Birriwa Solar and Battery Project

Modification Report

Prepared for ACEN Australia Pty Ltd

July 2025

Birriwa Solar and Battery Project

Modification Report

ACEN Australia Pty Ltd

E240117 RP1

July 2025

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Approved by

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11 July 2025

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Executive Summary

ES1 Introduction

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project, a large-scale solar facility with a 600-megawatt (MW) capacity and a 600 MW, two-hour duration battery energy storage system (BESS). The project, approved by the NSW Independent Planning Commission on 16 August 2024 (SSD-29508870), is located 15 kilometres (km) south-east of Dunedoo in the Central-West Orana region of New South Wales, within the Mid-Western Regional Local Government Area (LGA).

ACEN is seeking approval to modify development consent SSD-29508870 to include additional lots, an alternative access route and associated upgrade to part of the existing Birriwa Bus Route South, an increase in capacity of the approved temporary accommodation facility, and an increase in the storage capacity and duration of the BESS (the modification, Mod 1). This modification report has been prepared to support the application to modify SSD-29508870.

ES2 Strategic context

The modification has been proposed to enable flexibility in design and construction, optimisation of the solar array and BESS layout, and allow sufficient space for maintenance. The additional land will allow the project to increase its energy storage potential, providing additional firming support and greater network system strength.

The increase in BESS capacity and the construction timeframes associated with Energy Corporation of NSW's (EnergyCo) Central-West Orana (CWO) Renewable Energy Zone (REZ) Transmission Project (SSI-48323210), necessitates a larger peak construction workforce and therefore an increase in the capacity of the accommodation facility. The additional 150 workers will reside at the approved accommodation facility, which will remain within the approved accommodation footprint. ACEN understands EnergyCo intends on commissioning the CWO REZ transmission line in 2029. The Birriwa Solar and BESS project will be constructed in line with this commissioning date to enable efficient electricity supply to the grid in the REZ. To meet this goal, the intensity of construction will therefore need to increase from what was considered within the environmental impact statement (EIS) for periods of time, necessitating a larger peak construction workforce. The proposed expanded capacity for the accommodation facility will also assist in accommodating workforces from other developments within the CWO REZ, if deemed required and subject to future accommodation needs and approvals.

The Network Operator is currently upgrading parts of Merotherie Road between the Golden Highway and the Merotherie Hub as part of the approved CWO REZ Transmission Project (SSI-48323210). This upgrade presents an opportunity for the Birriwa Solar and Battery project to use the future upgraded road as an alternative access route to the project.

The co-location of road upgrade impacts across the CWO REZ Transmission Project and ACEN's projects along Merotherie Road and Birriwa Bus Route South Road will allow efficient management of construction traffic impacts and mitigate impacts on the environment and members of the community.

ES3 Statutory context

Under section 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), a consent authority may modify a State significant development (SSD) consent provided the development to which the consent as modified relates is substantially the same as the development for which the consent was originally granted. A modification under section 4.55(2) of the EP&A Act is the appropriate pathway given that:

- the nature of the project, being a solar and BESS development, remains the same
- the solar capacity of the project remains the same

- the approved associated infrastructure and grid connection remains the same
- the approved operational lifespan remains the same
- the layout remains materially the same, with a small (18%) increase in the footprint of the project
- as demonstrated in this modification report, the modification will result in minimal environmental impacts beyond those previously assessed and approved under SSD-29508870
- the proposed modifications remain generally in accordance with the EIS and the current development consent conditions, with the exception of the abovementioned proposed changes.

As such, it is considered that the modified development will remain substantially the same development for which consent was originally granted.

ES4 Engagement

Stakeholder engagement has been comprehensive and reflects the importance ACEN places on this aspect of its business. Since the determination of this project, ACEN has continued to engage with stakeholders including local authorities, government agencies, the local community and neighbouring landowners.

Key considerations with respect to the modification included engagement with the local community regarding the project as a whole and the modification, engagement with EnergyCo and the Network Operator regarding cumulative impacts with the CWO REZ and interfaces between the CWO REZ and the project, engagement with Central West Cycle Trail (CWCT) representatives regarding construction traffic and interactions with the CWCT, engagement with Mid-Western Regional Council regarding road and intersection upgrades, and targeted engagement with Registered Aboriginal Parties (RAPs) regarding heritage items and management.

