carbon emissions by 2050 through a broad range of actions*.' A large number of renewable energy projects have been developed or are currently undergoing approval. As such, the Project would assist cumulatively to support the region in the achievement of this goal.
Dubbo Local Strategic Planning Statement 2020	One of the Strategic Planning Statements aims/pathways is to promote and support investment in renewable energy opportunities. The Project would achieve this aim by utilising land not considered to be highly productive and industrial, cumulatively contributing energy efficiency and access in the area without compromising on land use compatibility/capability.
Dubbo 2040 Community Strategic	Both the Dubbo and Wellington community has identified generation of renewable energy as one of the top three action areas for Council. The Project has demonstrated it is compatible with existing and proposed

Relevant plan	Target
Plan	land uses and that its impact on amenity issues is in keeping with these principles
Climate Change Fund Draft Strategic Plan	The Project would be a working example of a Project which showcases the transition to a net-zero emissions economy. The Project would proactively involve the local community as well as host landowners, spreading the financial and social benefits, promoting energy productivity in the industry.
Dubbo Regional LEP – Land zoning	The Dubbo LGA covers an area of approximately 7536km^2 (~753,600ha). According to the zoning of the Dubbo LEP, approximately 1018641sq meters of land is used for or has potential for industrial use in the Project (being zoned SP2). There is no loss of agriculture land within the Dubbo LGA from this Project and area falls under SP2 zone, making the cumulative impacts to the region under provisions in the LEP negligible.

The Orana BESS would contribute cumulatively to the downward pressure on energy prices. The CSIRO and AEMO released the GenCost 2021-22 report in July of this year (2022). The report confirmed that renewables are the cheapest source of electricity generation and storage in Australia. The report confirmed renewable energy sources would continue to be the cheapest sources of new electricity generation in Australia, although cost reductions could be impacted over the next 12 months due to inflationary pressures. It concluded that after the current inflationary cycle ends that wind, solar and batteries are all projected to keep getting cheaper still. The best way to put downward pressure on energy prices for households and businesses is to help ramp up investment in renewables and that is exactly what this government doing.

7.3.3 Project-level CIA

Nearby large-scale projects

The Central-West Orana REZ is strategically located to maximise the benefits of and smooth the transition to greater renewable energy development. There are several renewable projects proposed or operating already within the REZ, including Wellington South Solar Farm (constructed), on the northern side of Goolma Road. The approved Wellington North Solar Farm is also located in the area and is anticipated to commence construction in July 2022. The assessment for the Wellington South Battery Energy Storage System, proposed 300m east of the Development Footprint, is currently underway.

Renewable projects in the locality and their current status as of 27 March 2023 include (refer to Figure 7-2):

- **Battery only**
    - **Aspley Battery Energy Storage System** located 12km south of the Development Footprint (Response to Submissions)

  - **Wellington South Battery Energy Storage System** located 300m east of the Development Footprint (Response to Submissions)

- **Solar farms**
  - **Wellington Solar Farm** located about 250m north of the Development Footprint (In operation)
  - **Wellington North Solar Farm** located about 4.5km north of the Development Footprint (In construction)
  - **Mumbil Solar Farm** located about 20.8km south of the Development Footprint (In planning, status unknown)
  - **Suntop Solar Farm** located about 12.5km south west of the Development Footprint (In operation)
  - **Suntop Stage 2 Solar Farm** located about 14.3km south west of the Development Footprint (Preparing Modification Report)
  - **Maryvale Solar Farm** located about 7.4km north west of the Development Footprint (Modification report, Response to Submissions)
  - **South Keswick Solar Farm (Dubbo Solar Hub)** located about 39.5km north west of the Development Footprint (in operation)
  - **47R Wellington Road Solar Farm** located about 32.6km north west of the Development Footprint (in planning, status unknown).
- **Wind farms**
  - **Uungula Wind Farm** located about 18.0km east of the Development Footprint (Construction expected to commence in 2023)
  - **Burrendong Wind Farm** located about 25.6km south east of the Development Footprint (Prepare EIS).

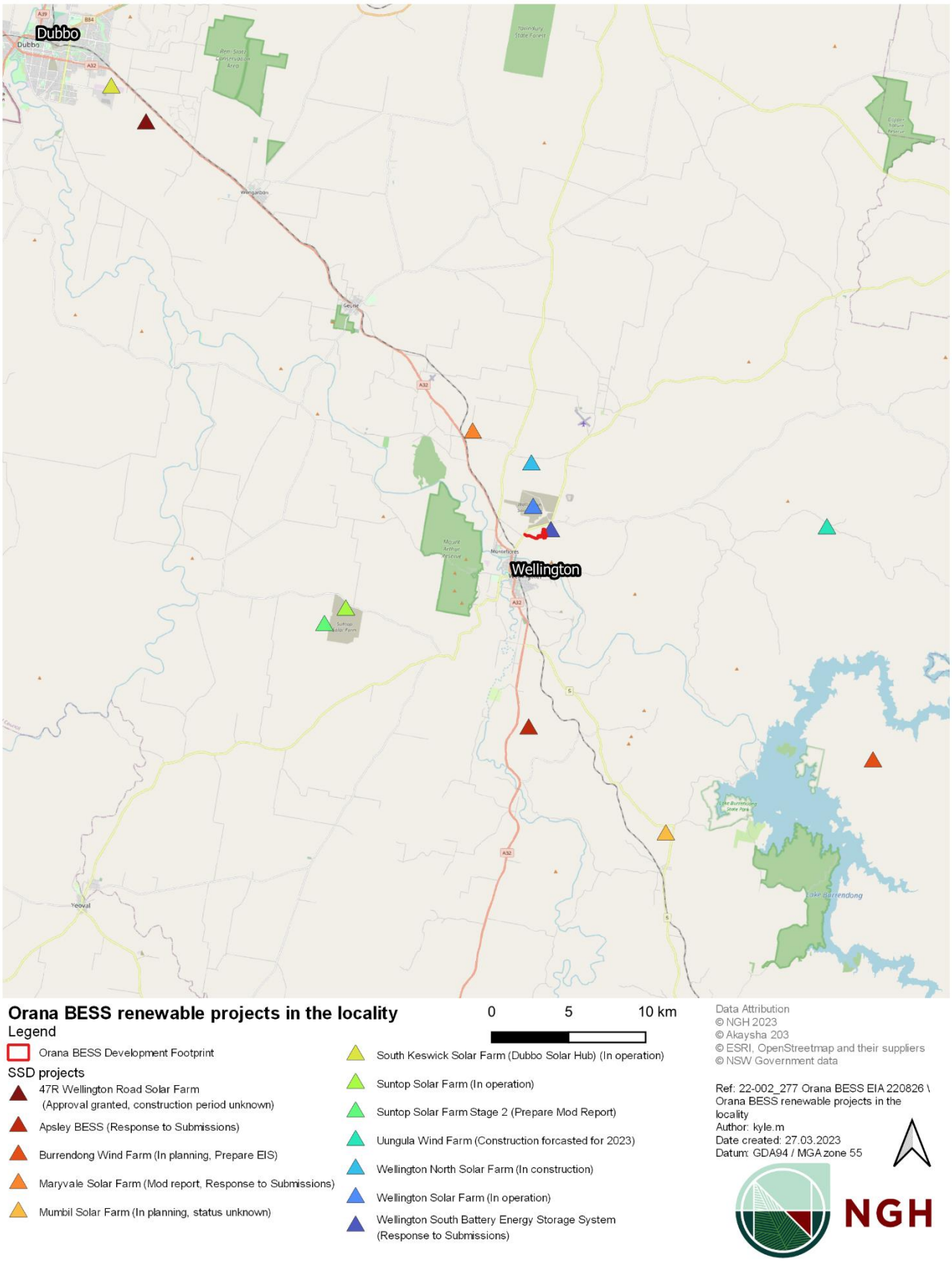


Figure 7-2 Renewable projects in the locality

Regional and local cumulative biodiversity impacts

The clearing of native vegetation, which is a key threatening process at both the State and Commonwealth level, is considered a major factor in the loss of biological diversity. At least 61 % of native vegetation in NSW has been removed since European settlement (NSW Scientific Committee Key Threatening Process Determination).

The cumulative impact of similar renewable energy projects, particularly where BC Act listed TEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* is involved, can be considerable given that many poorly conserved vegetation communities have a substantial portion of their extent represented on private land where most renewable energy projects are proposed. Small losses of vegetative communities may be insignificant at a local level but may accumulate over time to cause a significant reduction in the extent of remnant patches.

Avoid and minimise principles are well documented and evidenced in the linear north-located site layout. This is not the most efficient or cost-effective BESS layout but it is one that balances the Project's key objective to store and discharge energy economically with the site's key environmental values. It ensures that the Project has considered the 'avoid and minimise' biodiversity impacts mandate and the residual impacts are able to be offset.

Regional and local cumulative amenity impacts

The immediate local area has become dominated visually by solar farms and transmission infrastructure from some locations, including Goolma Road. This is a result of co-locating infrastructure in Renewable Energy Zones (REZs;: coordinating regional transmission and renewable generation in the right places for local communities. The necessary implication is that these areas would have higher cumulative amenity impacts.