ES5 Assessment of impacts

The potential impacts of the modification have been compared to the impacts assessed in the EIS and Amendment Report for the approved project. Impact assessments have been undertaken for those environmental and social values where the modification could result in changes to those values. Additional impacts associated with the modification are expected to biodiversity, Aboriginal cultural heritage and traffic. Where required, additional management measures have been proposed to complement the existing management measures for the approved project.

ES5.1 Biodiversity

The modification will result in an increase in the development footprint requiring additional clearing and associated impacts to native vegetation and fauna. An additional 69.05 hectares (ha) of native vegetation will be cleared as a result of the modification. Areas of high biodiversity value have been avoided as much as possible, including avoidance of 2.9 ha of plant community type (PCT) 281, avoidance of threatened species habitat including hollow-bearing trees, and avoidance of watercourses and associated riparian areas. Residual biodiversity impacts include:

- 66.38 ha of PCT 281 - Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion – Derived Native Grassland (DNG)
- 1.38 ha of PCT 281 – Woodland
- 0.72 ha of PCT 277 - Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – DNG

- 0.57 ha of PCT 277 – Woodland
- 1.7 ha of habitat for the Southern Myotis
- 1.0 ha of habitat for the Masked Owl.

To compensate for unavoidable disturbance of native vegetation and threatened species habitat, offsets are proposed through the implementation of a biodiversity offset strategy.

ES5.2 Aboriginal heritage

An Aboriginal Cultural Heritage Assessment Report was prepared by OzArk (2025a) for the modification area.

A review of the Aboriginal Heritage Information Management System (AHIMS) identified three previously recorded sites within the modification area. These sites include two artefact scatters (36-3-4105 [SNI-AS85] and 36-3-4095 [SNI-86]) and a scarred tree (36-3-3918 [Birriwa Bus Route South ST-1]).

A field survey was undertaken with the assistance of representatives from four RAPs. The survey identified three previously unrecorded sites, all isolated finds (White Creek IF-1, White Creek IF-2 and White Creek IF-3). Of these, two were identified on the immediate bank of White Creek and the third was identified within the channel of an unnamed tributary of White Creek.

The survey confirmed that the land within the modification area has been heavily disturbed through agricultural practices, including ploughing, grazing, dams, contour banks and road construction. This confirms that the potential for intact subsurface archaeological deposits is low, and test excavation is not warranted.

Avoidance of Aboriginal cultural heritage values has been a key aspect of the project design refinement process. In addition to the two sites that will be salvaged as part of the approved project (Mangarlowe IF-2 and Winora IF-2), site 36-3-4102 (SNI-AS85) will be subject to salvage. The scarred tree, 36-3-3918 (Birriwa Bus Route South ST-1) may require management in consultation with RAPs depending on the final design of the Birriwa Bus Route South Road upgrade.

ES5.3 Visual amenity

The visual study area for the modification is located in a rural setting. There are 17 non-associated dwellings scattered within 4 km of the modification. Much of the modification area has been extensively cleared of trees and has been highly modified by historic farming practices.

Four viewpoints were assessed for the visual impacts to private viewpoints. Visual impacts associated with the modification are expected to be very low, and when combined with the approved project, will remain low to very low at all private receivers. Landscape screening identified in the consent conditions is considered appropriate and no additional mitigations are required.

The only public viewpoints within the visual study area are for motorists and cyclists within 2.5 km of the modification infrastructure and include parts of Birriwa Bus Route South, Birriwa Bus Route North, and Merotherie Road. Visual impacts from these locations are not considered significant. Viewshed mapping indicates low potential visibility of the modification infrastructure based on topography. For most locations, views of the modification infrastructure that are not screened by topography will be screened by either existing vegetation and structures, or panels installed as part of the approved project. Any views from these roads are usually from moving vehicles with the occupants facing forward, limiting the viewing angle.

A glare analysis was completed for the modification area which predicted no glare at any receptors (public or private).

ES5.4 Traffic

The modification seeks an increase in the number of project related vehicles by up to 30% (i.e. a total of 156 daily heavy vehicle trips, or 312 heavy vehicle movements), and an alternative access route along Merotherie Road and Birriwa Bus Route South. It is anticipated that up to 90 heavy vehicles of the 156 will access the site per day via the alternative Merotherie Road access during peak periods. These peak movements via the alternative access will not coincide with the peak movements along the approved access route via Barneys Reef Road, such that the combined total heavy vehicles travelling to and from the site on any given day during pre-construction and construction will not exceed 156 (i.e. 312 movements).

Intersection operation analysis identified that the Golden Highway/Merotherie Road intersection and the Merotherie Road/Birriwa Bus Route South Road intersection require additional turning lanes in accordance with the current intersection design standards (Austroads 2023a):

- the Golden Highway/Merotherie Road intersection requires a channelised right turn treatment (CHR). A short turn lane of 104 m long is required (to turn right onto Merotherie Road)
- Merotherie Road/Birriwa Bus Route South Road intersection requires a shoulder treatment (BAR). A 56.5 m long shoulder widening is required.

In addition, consideration of road width standards for the proposed traffic volumes indicated the requirement to upgrade portions of Merotherie Road and Birriwa Bus Route South.

The following mitigation and management measures are proposed:

- The project traffic will not use Golden Highway / Merotherie Road intersection or Merotherie Road until these have been upgraded as part of EnergyCo CWO Renewable Energy Zone Transmission project (Merotherie Energy Hub).
- ACEN proposes to undertake the Merotherie Road / Birriwa Bus Route South Road intersection upgrade, and upgrade to Birriwa Bus Route South Road, to the satisfaction of council and in consultation with the Network Operator.
- A traffic management plan (TMP) and Driver Code of Conduct will be prepared for the project with a focus on safety for current users, including users of the CWCT. The TMP will take into consideration the Network Operator's traffic management plan where relevant.

ES5.5 Noise and vibration

The modification area and surrounding land uses are predominantly rural and agricultural uses. Ambient noise levels will be controlled by natural elements and limited human activity including traffic and agricultural activities.

Noise emissions for the modified project were modelled and identified that construction noise, operational noise emissions and road traffic noise will comply with all relevant criteria. The noise management measures identified in the consent conditions are considered appropriate and no additional mitigations are required.

ES5.6 Surface water and flooding

A qualitative water resource assessment has been prepared to assess the impacts of the proposed modification on watercourses, downstream systems and associated groundwater resources. The land parcels associated with the modification are drained by White Creek and the unnamed tributary of Huxleys Creek. One of the modification land parcels located at the centre of the project is intersected by a 4th order reach of White Creek.

Riparian corridors buffers have been adopted in the project design to protect watercourses. The modification will avoid placement of infrastructure within non-minor watercourses with the exception of that required for the provision of fencing, access and electrical reticulation and therefore no significant changes to geomorphology anticipated. Several watercourse crossings may be required, with the potential impacts to geomorphology associated with these considered minor and manageable under existing and approved management and mitigation measures.

There may be some minor flood risk to the operational infrastructure areas in parts generally associated with drainage lines and the tributary of White Creek. These risks are considered to be minor and manageable with implementation of a freeboard allowance when constructing BESS pads and a clean water diversion around the development in operational infrastructure areas.

ES5.7 Land use, soils and agriculture

The modification area is within a generally flat to slightly undulating landscape. Sheet and gullying erosion was observed throughout the modification area, indicating dispersive soils, with the most extreme gullying observed along White Creek.

The modification will be undertaken on an area of up to 257 ha of land that is currently subject to agriculture land use. Over the majority of the modification area, soils will be subject to minor disturbance as part of the construction or maintenance of solar arrays and electrical cabling trenches. In areas where earthworks are necessary for construction of the BESS, other site facilities or access tracks, soils will be subject to higher impact disturbance.

Soil that is proposed to be disturbed as a result of the proposed modification will be stripped and re-used during construction and/or rehabilitation, consistent with the approved project, in order to mitigate long term effects on soil resources during operation.

Following decommissioning and rehabilitation, it is expected that there will be no permanent decrease in land available for agriculture use.

ES5.8 Social

The SIA concluded that the assessed impacts and benefits identified due to the modification area minor. There was one impact where ratings changed:

- cultural impacts relating to loss of cultural heritage was assessed as medium (unmitigated) and low (mitigated).

There was one benefit where ratings changed:

- livelihood benefit related to use of goods and services was assessed as medium (unenhanced) and medium (enhanced) from high.

The modification creates one new benefit:

- potential long-term benefits associated with improvements to Birriwa Bus Route South Road was assessed. This new benefit was rated as low (unenhanced) and low (enhanced).