Appropriate project-specific mitigation is important to address these impacts one project at a time. Orana BESS commits to landscape management planning to screen the assessed low visual impacts. This would also be of benefit to future projects, pre-emptively screening views to the Orana BESS, as well as the community, retain its visual character.

The Orana BESS Project has also been designed such that feasible and reasonable noise strategies would ensure low risk of noise exceedances in construction and no exceedances are predicted from operation.

Cumulative traffic impacts

A review has been undertaken for the major projects within the vicinity of the site which indicates there is the potential for a number of projects to overlap, particularly from other renewable projects which are outlined below:

- Wellington South BESS is located 300 metres east of the site and is not yet approved
- Uungula Wind Farm is located 18km east of the site and is not yet approved
- Aspley BESS is located 12km south of the site and is not yet approved
- Wellington North Solar Farm is located 4.5km north of the site with construction understood to have commenced July 2022
- Wellington Solar Farm is located north of the site and has completed construction.

The traffic assessment provided within this report demonstrates that the road network is expected to continue to operate with a good level of service with ample spare capacity. The combined

increase in traffic generated by the site and these projects is expected to have a minimal cumulative impact on the road network in the surrounding area. However, to account for the safety risks and delays for motorists, the Project acknowledges that overlapping construction schedules is a current information gap. To address this, the Project commits to consultation with affected stakeholders, within environmental management plans, developed in tandem with the final detailed design.

Cumulative land compatibility impacts

About 6.9ha within the fenced area of the BESS would be developed for the sole purpose of energy storage. This would represent the loss of a small proportion of active grazed land in the 'Cadia' property. As detailed in Section 6.9 the Project would have an impact on the following land compatibility issues:

- Resource loss and fragmentation of land
- Impacts on farming operations and livestock
- Biosecurity risks – pests, diseases and weeds
- Impacts to residents (covered in social impacts summary in the next sub-heading)

The loss of about 6.9ha of existing grazing land is not likely to impact the productivity of grazing activity for the 'Cadia' property and as an extension would also not impact of agricultural activity in the Central West Orana Region.

The loss of 6.9ha of agricultural land within the region weight against wider government strategic goals and environmental benefits, which include:

- Strategic goals of the Commonwealth and NSW Governments for renewable energy development going forward
- The environmental benefits of energy storage, in particular the reduction of greenhouse gas emissions obtained by surrounding renewable projects in the planning pipeline and existing
- The benefits of alternative and increased energy supply for grid stability and reliability under the energy transition.

Mining resources on the Development Footprint are not considered remarkable by exploration licence holder Magmatic Resources Pty Ltd. As such the Project does not present a loss to the mining resource.

Risks to biosecurity would be managed through measures in Section 6.1.4.

Regional and local cumulative social impacts:

The SIA consultation highlighted that people are concerned about cumulative impacts; specifically:

- Pressure on local facilities, goods and services
- Pressure on the housing market, short-term accommodation, and local services (construction phases)
- Changes to the community feel of the town (construction phases)
- Increased economic activity, and employment, training and procurement opportunities (construction phases)
- Way of life impacts for near neighbours.

The Orana BESS Project has been developed to be responsive to its social context and as such the following benefits are built into the Project, by way of Project commitments:

- Community and Stakeholder Engagement Strategy
- Industry Participation Plan
- Community Enhancement Fund.

These overarching plans would be developed with stakeholders to realise the positive outcomes and manage areas of concern.

7.3.4 Mitigation measures

The proposed impact mitigation strategies set out in Section 6 and Section 7 would be sufficient to address the cumulative impacts identified.

8. Justification of the Project

This section provides the justification and conclusion of the Project based on the outcomes of the environmental and social impact assessments. Consideration Project against the objects of the EP&A Act and ecologically sustainable development.

8.1 Justification

The Project would allow energy to be stored during times of low demand and released (or dispatched) at times of peak demand. The total capacity of the Project at 400MW/1600MWh would provide significant energy storage capacity to the NEM. The importance of this project has been identified by DPE for their Priority Assessments Programme.

The Orana Battery Energy Storage System would contribute to stable and reliable energy supply in the area to maintain the ability for renewable energy to provide enough clean, renewable energy in NSW homes while displacing carbon dioxide. It would also assist the NSW and Commonwealth Governments to meet Australia's renewable energy targets.

The Project is considered compatible with its context land uses. Specifically, the EIS shows the Project would:

- Complement current grid infrastructure located nearby
- Assist the NSW and Commonwealth Governments to meet Australia's renewable energy targets
- Meet and exceed all relevant environmental and regulatory requirements for the Project, in collaboration with key stakeholders
- Respond to key environmental values of the site and surrounds
- Provide local and regional employment opportunities and other social benefits during the construction and operation of the facility.

Stated in terms of Project benefits, the Orana BESS Project:

- ✓ Builds on the aims of the Central-West Orana REZ by being strategically located to maximise the benefits of and smooth the transition to greater renewable energy development
- ✓ Builds on the aims of the NSW Electricity Infrastructure Roadmap to transition away from coalfired energy, towards greater levels of renewable energy
- ✓ Act to stabilise and secure the supply of electricity for residents, business owners and service providers
- ✓ Assists to drive down the wholesale electricity prices for energy consumers
- ✓ Generates local employment, economic stimulus and other local economic benefits.

The Orana BESS Project has been developed to be responsive to its social context and as such the following benefits are built into the Project, as Project commitments:

- ✓ **Community and Stakeholder Engagement Strategy**: the existing strategy is a 'live' document, being updated concurrent with the Project's development. Moving forward into Public exhibition of the EIS, some of its key benefits include:
    - Keep the community and stakeholders informed about the Project through the provision of accurate and factual Project information
    - Provide opportunities for people to collaborate on relevant Project design matters and provide input into preferred solutions
    - Ensure people know how their input and views have been considered, and what strategies would be put in place to address their concerns
    - Identify and address community and stakeholder concerns and maintain transparency in Project design, implementation, and ongoing operations
    - Adaptively respond to emerging community concerns and changes in the social environment
    - Ensure provision of accessible, adequate, and responsive grievance and remedy mechanisms in the event of complaints. This will be particularly important during construction
    - Actively promote the positive benefits of the Project.
- ✓ **Industry Participation Plan**: The Project would prioritise local jobs and businesses wherever possible. Given widespread skills shortages and a disadvantaged local population, a very active approach is being adopted to address local employment and procurement (with a specific focus on First Nations participation), and the accommodation of the construction workforce. It would be:
    - Be targeted towards the people and businesses within Wellington and surrounds, the Dubbo Regional LGA, and the wider regional area
    - Be developed in partnership with key local and regional stakeholders, such as:
        - Dubbo Regional Council
        - Dubbo and Wellington Business Chambers
        - Economic development and industry support agencies (e.g., Regional Development Australia, Industry Capability Network)
        - Training and employment support agencies (e.g., TAFE NSW, Verto, Joblink Plus)
        - First Nations stakeholders (including the Central West Orana Working Group)
        - Other local social service or support agencies, and accommodation providers.
- ✓ **Community Enhancement Fund:** The intention of this fund is to support very localised and meaningful community and environmental initiatives that have strong resident and broader community support, throughout the life of the Project. Development of this fund has been informed by consultation with key stakeholders; however, there is still a need for further program development in partnership with the community and key stakeholders. Details regarding the Community Enhancement Fund are still under consideration, however one key concept that is currently being explored is to make a contribution to the development of a mountain bike facility at Mount Arthur Reserve, just outside Wellington.

8.2 Ecologically Sustainable Development

8.2.1 The Precautionary Principle

The Precautionary Principle states 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. This EIS has been prepared utilising the precautionary principle. That is, if threats are perceived as possibly leading to serious or irreversible environmental damage, then either the non–development of the Project would occur, or the development modified to ensure that such threats do not exist.

This EIS assesses the environmental and social impacts associated with the Project. A conservative approach was adopted for the assessments, which were often based on the worst-case scenarios. This has been the approach in relation to the recommended mitigation measures. No threat of serious or irreversible environmental damage is considered likely as a result of this Project. Section 6 and Section 7 detail the ongoing management measures to minimise environmental and social impacts.

8.2.2 Inter-generational equity

The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. The Project would not impact on natural or cultural features to a level that would compromise the health, diversity or productivity of the environment to a level that would impact on future generations. Furthermore, this Project would provide stability and reliability to the renewable energy supply in the area. This would help facilitate the transition to low carbon energy generation and help to reduce greenhouse gas emissions to minimise climate change implications for future generations.

8.2.3 Conservation of biological diversity and ecological integrity

The Proposal would disturb areas of previously disturbed habitat. The assessment has identified that the works would not impact significantly on the biological diversity and ecological integrity of the locality. Furthermore, safeguards have been developed that would assist in protecting woodland habitats.

Iterations of the design of the Proposal has incorporated avoidance, minimising and mitigation of impacts. The Proposal now impacts trees, with 0.91ha of native vegetation to be impacted. The remainder of the Development Site is located on exotic vegetation (0.04ha).

Environmental management measures have been identified to reduce the severity of impacts of the Proposal on biodiversity. Impacts to native vegetation and habitat would be offset. Offset requirements would be in accordance with the Biodiversity Offset Scheme under the BC Act. This would ensure that improvements to biodiversity and conservation outcomes would be achieved.

8.2.4 Appropriate evaluation of environmental matters

This principle relates to giving monetary values to environmental resources. These matters ensure that the development would conform to the principles of ecologically sustainable development. Environmental matters were considered during the iterative design of this Project to ensure environmental impacts were avoided or minimised through design and/or mitigation measures.

Environmental management safeguards and mitigation measures would be implemented during the construction, operation and decommissioning of this Project.

8.3 Environmental impacts, management and uncertainty

The environmental issues of the Orana BESS have been investigated through specialist investigations and the resulting mitigation strategies are considered feasible to address the low level impacts identified.

Key uncertainties of the assessment are acknowledged below. Overall, the results obtained in this EIS can be considered moderate-high confidence, given the existing detailed investigations on the Subject Land and adjacent large scale developments that have also been subject to detailed environmental assessments in recent years. Furthermore, to ensure flexibility in the final consent, where required, upper limit quantities and power level estimates are provided and assessed. Similarly, while an indicative Infrastructure Layout is provided to provide a clearer understanding of what would be constructed, the delineation of a broader Development Footprint at this stage provides the assessment and approval some resilience to minor layout changes in the final design. Together this 'upper limit' or 'worst case' approach ensures that all impacts of construction, as well as operation and decommissioning are captured in the environmental assessment section of this EIS and that any recommendations and mitigation strategies would be appropriate to the final detailed design.

With regard to uncertainty, the investigation of key environmental matters found:

- Biodiversity field surveys are a snap shot of a dynamic ecological system and cannot hope to capture all site values accurately. However, the biodiversity assessment has followed the prescriptive NSW Biodiversity Assessment Method, developed to address this issue, with its focus on 'candidate species' for targeted assessment during appropriate times, aiming to maximise detection of these species.
    - There may be some impacts to biodiversity that cannot be predicted; if this occurs, they can be addressed using the adaptive management strategy.
    - The Pink-tailed Legless Lizard is a cryptic species that lives mainly underground. There is limited knowledge of how the species moves through the landscape. The uncertainty is knowing all individuals have been found or potentially relocated prior to construction. To reduce uncertainty, a Pink-tailed Legless Lizard management plan is proposed as part of the mitigation to ensure the species is appropriately managed prior and during construction.
- Specific traffic information requested by TfNSW during the preparation of the TIA is not known at this time. The traffic assessment has however addressed the SEARs and relevant guidance in relation to intersection treatments and has included as much information as is currently known in relation to the potential for cumulative impacts with other developments.
- Hazards including bushfire ignition risks; the final layout of bushfire management infrastructure such as water storage tank locations has not been confirmed. The final design would be confirmed in consultation with NSW RFS and FRNSW and would take on recommendations from these agencies. This is a commitment of the Project.
- Detailed soil surveys have not been undertaken to date but would be contracted pending Project approval to inform rehabilitation of areas disturbed during construction and upon which to base a rehabilitation plan to ensure the site is left safe, stable and non-polluting.

- Recycling options at this time are not well developed for decommissioning stage however, BESS development is a key growth industry progressing rapidly to meet state and federal energy targets. As such this is not considered a limiting factor for the Project.

This upper limit' or 'worst case' approach is intended to over-estimate impacts and over-scope mitigation strategies and is therefore considered conservative. It is underpinned by the Project's commitment to capture this higher level of Project-specific detail in consultation with affected stakeholders, within environmental management plans, developed in tandem with the final detailed design.

All commitments and mitigation measures would be managed through the implementation of a Project Environmental Management Strategy (EMS). The EMS would comprise a Construction Environmental Management Plan (CEMP), an Operation Environmental Management Plan (OEMP) and a Decommissioning Environmental Management Plan (DEMP). These plans would be prepared sequentially, prior to each stage of works by the contractor (CEMP, DEMP) and Applicant (OEMP).

The EMS would include performance indicators, timeframes, implementation and reporting responsibilities, communications protocols, a monitoring program, auditing and review arrangements, emergency responses, induction and training and complaint/dispute resolution procedures. The monitoring and auditing program would clearly identify any residual impacts following mitigation. Adaptive management would be used to ensure that improvements are consolidated in updated EMPs.

The Project demonstrates responsiveness to the findings of the specialist assessments. Project outcomes in terms of impacts on key social and environmental values of the site are summarised as follows:

Biodiversity	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Plant Community Type 266) impacts: • Removal of 3.66 ha in low to good condition categories • Removal of 6.96 ha in poor condition This includes 37 hollow bearing trees and confirmed habitat for the threatened: • *Aprasia parapulchella* Pink-tailed Legless Lizard (10.34 ha) • *Tyto novaehollandiae* Masked Owl (5.1 ha). The remaining vegetation within the Development Footprint is considered exotic. The impacts are not considered serious and irreversible. They can be offset and the project has applied the NSW Biodiversity Assessment Method to demonstrate 'avoid and minimise' as required.
Aboriginal heritage	One previously recorded culturally modified tree is located is approximately 150 m from proposed Development Footprint. The surveys and assessment concluded there is low potential for surface or subsurface stone artefacts to be present or to be harmed by the Project. No known specific values (scientific, social or cultural, aesthetic or historic) would be impacted by the Project.
Access and traffic	A site access off Goolma Road is required for the Project. its location has been

	selected to ensure safe sight lines and turning movements. Impacts on local traffic would be concentrated in the construction phase where there is the potential for a number of projects to overlap, particularly from other renewable projects, generating cumulative traffic impacts. Modelling shows the road network can accommodate the additional traffic generated during peak phases, in consideration of what is known of other local projects. The Project is expected to generate approximately 12 Oversize Overmass vehicle movements (12 back and forth movements) during construction. During operation the BESS is expected to generate a minimal level of traffic.
Hazards - Preliminary Hazards Assessment	Preliminary risk screening found that the Project is not considered as 'potentially hazardous industry'. Electric and Magnetic Fields created from the Project will not exceed the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines reference level. The designated land area can accommodate the BESS units to meet the proposed capacity, as verified by detailed general arrangement drawings. No off-site impact is expected as the BESS would be situated in a rural area and there is a large separation distance to the nearest sensitive receptor.
Bushfire	Asset Protection Zones are included in the Development Footprint to ensure a defendable space is provided and to manage heat intensities at the infrastructure interface.
Visual amenity	Two private and eleven public view points were evaluated as having a low to very low visual impact without mitigation. With mitigation this reduces to very low in all cases. Nine Non-associated Receivers were evaluated as having a low (R1) to very low (R2, 3, 4, 5, 6, 7, 8,10) visual impact without mitigation. With mitigation this reduces to very low / negligible in all cases.
Noise amenity	For Receiver R1, it is expected that a noise exceedance of 3 dB during construction would likely occur when the construction works are conducted within 700m of the dwelling / building (expected duration would two to three days). No exceedances are relevant to operation. No vibration or road traffic noise impacts warrant mitigation.
Non-Aboriginal heritage	The view to Nanima Homestead (I51; R1) from the Subject Land is largely occluded by mature plantings surrounding this item. The Keston Homestead (I50) is located even further from the Subject Land (more than 1 kilometre away). Potential impacts to the heritage values of the locally listed heritage items (I50 and I51) are negligible.
Cumulative impacts	While most cumulative impacts are best mitigated on a project by project basis, traffic impacts may be more significant and are more uncertain. The Applicants best understanding of timing is presented in this EIS as well as the stated timing of nearby projects which may coincide. While the chance of overlap cannot be known with certainty at this time, the period of overlap of peak construction traffic is not considered significant in terms of the ability of the local road network to handle this

	overlap. Cumulative traffic impacts will require more accurate data, closer to construction with regard to managing overlapping construction schedules.

Key community Project issues and opportunities were identified throughout the Project's engagement activities and informed the development of social impact and engagement strategies to be implemented as part of the Project, pending approval, including:

1.	Employment, training and procurement opportunities	The development of a Local Participation Plan is proposed to enhance positive impacts.
2.	Impacts on the local economy	The development of a Local Participation Plan and a Local Procurement Policy is proposed to provide tangible outcomes for local business, even over the short term.
3.	The ability to share benefits	The Applicant has committed to developing a community benefit sharing program that is tailored to the local context, to maximise local benefits and designed to have a positive and lasting impact on the Wellington community.
4.	Impacts on local housing and accommodation	The Applicant has committed to hiring locally (where possible) to reduce accommodation burdens and is recommended to work closely with Dubbo Regional Council and other key stakeholders in Wellington and Dubbo to develop an Accommodation and Employment strategy to minimise negative impacts on the rental market and other users of short-term accommodation, such as tourists.
5.	Amenity impacts for near neighbours	The nearest neighbours were consulted early in the planning phase to discuss visual amenity impact on their property. Within the Project planning phase, consideration was given to siting the facility to take advantage of local terrain and vegetation and thereby minimise views. Consideration was also given to ensuring that the colours of the buildings within the site blend into the landscape as much as possible. The Applicant has committed to working closely with impacted near neighbours to develop appropriate and acceptable mitigation measures specifically to manage noise impacts.

8.4 Conclusion

This EIS indicates that the Orana BES Project is well justified as it:

- Meets relevant statutory requirements, as set out in Section 4
- Demonstrates that the environmental risks associated with the Project are well understood and manageable
- Demonstrates responsiveness to the key social and environmental values of the site. This is primarily in the areas of:
    - Biodiversity – avoid and minimise principles are well documented and evidenced in the linear north-located site layout. This is not the most efficient or cost-effective BESS layout but it is one that balances the Project's key

objective to store and discharge energy economically with the site's key environmental values.