There are no High or Very High mitigated impacts.

ES5.9 Hazards and risk

Public safety risks, including bushfire, hazards and risks associated with project infrastructure, will be mitigated through design of buildings, construction areas and other assets to include appropriate bushfire protection measures (e.g. asset protection zones), and emergency access and evacuation protocols, which will be developed as part of the emergency response plan.

ES5.10 Historical heritage

No items of heritage significance were identified in the modification area on heritage lists or following field survey. The project will not impact any historic heritage sites and no additional mitigation measures are required as a result of the modification.

ES6 Justification and conclusion

The approved Birriwa Solar and BESS Project will play an important part in achieving the objectives of the CWO REZ by contributing to the continued growth of renewable energy generation and storage capacity. The project will provide economic benefits for both the local economy within the Mid-Western Regional LGA and the Warrumbungle Shire LGA and more broadly, the regional economy within the Central West.

ACEN is seeking to modify SSD-29508870 under section 4.55(2) of the EP&A Act. The modification will enable flexibility in design and construction and optimisation of the solar array layout, increase the project's energy storage potential providing additional firming support and greater network system strength, increase employment opportunities during the peak construction period, allow sufficient space for maintenance, and provide an alternative access route to the project.

A range of assessments have been undertaken to support the modification. These assessments show that the modification will result in minimal environmental impacts beyond those previously assessed and approved under SSD-29508870. The modified project will comply with all relevant government legislation, plans, policies and guidelines.

The project (as modified) will remain substantially the same development for which consent was originally granted. As such, it is considered that the modification can be approved pursuant to section 4.55(2) of the EP&A Act.

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1 Introduction

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project, a large scale solar photovoltaic (PV) electricity generation facility along with battery storage and associated infrastructure, including the construction of a temporary accommodation facility (hereafter referred to as the 'approved project'). The solar component of the project will have an indicative capacity of around 600 megawatts (MW) and will include a centralised battery energy storage system (BESS) of up to 600 MW for a two-hour duration (1,200 MWh). The project (SSD-29508870) was approved on 16 August 2024 by the NSW Independent Planning Commission, with development consent conditions.

The project site is approximately 15 kilometres (km) south-east of Dunedoo, in the Central-West Orana (CWO) region of New South Wales (NSW), in the localities of Birriwa and Merotherie (refer to Figure 1.1). It is situated within the Mid-Western Regional Local Government Area (LGA). Part of the approved transport access route to the project site via the Castlereagh Highway is situated within the Warrumbungle Shire LGA. The project is within the CWO Renewable Energy Zone (REZ).

ACEN is seeking approval to modify development consent SSD-29508870 to include additional lots, an alternative access route and upgrade to a section of the Birriwa Bus Route South Road (hereafter referred to as Birriwa Bus Route South), an increase in capacity of the approved temporary accommodation facility, and an increase in the storage capacity and duration of the BESS (hereafter referred to as the 'modification').

This modification report has been prepared to support the application to modify SSD-29508870.

1.1 Approved project

The approved project is shown on Figure 1.2 and comprises the following key components:

- installation of approximately 1 million solar PV panels and associated mounting infrastructure
- a BESS with a capacity of up to 600 MW and a storage duration of up to 2 hours (1,200 MWh)
- an on-site substation with a connection voltage of up to 500 kilovolts (kV)
- electrical collection and conversion systems, including inverter and transformer units, switchyard, control room and staff car park
- underground and aboveground cables
- an operational infrastructure area, including demountable and permanent offices, amenities, and equipment sheds
- internal access roads
- a temporary construction compound (during construction and decommissioning phases)
- an access route upgrade from Castlereagh Highway to the project site via Barneys Reef Road and Birriwa Bus Route South
- a temporary accommodation facility to provide accommodation for up to 500 construction staff during the construction phase of the project
- an emergency access track providing alternative access to the accommodation facility, suitable for emergency vehicles.

1.2 Proposed modifications

ACEN is seeking to modify SSD-29508870, pursuant to section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to:

- Increase the project area and development footprint to include three additional lots (Lot 11/DP 750755, Lot 40/DP 750755, Lot 60/DP 750755) and the remaining part of Lot 34/DP 750755, allowing for additional land to be used for solar generation, BESS, and associated ancillary infrastructure, as needed. Modifying the project area and development footprint across additional neighbouring lots will enable flexibility in design and construction, optimisation of the solar array and BESS layout, and will allow sufficient space for maintenance.