- Traffic and access – consideration of all feasible access points has led to the Project adopting an access that both provides for safe site access and minimises biodiversity impacts.
- Visual amenity – screen planting would further reduce low visual impacts. This is considered particularly important given the cumulative impact of additional industrial infrastructure on existing residential and motorist views.
- Noise amenity – feasible and reasonable noise strategies would ensure low risk of noise exceedances in construction. No exceedances are relevant to operation.
- Social impacts – the Project has incorporated commitments to address local issues that maybe exacerbated by the Project or which the local community has raised as being of interest.

The consequences of not proceeding with the proposed Orana BESS would result in:

- Loss of opportunity to reduce greenhouse gas emissions and move towards cleaner renewable electricity generation
- Loss of facilitating energy release into the electricity network from a renewable energy supply that would assist in reaching the NSW and National renewable energy targets
- Loss of social and economic benefits created through the provision of direct and indirect employment opportunities and economic stimulus created during the construction (and to a lesser extent) operation of the BESS.

The Orana BESS provides a balance between technological, energy and environmental aspects, while retaining the flexibility required in the final design stage of the Proposal. Furthermore, the proposal is consistent with the principles of ESD and forms an important part of Australia's transition to renewable energy generation. It is considered justifiable.

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Appendix A Secretary's Environmental Assessment Requirements

As the Proposal is classified as State Significant Development (SSD), a Scoping Report was prepared and SEARs were requested. These were provided by DPE on 12 July 2022. The SEARs are intended to guide the structure and content of this EIS and reflect the responsibilities and concerns of NSW government agencies in relation to the environmental assessment of the Proposal.

Table 9-1 SEARs and the section that they are discussed in the EIS

Issue summary	Addressed in this EIS
The Environmental Impact Statement (EIS) must meet the minimum form and content requirements as prescribed by Part 8, Division 5 of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) and must have regard to the *State Significant Development Guidelines*.	
• a stand-alone executive summary;	• Executive summary, page xiv

• a full description of the development, including:
  ○ details of construction, operation and decommissioning;
  ○ a high quality site plan at an adequate scale showing all infrastructure and facilities (including any infrastructure that would be required for the development, but the subject of a separate approvals process);
  ○ a high quality detailed constraints map identifying the key environmental and other land use constraints that have informed the final design of the development;
	• Section 3
	• Figure 1-2
	• Figure 3-1
	• Figure 3-2

• a strategic justification of the development focusing on site selection and the suitability of the proposed site with respect to potential land use conflicts with existing and future surrounding land uses (including existing land use, residential development, any Crown lands adjacent to the site and neighbouring industrial and infrastructure developments);	• Section 1.5 • Section 8

• an assessment of the likely impacts of the development on the environment, focusing on the specific issues identified below, including:
  ○ a description of the existing environment likely to be affected by the development using sufficient baseline data;
  ○ an assessment of the likely impacts of all stages of the development, (which is commensurate with the level of impact), including any cumulative impacts of the site and existing or proposed developments in the region in accordance with the Cumulative Impact Assessment Guideline (DPIE, Nov 2021);
	• Sections 6 and 7

Issue summary	Addressed in this EIS
○ a description of the measures that would be implemented to avoid, mitigate and/or offset the impacts of the development (including draft management plans for specific issues as identified below); and ○ a description of the measures that would be implemented to monitor and report on the environmental performance of the development;	
• a consolidated summary of all the proposed environmental management and monitoring measures, identifying all the commitments in the EIS;	• Appendix D
• a detailed evaluation of the merits of the project as a whole having regard to: ○ the requirements in Section 4.15 of the *Environmental Planning and Assessment Act 1979*, and how the principles of ecologically sustainable development have been incorporated in the design, construction and ongoing operations of the development; ○ the suitability of the site with respect to potential land use conflicts with existing and future surrounding land uses; and ○ feasible alternatives to the development (and its key components), including the consequences of not carrying out the development;	• Section 8
• a detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system in the National Electricity Market, having regard to local system conditions and the Department's guidance on the matter; and	• Section 2.1, 2.2
• a signed statement from the author of the EIS, certifying that the information contained within the document is neither false nor misleading.	• Declaration, page ix
• a report from a suitably qualified person providing a detailed calculation of the capital investment value (CIV) (as defined in the Dictionary of the EP&A Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived;	• Provided separately to DPE
• an estimate of jobs that will be created during the construction and operational phases of the proposed development; and	• Table 3-1
• certification that the information provided is accurate at the date of preparation.	• Declaration, page ix
• The development application must be accompanied by the consent in writing of the owner/s of the land (as required in clause 23(1) of the EP&A Regulation).	• Provided separately to DPE
• **Biodiversity** – including: ○ an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity	• Section 6.1 • Appendix E.1

Issue summary	Addressed in this EIS
Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPE determine the proposed development is not ○ likely to have any significant impacts on biodiversity values; ○ the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM; and ○ if an offset is required, details of the measures proposed to address the offset obligation.	
• **Heritage** – including: ○ an assessment of the impact to Aboriginal cultural heritage items (cultural and archaeological) in accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011) and the Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010), including results of archaeological test excavations (if required); ○ provide evidence of consultation with Aboriginal communities in determining and assessing impacts, developing options and selecting options and mitigation measures (including the final proposed measures), having regard to the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010); and ○ assess the impact to historic heritage having regard to the NSW Heritage Manual.	• Section 6.2 • Appendix E.2 • Section 6.11
• **Land** – including: ○ a detailed justification of the suitability of the site and that the site can accommodate the proposed development having regard to its potential environmental impacts, permissibility, strategic context and existing site constraints; ○ an assessment of the potential impacts of the development on existing land uses on the site and adjacent land, including: ▪ agricultural land, flood prone land, Crown lands, mining, quarries, mineral or petroleum rights; ▪ a soil survey to determine the soil characteristics and consider the potential for erosion to occur; and ▪ a cumulative impact assessment of nearby developments, ○ an assessment of the compatibility of the development with existing land uses, during construction, operation and after decommissioning, including: ▪ consideration of the zoning provisions applying to the land, including subdivision; ▪ completion of a Land Use Conflict Risk Assessment in accordance with the Department of Industry's Land Use Conflict Risk Assessment Guide; and	• Section 6.8 Flooding • Section 6.9 Land use compatibility • Section 6.10 Soil It is argued that the site is neither BSAL nor highly vulnerable being Class 6. Soil surveys are a commitment of the Project to ensure construction risks are mitigated. They are not required to inform compatibility.

Issue summary	Addressed in this EIS
▪ assessment of impact on agricultural resources and agricultural production on the site and region.	
• **Visual** – including: ○ including a detailed assessment of the likely visual impacts (including night lighting) of all components of the project (including transmission lines and any other ancillary infrastructure) on surrounding residences, scenic or significant vistas and road corridors in the public domain and on the Siding Spring Observatory in accordance with the Dark Sky Planning Guideline (2016).	• Section 6.6 • Appendix E.5
• **Noise** – including: ○ an assessment of the construction noise impacts of the development in accordance with the Interim Construction Noise Guideline (ICNG), operational noise impacts in accordance with the NSW Noise Policy for Industry (2017), cumulative noise impacts (considering other developments in the area), and a draft noise management plan if the assessment shows construction noise is likely to exceed applicable criteria;	• Section 6.7 • Appendix E.6
• **Transport** – including: ○ an assessment of the peak and average traffic generation, including over-dimensional vehicles, construction worker transportation and transport of materials by rail ○ an assessment of the likely transport impacts to the site access route, site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance; ○ a cumulative impact assessment of traffic from nearby developments; and ○ provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority;	• Section 6.3 • Appendix E.3
• **Water** – including: ○ an assessment of the likely impacts of the development (including flooding) on surface water and groundwater resources and measures proposed to monitor, reduce and mitigate these impacts; ○ details of water requirements and supply arrangements for construction and operation; and ○ a description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom 2004);	• Section 6.8 • Appendix E.7

Issue summary	Addressed in this EIS

• **Hazards** – including:
  ○ a preliminary risk screening completed in accordance with the State Environmental Planning Policy (Resilience and Hazards) 2021;
  ○ a Preliminary Hazard Analysis (PHA) must be prepared in accordance with the Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-Level Risk Assessment (DoP, 2011). The PHA must:
  ▪ consider all recent standards and codes; and
  ▪ verify that the area designated for the BESS, and separation distances to on-site and off-site receptors and between BESS sub-units, is sufficient to prevent fire propagation and compliance with Hazardous Industry Advisory Paper No. 4, 'Risk Criteria for Land Use Safety Planning (DoP, 2011); and
  ○ an assessment of potential hazards and risks including but not limited to bushfires, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to Time-varying Electric, Magnetic and Electromagnetic Fields;
	• Section 6.4
	• Appendix E.4

• **Social impact** – including: ○ including an assessment of the social impacts in accordance with Social Impact Assessment Guideline (DPIE, Nov 2021);	• Section 6.12 • Appendix E.8
• **Economic** – including: ○ including an assessment of the economic impacts or benefits of the project for the region and the State as a whole; and	• Section 2.4
• **Waste** – identify, quantify and classify the likely waste stream to be generated during construction and operation, and describe the measures to be implemented to manage, reuse, recycle and safely dispose of this waste.	• Section 7.1
• The EIS must include all relevant plans, diagrams and relevant documentation required under Part 3 of the EP&A Regulation. Provide these as part of the EIS rather than as separate documents. • In addition, the EIS must include high quality files of maps and figures of the subject site and proposal.	• noted
• The assessment of the key issues listed above must take into account relevant & Guidelines, policies, and plans as identified. • A list of some of the legislation, policies and guidelines that may be relevant to the assessment of the project can be found at: • https://www.planning.nsw.gov.au/Policy-and-Legislation/Planning-reforms/Rapid-Assessment-Framework/Improving-assessment-guidance	• noted

Issue summary	Addressed in this EIS
• https://www.planningportal.nsw.gov.au/major-projects/assessment/policies-and-guidelines; and • http://www.environment.gov.au/epbc/publications#assessments	
• During the preparation of the EIS, you should consult with relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners and any exploration licence and/or mineral title holders. • In particular, you must undertake detailed consultation with affected landowners surrounding the development, Dubbo Regional Council, and NSW Aboriginal Land Council. The EIS must: • detail how engagement undertaken was consistent with the *Undertaking Engagement Guide: Guidance for State Significant Projects* (DPIE, July 2021); and • describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	• Section 5 • Appendix C • Appendix E.8
• If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, your SEARs will expire. If an extension to these SEARs will be required, please consult with the Planning Secretary 3 months prior to the expiry date.	
• If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, your SEARs will expire. If an extension to these SEARs will be required, please consult with the Planning Secretary 3 months prior to the expiry date.	

Appendix B Community engagement strategy

Appendix C Consultation evidence

C.1 Community engagement activities

C.2 Agency engagement

C.2.1 Transport for NSW additional comments

Response to TfNSW additional comments below as provided in Table 7 of the TIA (Appendix E.3)

Table 7: Response to TfNSW Comments

Comment	Response
It is noted that this section of Goolma Road is subject to a number of other developments occurring that will likely have implications for the road environment such as the Uungula Wind Farm realignment of Twelve Mile/Goolma Road and the Wellington South BESS that will be neighbouring this site. The TIA currently presented does not identify the constraints or cumulative impacts with these other projects occurring within this space.	An assessment of the cumulative traffic impacts of nearby projects is provided within Section 3.4 and indicates the road network is expected to continue to operate with a good level of service.
It does not identify the origin and destination of the light and heavy vehicle workforce to the sites or provides inputs to the assumptions made in relation to the light/heavy/OSOM vehicles identified within the report.	The distribution of vehicles is discussed within Section 3.2 with the traffic volume calculations provided within Appendix A.
Will there be a transmission line required to be undertaken as a part of this work? Will that have a separate access with separate vehicles required to enter/exit this access?	The project includes 200 metres of transmission line to connect to the existing substation which would not require a separate access.
Has there been any consideration of the lateral/horizontal and vertical requirements for the OSOM in particular transformers required to move to the site from the route? Will tree clearing, signage removal or any other modifications be required for the route.	The OSOM vehicle route is discussed within Section 4.2. Given the route utilises the State road network and has been adopted by other projects it is concluded that the route is able to be utilised by OSOM vehicles associated with the project with permits to be applied for as part of the CTMP.
It is noted that shuttle buses are proposed as a mitigation measure with no consideration of measures to enforce shuttle buses.	It is understood that the Applicant is seeking to transport at least 80% of the workforce to the site by shuttle bus during peak construction. The size of the on-site car park during construction would prevent a high use of private vehicles.
SISD is not based on the 85th percentile and is actually for the posted speed zone. Meaning the SISD presented as 224 is deficient requires 226m would likely need to take into account the curve and superelevation.	Section 5.2 discusses the sight distance at the site access and indicates that the requirement is based on the 85th percentile speed as outlined within the Austroads Guide. As such, the sight distance complies with the requirements of the Austroads Guide.
What will happen in relation to the OSOM route if the road works for the Twelve Mile Road/Goolma Road intersection have not been completed?	The OSOM vehicles are not required to turn at the intersection and subsequently would be able to travel along Goolma Road. Any OSOM vehicle movements should consider construction works at the intersection as part of the future permit applications.
Please provide the raw data for the tube counts undertaken on Monday 12-19 September 2022.	It is understood that the data has been provided to TfNSW.

In relation to Table 2: Traffic Generating During Construction the Peak Hour for light vehicles is identified as 20 with 10 shuttle buses this is an assumption that 86% of the workforce will be utilising shuttle buses. With no clear measures in relation to enforcement as to how this will be implemented and achievable. Is this for peak construction for the project?	It is understood that the Applicant is seeking to transport at least 80% of the workforce to the site by shuttle bus during peak construction. The size of the on-site car park during construction would prevent a high use of private vehicles.
The peak construction year should take into account the other projects such as Wellington South BESS and Uungula Wind Farm within the background traffic volume assumptions.	An assessment of the cumulative traffic impacts of nearby projects is provided within Section 3.4 and indicates the road network is expected to continue to operate with a good level of service.
Has there been any assessment of capacity of surrounding townships to accommodate the workforce of these simultaneous projects? If workforce can't be accommodated in surrounding townships then this will changed the distribution splits at the proposed access. I imagine this would have been a requirement of the Social Impact Assessment Guidelines.	This is investigated in the social impact assessment and mitigation measures include a specific Industry Participation Plan which would be developed to ensure a focus on maximising the involvement of local people and businesses in the Project and include a Local Procurement Policy and Accommodation and Employment Strategy.
The traffic assessment should be based on the worst case scenario of 150 construction staff and 6 heavy vehicles (is this inclusive of input materials concrete, aggregate etc) entering the site in the AM/PM peak.	The traffic volumes have been based on the worst case scenario.
It is noted that the Mon-Friday construction timeframes are 7-6pm however Table 3: Expected Peak Hour Traffic Volumes During Construction you have stated the AM Peak as 7am and PM Peak as 6pm which is incorrect. As the construction workforce will already be on site or have left the site. The correct peak hour will in face be 6-7am and 5-6pm.	The assessment has been based on the peak hours assuming 6:00am (morning peak) and 5:00pm (evening peak).
The last section notes that there will be no overlap with timeframes with other projects. Reviewing the Wellington South BESS the construction hours will be 7am to 6pm and therefore will have the same AM/PM peak as the proposed project of 6-7am and 5-6pm.	An assessment of the cumulative traffic impacts of nearby projects is provided within Section 3.4 and indicates the road network is expected to continue to operate with a good level of service.
The strategic design provided does not represent the BAL/CHR(S) and should be noted that the whole TIA should be reviewed to address the above discrepancies and will likely require review of the turn warrant assessment and the strategic concept design.	An assessment of the turn treatment requirements based on the revised peak hour times indicates the site access would require a BAR and BAL. The required turn treatments are proposed at the site access.
The strategic concept design should include how the treatments for Wellington South BESS and the proposed treatments for this BESS will work together and be in accordance with Austroads.	The treatment design for the Wellington South BESS is located 1.7km northeast of the project site access and as such, there is no interaction between the designs.
The last swept path identifies that the B-double design vehicle turning right will require to utilise the through lane and the BAL to turn right.	Amber is unsure as to what is being identified in this comment. TfNSW have refused a meeting and subsequently this comment is unable to be addressed.

Dubbo Regional Council was contacted as part of the preparation of the Traffic Impact Assessment. As the site access connects with the State road network Council Officers did not provide any comment on the project in relation to traffic.

Appendix D Mitigation measures (consolidated)

Mitigation number	Mitigation measure	Project stage
B1	Completion of Biodiversity Management Plan to minimise impacts on biodiversity. The Biodiversity Management Plan needs to include the following: • Hollow-bearing tree protocol (Appendix E). • Pink-tailed Legless Lizard management plan. • Masked Owl management plan. • Identification of temporary fencing location based on the development footprint. • Unexpected Finds Protocol. • Staff training and induction measures which include Maked Owl, Pink-tailed Legless Lizard, Superb Parrot and Grey-headed Flying Fox, Diamond Firetail and Turquoise Parrot. Management of biodiversity mitigation measures for indirect and prescribed impacts.	Pre-Construction
B2	Timing works to avoid critical life cycle events such as breeding or nursing. • Hollow bearing tree removal should be timed to avoid breeding season for the highest number of species such as Masked Owl. • Rock removal to be completed when Pink-tailed Legless Lizard is not breeding.	Pre-clearance surveys prior to construction
B3	Masked Owl management plan • Pre-clearance surveys of HBTs to determine if Masked Owl are breeding on site. • Avoid HBT removal if any Masked Owl breeding on site • Ecologist present during tree removal • Threatened species protocol.	Pre-construction
B4	Pink-tailed Legless Lizard management plan • Consultation with the species expert to determine timing for relocation of this species prior to construction. • Any proposed relocation undertaken by an appropriately qualified ecologist. • Pre-clearance surveys. • Relocation of scattered rocks in the development site from the development footprint	Sept-Nov Autumn (warmer months)