- Increase the storage capacity and duration of the BESS from up to 600 MW for a two-hour duration up to 900 MW for a four-hour duration. The additional capacity will allow the project to increase its energy storage potential, providing additional firming support and greater network system strength.

- Increase the project area and development footprint to allow for an upgrade to part of the existing Birriwa Bus Route South Road from the Golden Highway via Merotherie Road, for use as an alternative access route. It also includes a public road crossing along Birriwa Bus Route South to allow construction and operation traffic to access different areas of the project with limited impacts on Birriwa Bus Route South. This upgrade will enable access to the project for the purpose of constructing and operating the approved temporary accommodation facility, as well as the BESS. Oversize over-mass vehicles will continue to access the project area, via the approved primary access point (i.e. Castlereagh Highway-Barneys Reef Road-Birriwa Bus Route South).

- Increase the approved project's accommodation facility capacity from 500 workers to 650 workers, within the approved accommodation footprint (up to an additional 150 workers will reside at the accommodation facility in peak construction periods). The anticipated period of construction for the accommodation facility will be over a period of approximately 3 to 7 months (10 to 28 weeks) within a four-year construction window for the project. Note, this construction period will be determined once a supplier has been selected and contracts executed.

- Amend the schedule of lands to include three additional neighbouring lots.

- Increase the total number of daily vehicle movements to and from the site during pre-construction and construction, from 120 to 156 daily heavy vehicle trips, split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road. Correction of wording errors in the consent conditions from "vehicle movements" to "vehicle trips".

The modification area is shown on Figure 1.3.

The modification does not propose any increase in the capacity of energy generation from the solar arrays and will not change the approved life of the project operations. Amendments to SSD-29508870 conditions of consent are required to reflect the proposed modifications and are detailed in Section 3.9. No feasible alternatives to the proposed modification have been identified, as discussed further in Section 7.2.

The modification is described in detail in Section 3. This modification report provides an assessment of the impacts and benefits associated with the proposed modification, as well as proposed management and mitigation measures for residual impacts.

1.3 The applicant

The applicant details are outlined in Table 1.1.

Table 1.1 Applicant details

Name	ACEN Australia Pty Ltd (ACEN)
Postal address	Suite 2, Level 2, 15 Castray Esplanade, Battery Point, Tasmania 7004
Contact	Cédric Bergé
ABN	27 616 856 672

1.4 Terminology

The following terms are used throughout this modification report:

- **The project (or the approved project)**: The project as approved by development consent SSD-29508870, comprising the solar and battery project as well as public road upgrades, as assessed in the *Birriwa Solar and Battery Project Environmental Impact Statement* (EIS) (EMM 2022) and the accommodation facility assessed in the *Amendment Report* (EMM 2023a).

- **The project area (or the approved project area)**: The area to which SSD-29508870 applies (approximately 1,535 hectares (ha)). Note, this area is not the development footprint and hence is not the maximum extent of ground disturbing work.