Mitigation number	Mitigation measure	Project stage
	by an experienced ecologist. • Threatened species protocol for managing individuals if construction occurs when species are likely to be underground. • Avoid creation of rock piles. Rocks should be loosely scattered in the development site • Avoid any relocation during breeding season (December -March).	
B5	Pre-clearing protocols • Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed trained spotter catcher during clearing events. • Staged clearing, supervised by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required. • A hollow bearing tree clearing protocol has been included in **Error! Reference source not found.** for the 37 HBTs. The clearing protocol includes pre-clearance surveys and a protocol for managing fauna during clearing or if any harm or injury may occur but also how to avoid and minimise harm to wildlife.	Construction
B6	Relocation of habitat features (fallen timber, hollow logs and rock) from within the Development Site. • All rock, fallen timber and hollow logs should be relocated outside of the construction area under the supervision of an Ecologist or spotter catcher.	Construction
B7	Staff inductions • Induct all staff prior to construction to identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance.	Prio to and during construction
B8	Clearing protocols • Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed. • Documented clearance protocols to mark and protect vegetation to be retained.	Pre-construction

Mitigation number	Mitigation measure	Project stage
	• Use handheld machinery where possible and have elevated work platform check hollows prior to tree felling.	
B9	Install temporary fencing to protect significant environmental features such as riparian zones. Prior to construction commencing, exclusion fences and signage would be installed around habitat to be retained.	Construction
B10	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas. Ensure machinery and equipment as clean and free from pathogens and weeds prior to entering site.	Construction
B11	Preparation of a Biodiversity Management Plan (BMP) for the site to include: • How to remove and dispose of vegetation and topsoil containing weeds declared under the Biosecurity Act 2015 during and after construction. • Reporting any occurrences of pathogens such as Myrtle Rust and Phytophthora.	Construction, operation
B12	Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment. • An erosion and sediment control plan would be prepared and implemented.	Construction
B13	Use of temporary fencing to protect significant environmental features.	Pre-construction Construction
B14	Introduce speed limits to reduce vehicle strike.	Pre-construction Construction

Mitigation number	Mitigation measure	Project stage
AH1	Works must not impact the CMT sites to the south of the Development Site. If works are to extend outside of the indicative Development Footprint in close proximity to the modified trees (AHIMS#36-4-0117, 36-4-0118, 36-4-0223, 36-4-0224 and 36-4-0225) then a “no-go zone” with a 10 m buffer within the Development Site should be established to ensure there are no inadvertent impacts to these CMTs (see area in Figure 11-1 of the ACHA). The “no go zone” fence should be hi-visibility mesh and be in place for the duration of the construction.	Design Construction Operation Decommissioning
AH2	Aboriginal heritage will be included within the Construction Environment Management Plan (CEMP) or equivalent for the Project. This will include an unexpected finds protocol and will include an onsite induction and be developed in consultation with the RAPs for the Project. Site personnel will be advised that there are registered Aboriginal heritage sites within the vicinity of the Development Site and ground disturbance is not allowed outside of the approved areas.	Construction
AH3	In the unlikely event that human remains are discovered during the development works, all work must cease in the immediate vicinity and follow the protocol provided in Appendix B of the ACHA. Heritage NSW and the police should be notified. Further assessment shall be undertaken to determine if the remains were Aboriginal or non-Aboriginal.	Construction
AH4	Further archaeological assessment will be required if the proposal activity extends beyond the area of the current investigation. This will include consultation with the RAPs and may include further field survey.	Pre-construction Construction
AH5	Consultation with the RAPs for the Project will be maintained through the approvals process and post-approval construction.	Pre-construction Construction
AH6	A copy of the final ACHA will be lodged with AHIMS and provided to each of the RAPs for their records.	Pre-construction
T1	A Construction Traffic Management Plan (CTMP) will be prepared and implemented. The CTMP will include additional information not available at this stage in the planning process including: • Road transport volumes, distribution and vehicle	Construction

Mitigation number	Mitigation measure	Project stage
	types broken down into: ○ Hours and days of construction ○ Schedule for phasing/staging of the Project. • The origin, destination and routes for: ○ Employee and contractor light traffic. ○ Heavy vehicle traffic. ○ Oversize and overmass traffic. Specific mitigation measures that will be implemented and included in the CTMP are as follows: • OSOM movements will be defined by further route assessment. If substantial road upgrade is required due to excessive OSOM size requirements, the Applicant would select smaller plant. • Ensure that 80% of the construction workforce travel to the site via shuttle bus. • Neighbours, stakeholders and major projects nearby the of the BESS will be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access. • All heavy vehicle movements are recommended to occur outside of school times when school buses are expected on Goolma Road. • Loading and unloading will occur within the Development Footprint. No street or roads will be used for material storage at any time. • All vehicles will enter and exit the site in a forward direction. • The following code is to be implemented as a measure to maintain safety within the site: ○ Utilisation of only the designated transport routes. ○ Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities. • Implementation of a proactive erosion and sediment control plan for on-site roads, hardstands and laydown areas. • All permits for working within the road reserve must be received from the relevant authority prior to works commencing. • A map of the primary haulage routes highlighting critical locations. • An induction process for vehicle operators and	

Mitigation number	Mitigation measure	Project stage
	regular toolbox meetings. • A complaint resolution and disciplinary procedure. • Local climatic conditions that may impact road safety of employees throughout all Project phases (e.g. fog, wet and significant dry, dusty weather). • Any construction outside of normal working hours would only be undertaken with prior approval from relevant authorities.	
T2	An Operational Traffic Management Plan will be implemented in consultation with the relevant roads authority prior to any additional major material deliveries requiring large vehicle movements during operation.	Operation
T3	A Decommissioning Traffic Management Plan will be implemented in consultation with the relevant roads authority prior to decommissioning of the Project.	Decommission
E1	All electrical equipment will be designed in accordance with relevant codes and industry best practice standards in Australia.	Design
E2	All design and engineering will be undertaken by qualified and competent person/s with the support of specialists as required.	Design
E3	Design of electrical infrastructure will minimise EMFs.	Design
H1	Locate the O&M building appropriate distance from the closest BESS enclosure to correspond with the minimum safety perimeter in the event of an emergency specified in Powin's Battery Emergency Response Guide.	Design Construction Operation
H2	Review the investigation reports on the Victorian Big Battery Fire (occurred on 31 July 2021) and implement relevant findings for the Project. The publicly available investigation reports include: • Energy Safe Victoria: Statement of Technical Findings on fire at the Victorian Big Battery. • Fisher Engineering and Energy Safety Response Group: Report of Technical Findings on Victorian Big Battery Fire.	Design Construction Operation
H3	Consult with Fire and Rescue NSW (FRNSW) to ensure that relevant aspects of fire protection measures have been included in the design. This may include:	Design Construction

Mitigation number	Mitigation measure	Project stage
	• Type of firefighting or control medium. • Demand, storage, and containment measures for the medium. The above aspects will form an input to the Fire Safety Study, which may be required as part of the development consent conditions, for review and approval by FRNSW.	Operation
BF1	Dangerous or hazardous materials shall be stored and handled in accordance with AS1940-2004: *The storage and handling of flammable and combustible liquids*.	Construction Operation Decommissioning
BF2	Develop a BFEMOP to include but not be limited to: • Detailed measures to prevent or mitigate fires igniting. • Construction work that should not be carried out during total fire bans. • Availability of fire-suppression equipment, access and water. • Storage and maintenance of fuels and other flammable materials. • Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate • Appropriate bush fire emergency management planning. In developing the BFEMOP, NSW RFS and FRNSW will be consulted on the volume of water supplies, fire-fighting equipment maintained on-site, fire truck connectivity requirements, proposed APZ and access arrangements, communications, vegetation fuel levels and hazard reduction measures.	Construction Operation Decommissioning
BF3	An APZ of minimum 10m will be maintained between remnant or planted woody vegetation and the BESS and ancillary infrastructure. Average grass height within the APZ will be maintained at or below 5cm on average throughout the October to March fire season. Average grass height outside the APZ, will be maintained at or below 10cm throughout the fire season.	Construction Operation
BF4	Non-combustible (steel or concrete) water storage tanks	Construction

Mitigation number	Mitigation measure	Project stage
	should be installed adjoining the main internal access road, or nearby the BESS, for fire-fighting and other non-potable water uses, with a 65mm Storz outlet, a metal valve and a minimum of 20,000 litres reserved for fire-fighting purposes, in accordance with PBP. The final location/s of water tanks will be determined in agreement with NSW RFS and FRNSW recommendations.	
BF5	Appropriate fire-fighting equipment will be held on site to respond to any fires that may occur at the site during construction. This equipment will include fire extinguishers, a 1000 litre water cart (fitted with suitable hosing, fittings and diesel firefighting pump) retained on site on a precautionary basis. Equipment lists would be detailed in Work Method Statements.	Construction
BF6	The NSW RFS and Fire and Rescue NSW will be provided with a contact point for the BESS, during construction and operation.	Construction Operation
BF7	Following commissioning of the BESS, the local NSW RFS and Fire and Rescue brigades will be invited to an information and orientation day covering access, infrastructure, firefighting resources on-site, fire control strategies and risks/hazards at the site.	Operation
BF8	The access track will comply with the requirements of property access roads in accordance with Table 5.3b of the PBP. All access and egress tracks on the site would be maintained and kept free of parked vehicles to enable rapid response for firefighting crews and to avoid entrapment of staff in the case of bush fire emergencies.	Construction Operation Decommissioning
BF9	A Hot Works Permit system shall be applied to ensure that adequate safety measures are in place. Fire extinguishers would be present during all hot works. Where practicable hot works would be carried out in specific safe areas (such as the Construction Compound temporary workshop areas).	Construction Operation Decommissioning
BF10	Protocols to manage activities in bushfire danger weather, including Total Fire Ban days, will be developed.	Construction Operation Decommissioning
BF11	Prior to operation of the BESS, an Emergency Response Plan (ERP) will be prepared in consultation	Design Construction Operation

Mitigation number	Mitigation measure	Project stage
	with the RFS and FRNSW. This plan must include but not be limited to: • Specifically addresses foreseeable onsite and off-site fire events and other emergency incidents. • Risk control measures would include the level of personal protective clothing required to be worn, the minimum level of respiratory protection required, decontamination procedures, minimum evacuation zone distances and a safe method of shutting down and isolating the PV system (either in its entirety or partially, as determined by risk assessment). • Outline other risk control measures that may need to be implemented in a fire emergency due to any unique hazards specific to the site. • Two copies of the ERP are stored in a prominent 'Emergency Information Cabinet' which is located in a position directly adjacent to the site's main entry point. • Once constructed and prior to operation, the operator of the facility will contact the relevant local emergency management committee.	Decommissioning
BF12	Fire risks associated with the lithium-ion energy storage facility would include: • Locating the BESS as far as practicable from any sensitive receptors or large stands of vegetation. • Installing reliable automated monitoring (voltage and temperature), alarm and shutdown response systems. • Installing reliable integrated fire detection and fire suppression systems (inert gas). • Ensuring the battery containers are not vulnerable to external heat effects in the event of a bush fire. • Designing appropriate separation and isolation between battery containers and between batteries and other infrastructure, including gravel surfacing around the facility for a minimum 10m in accordance with APZ. • Compliance with all relevant guidelines and standards. • Preparation of a specific Battery Fire Response Plan, under the general BFEMOP, in consultation with fire authorities, fire suppression experts and in reference to relevant	Design

Mitigation number	Mitigation measure	Project stage
	standards and guidelines. • Facilitation of first responder training in the management of Lithium-ion battery fires at the site for local brigades.	
V1	A Landscape Management Plan (LMP) will be developed for the Project to minimise views of infrastructure including: • Plant screening of native vegetation typical to the area along areas of Goolma Road lacking existing vegetation to further reduce impact of the Project. • Planting layout should avoid screening views of the broader landscape or increasing bush fire risk. • Avoid impacts on of existing vegetation outside of the Development Footprint.	Design Construction
V2	Consult with landowner at R1 where landscaping has been proposed, in order to receive their feedback and adjust the mitigation measures accordingly.	Design
V3	Consideration will be given to the colours, type and height of the facility to ensure minimal contrast and to help blend into the surrounding landscape to the extent practicable.	Design
V4	External lighting shall be installed to comply with Australian/New Zealand Standard AS/NZS 4282:2019 – Control of Obtrusive Effects of Outdoor Lighting, or its latest version.	Design
N1	A Noise Management Plan (NMP) would be developed as part of the CEMP. The plan would include, but not be limited to: • Use less noisy plant and equipment where feasible and reasonable. • Plant and equipment will be properly maintained. • Use and maintain 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended. • Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel. • Avoid any unnecessary noise when carrying out manual operations and when operating plant. • Any equipment not in use for extended periods	Construction

Mitigation number	Mitigation measure	Project stage
	during construction work will be switched off • Implement a complaints procedure to manage noise complaints that may arise from construction activities. Each complaint will need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits. • Establish good relations with people living in the vicinity of the site at the beginning of Project. Keep people informed, deal with complaints seriously and expeditiously. The community liaison member of staff should be adequately experienced.	
N2	Manage potential noise impacts of construction works within approximately 700m of the dwelling / building of Receiver R1 by implementing feasible and reasonable time restrictions and/or providing periods of repose for the resident. For example, between 10am and 3pm (with one-hour break for lunch), noisy activities could occur with no noise level restrictions over a limited period. Allowing the construction activities to proceed despite the noise exceedance may be preferred for works to be completed expeditiously, with exceedances occurring over only 2-3 days. Residents would be consulted to determine appropriate respite periods and notified of the potential noise impacts so that they can organise their day around these noisy periods.	Construction Decommissioning
W1	**General** • Excavation to be confined to the Development Footprint. • Excavation depths to be informed during detailed design by further geotechnical information plus; works must avoid physical impacts to the groundwater resource. **Buildings and structures** • Finished floor level of all buildings would be designed to ensure an appropriate freeboard above the 1%AEP flood level and outside flood hazard areas, incorporating future climate change intensity estimates should be provided. This is to be informed by further hydrologic and hydraulic analysis in the catchments studied.	Design

Mitigation number	Mitigation measure	Project stage
	Electrical infrastructure • All electrical infrastructure including power conversion stations and substation located above the 1% AEP flood level *plus* an appropriate freeboard. **Works in waterways** • Designed to minimise any hydraulic impact in accord with Laying Pipes and Cable in Watercourses on Waterfront Land (Office of Water, 2010). • Design in accordance with the Guidelines for controlled activities on waterfront land Riparian corridors (NRAR, 2018) **Access roads** • Floodplain – keep as close to natural ground levels as possible. • Surface treatment – give regard to velocity of floodwaters to minimise potential for souring during flood events.	
W2	Detailed construction Soil and Water Management Plan (SWMP), and construction Erosion and Sediment Control Plan (ESCP), based on soil surveys and geotechnical surveys to be completed in alignment with the Blue Book (Landcom 2004), to include: Detailed understanding of soil properties across the site • Construction sequencing strategy. • Management of upslope flows. • Detailed erosion and sediment controls, including sediment basins in accordance with relevant standards.	Pre-construction
W3	Erosion and sediment controls during construction could include but will not be limited to the following: **General** • Additional erosion and sediment control measures must be implemented and a revised ESCP must be prepared in the event that site conditions or Project design change significantly. • The construction schedule must aim to minimise the duration that any and all areas of soil are exposed to the erosive effects of wind, rain and surface water. • Land-disturbing activities must not cause	Pre construction Construction

Mitigation number	Mitigation measure	Project stage
	unnecessary soil disturbance if an alternative construction process is available that achieves the same or equivalent outcomes at an equivalent cost. **Site access** • All site access points will be stabilised in accordance with SD 6-14 or a cattle grid installed. • The primary site access point exiting onto Goolma Road will be monitored for sedimentation, particularly after rainfall. Any sedimentation on sealed, public roads must be removed via sweeping or washing into an installed sedimentation control. **Clearing and groundcover removal** • Clearing is to be delayed as long as possible prior to the commencement of works, particularly within 50m of drainage lines. • All reasonable and practicable efforts must be taken to delay the removal of, or disturbance to, existing groundcover (organic or inorganic) prior to the commencement of works. • Groundcover removal and clearing is to be staged in a way that minimises ground exposure timeframes. • Where practicable, clearing and grubbing must be immediately followed by specified temporary stabilisation measures prior to commencement of construction. • Sedimentation controls must be installed, where practicable, prior to the commencement of clearing and grubbing. **Erosion control** • Prevention of erosion will be prioritised above sediment control at all times. • Dust suppression will occur when visible dust is sited. Sediment-laden runoff from dust suppression must not run off site, cause a traffic hazard or environmental issues. • All temporary earth bunds and flow diversion systems must be machine-compacted and, if in place for the lifetime of the Project, stabilised with polymer or landscaping techniques (seeding, hydromulch etc.). • Where ground is disturbed and works are not likely to commence within 20 days, or less if a	

Mitigation number	Mitigation measure	Project stage
	significant rainfall event is forecast, polymer spray (P-47 or similar) should be applied at 5% dilution. Alternate groundcover materials may be utilised for areas not within site drainage lines or adjacent banks. • Where initial disturbance reflects final levels and access is not required for adjacent construction works, landscaping should occur as soon as practicable. **Sediment control** • All reasonable and practicable measures must be taken to prevent the release of sediment from the site. • Suitable access must be provided to all sediment control devices for maintenance purposes. • Sediment control devices must be de-silted and made fully operational as soon as reasonable and practicable after a sediment-producing event. • Dirty water sumps will be dewatered as soon as practicable following a rain event, with water to be utilised as dust suppression as first preference. If water is to be discharged into a drainage line or waterway it must comply with water quality parameters outlined in the SWMP. **Stockpile management** • Stockpiling on site is to be limited where practicable and no stockpiling is to be sited within or adjacent drainage lines. • All stockpiles must have sediment controls (earth bund, sediment fence) installed on the downslope side immediately following material placement, unless they are of a temporary nature (<5 days) and no rain is forecast. • All stockpiles must have flow diversion controls (earth bund or similar) installed on the upslope side to minimise erosion of material unless they are of a temporary nature (<5 days) and no rain is forecast. • All stockpiles of erodible material, particularly topsoil and general fill, will be stabilised with polymer spray, rock or similar if material is not to be disturbed for >10 days. • Handling of topsoil shall be undertaken when the topsoil is moist (not wet or dry) to avoid structural decline and avoid stockpiles greater	

Mitigation number	Mitigation measure	Project stage

	than 2 m in height to prevent structural decline. It shall be stripped and stockpiled separately. Stockpiles shall be stabilised with a groundcover (i.e., geo-textile or similar) if stockpiling is required for more than 6 weeks.
	Waterway protection
	• If temporary waterway crossings are required, they will be constructed with hard, sound, durable rock free of fine particles and not contaminated with foreign materials. Crossings will be constructed in accordance with SD 5-1.
	• All chemicals, including fuel, will be stored outside of the drainage lines. If any chemicals or fuels are required within the work area they will be stored in an impervious, bunded container and removed and covered prior to rainfall. Drip trays will be used for refuelling.
	• Clean water diversions will be implemented along the boundary of the BESS area to divert clean water from up-gradient around the site and into the 1st order waterway via a controlled discharge point, downstream of the site.
	Landscaping
	• No completed earthwork surface will remain exposed for longer than 20 days.
	• The type of groundcover applied to completed earthworks will be compatible with the anticipated long-term land use, environmental risk and site rehabilitation measures.
	• A minimum of 70% ground cover must be achieved within 20-30 days of topsoiling.
	Site maintenance
	• All erosion and sediment control measures, including drainage control measures, must be maintained in proper working order at all times during their operational lives.
	• All drainage, erosion and sediment controls must be inspected:
	  ○ At least daily (when work is occurring on site).
	  ○ At least weekly (when work is not occurring on site).
	  ○ Within 24 hours of expected rainfall; and within 18 hours of a rainfall event of sufficient intensity and duration to cause runoff on site.	

Mitigation number	Mitigation measure	Project stage
W4	Asbestos Management Plan to be prepared and implemented if soil surveys confirm its presence in excavation areas.	Pre construction
W5	An Emergency Response Plan incorporating a Flood Response Plan would be prepared prior to construction covering all phases of the proposal. In relation to flooding the plan will: • Detail who would be responsible for monitoring the flood threat and how this is to be done. • Detail specific response measures to ensure site safety and environmental protection. • Outline a process for removing any necessary equipment and materials offsite and out of flood risk areas (i.e. rotate array modules to provide maximum clearance of the predicted flood level). • Consider site access in the event that some tracks become flooded. • Consider appropriate vehicles used to transport staff to and from site, with 4WDs being the preferred vehicle. • Establish an evacuation point. • Define communication protocols with emergency services agencies.	Construction Operation Decommissioning
L1	A Rehabilitation and Decommissioning Management Plan is to be prepared in consultation with NSW Department of Primary Industries prior to decommissioning. The Rehabilitation and Decommissioning Management Plan is to include: • Removal of all above ground infrastructure • Reverse any compaction by mechanical ripping. • Verification of a safe, stable and non-polluting site.	Design Decommissioning
S1	A construction Erosion and Sediment Control Plan (ESCP) shall be prepared for the Project in accordance with Landcom's *Soils and Construction: Managing Urban Stormwater* (2004).	Construction
S2	The design, construction and decommissioning of the Project shall minimise the extent and duration of ground disturbance and avoid ground disturbance near waterways.	Construction Decommissioning

Mitigation number	Mitigation measure	Project stage
S3	Where ground disturbance is required the vegetation (organic matter) shall be retained and reused during rehabilitation where possible.	Construction Decommissioning
S4	Handling of topsoil shall be undertaken when the topsoil is moist (not wet or dry) to avoid structural decline and avoid stockpiles greater than 2 m in height to prevent structural decline. It shall be stripped and stockpiled separately. Stockpiles shall be stabilised with a groundcover (i.e., geo-textile or similar) if stockpiling is required for more than 6 weeks.	Construction Decommissioning
S5	A Revegetation Plan (operation) and Rehabilitation Plan (decommissioning) shall be prepared and include stabilisation and topsoil amelioration (e.g., incorporation of organic matter to improve soil structure or gypsum to improve structure, reduce hard-setting surfaces and reduce soil dispersion).	Construction Operation Decommissioning
S6	Subsoils disturbed during construction and with an exchangeable sodium percentage above 6% shall be treated with gypsum to increase the levels of calcium and magnesium, and thus lowering the exchangeable sodium percentage and the dispersiveness of the soil.	Construction Decommissioning
S7	Avoid altering the groundwater and surface water regime to prevent mobilisation of any salt stores, however low, in the soil.	Construction
S8	Complete a soil survey according to the Australian Soil and Land Survey Field Handbook (CSIRO, 2009) and The Australian Soil Classification (Isbell, 2021) and the *Guidelines for Surveying Soil and Land Resources* (McKenzie, Grundy, Webster, & Ringrose-Voase, 2008) and reference it in the ESCP, SWMP and when rehabilitating the site.	Pre-construction
NAH1	Should an item of historic heritage be identified, the Heritage NSW would be contacted prior to further work being carried out in the vicinity in accordance with the Non-Aboriginal heritage unexpected finds procedure in Section 6.11.4 of the EIS.	Construction Operation Decommissioning
E1	The existing Community and Stakeholder Engagement Strategy (CSES) shall be developed and implemented in line with DPIE's *Undertaking engagement guidelines for State Significant Projects* (DPIE, 2021), and be guided	Pre-approval

Mitigation number	Mitigation measure	Project stage
	by the SIA Guidelines and relevant frameworks (e.g. the International Association for Public Participation (IAP2) *Spectrum of Public Participation* (IAP2, 2018)).	
E2	An Industry Participation Plan shall be developed to ensure a focus on maximising the involvement of local people and businesses in the Proposal, as set out in the SIA, Appendix E.8. It will include a: • Local Procurement Policy (LPP). • Accommodation and Employment Strategy (AES).	Pre construction
E3	A Community Enhancement Fund to support very localised and meaningful community and environmental initiatives that have strong resident and broader community support, throughout the life of the Project would be developed as set out in the SIA, Appendix E.8.	Pre construction
R1	A Waste Management Plan (WMP) would be developed to minimise waste, including: • Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy. • Quantification and classification of all waste streams. • Provision for recycling management on-site. • Provision of toilet facilities for on-site workers and identify that sullage would be disposed of (i.e., pump out to local sewage treatment plant). • Tracking of all waste leaving the site. • Disposal of waste at facilities permitted to accept the waste. • Requirements for hauling waste (such as covered loads).	Construction/ Operation/ Decommissioning
R2	A septic system would be installed and operated according to the Dubbo Regional Council regulations.	Construction/ Operation
R3	Where possible, waste would be removed on a daily basis, or as soon as reasonably practical, to maintain the Development Footprint being litter free.	Construction
R4	Lithium Ion Batteries would be kept, stored, managed and transported according to manufacturer's instructions and the ADG Code. Any spent batteries would be recycled at a B-Cycle accredited, EPA permitted and licensed recycler of Li-	Construction/ Operation/ Decommissioning

Mitigation number	Mitigation measure	Project stage
	Ion batteries.	
A1	Management protocols will include measures to minimise impacts on air quality including: • Identification of high-risk construction activities with potential to generate dust, and control measures for the activities. • A process for monitoring dust on-site and weather conditions, as well as procedures for altering management measures where required. • A map identifying locations of sensitive receivers. • Notification of relevant stakeholders to hours of work and duration of work. • An accessible complaints process with a timely response protocol.	All stages
A2	Dust generation by vehicles accessing the site and earthworks at the site will be suppressed using water applications or other means as required, using visual cues. • Covering dirt, sand, soil, or any lose material while in transport. • Clean-up of any material spillage on the roads • Limiting construction vehicle speeds on unsealed roads. • Checking of weather conditions (such as wind strength and direction) prior to major potential dust emitting activities.	Construction/ decommissioning
A3	Stockpiles will be covered or stored in areas not subject to high winds, and vehicle loads of material which may create dust would be covered while using the public road system.	Construction/ decommissioning
A4	All vehicles and machinery used at the site will be in good condition, fitted with appropriate emission controls and comply with the requirements of the POEO Act, relevant Australian standards and manufacturer's operating recommendations. Plant will be operated efficiently and turned off when not in use.	All stages
A5	Fires and material burning is prohibited on site.	All stages
A6	Works that disturb vegetation, soil or stockpiles will not be carried out during strong winds (over 40 km/h).	Construction
A7	The use of renewable fuels/power sources for construction will be investigated and implemented where	Construction

Mitigation number	Mitigation measure	Project stage
	appropriate.	
A8	Materials will be delivered as full loads, and local suppliers utilised where possible, to minimise haulage emissions.	Construction

Appendix E Specialist reports

1. **Biodiversity Development Assessment Report**
2. **Aboriginal Heritage Assessment Report**
3. **Traffic Impact Assessment**
4. **Preliminary Hazards Assessment**
5. **Visual Impact Assessment**
6. **Noise and Vibration Assessment**
7. **Hydrological Peer Review**
8. **Social Impact Assessment**

E.1 Biodiversity Development Assessment Report

E.2 Aboriginal Cultural Heritage Assessment Report

E.3 Traffic Impact Assessment

E.4 Preliminary Hazards Assessment

E.5 Visual Impact Assessment

E.6 Noise and Vibration Assessment

E.7 Hydrological Peer Review

E.8 Social Impact Assessment