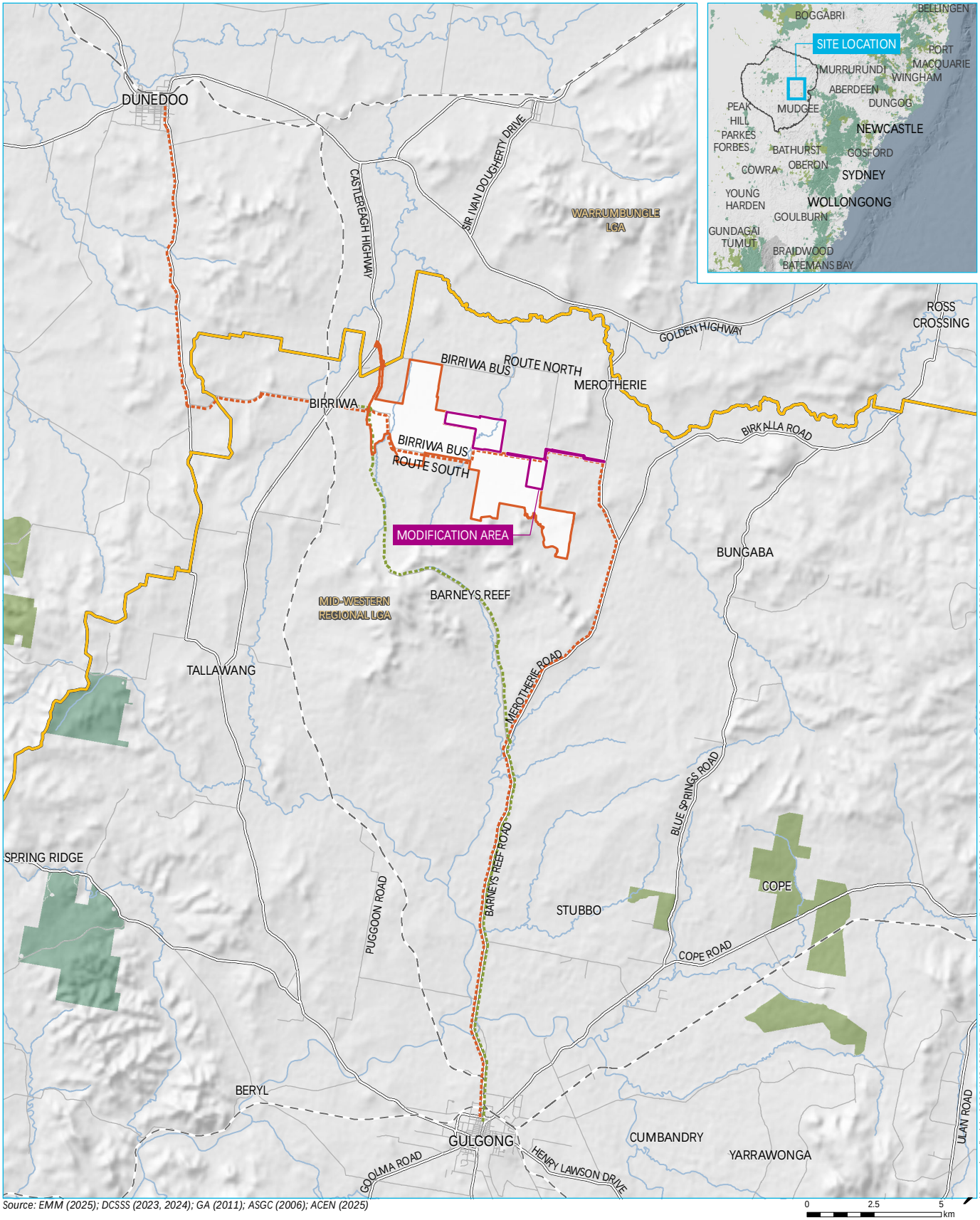
- **The modification area**: The three additional lots to be added to the schedule of lands (Lot 11/DP 750755, Lot 40/DP 750755, Lot 60/DP 750755) and the remaining part of Lot 34/DP 750755, comprising additional areas for infrastructure associated with the solar generation, BESS infrastructure and general operation of the project (approximately 257 ha), and the area of potential impact associated with the upgrade of Birriwa Bus Route South Road as an alternative access route to the project area from the Golden Highway via Merotherie Road.

- **The modification development footprint:** This is the impact footprint (approximately 216 ha) associated with the proposed modification, within the modification area. It is the area to be developed within land where ACEN holds landholder agreements. All operational components of the modification will be within the modification development footprint. The modification development footprint is the outcome of the iterative process which led to excluding certain areas of environmental or social constraint.

- **Project development footprint:** The maximum extent of ground disturbing work (impact footprint) associated with construction and operation of the project, comprising approximately 1,413 ha of land, including the development footprint associated with the approved project (approximately 1,197 ha), and the modification development footprint (approximately 216 ha).

- **Associated residence:** A dwelling whose owners have entered into a land agreement with ACEN for the project. Residences identified with an 'A' are associated residences. Note, there are no additional associated residences as a result of the proposed modification.

- **Non-associated residence**: A dwelling whose owners do not have an agreement with ACEN for the project. Residences identified with an 'R' are non-associated.



Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ASGC (2006); ACEN (2025)

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GDA 1994 MGA Zone 55

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KEY

- Modification area
- Approved project area

Existing environment

- Rail line
- Major road
- Minor road
- Watercourse
- Local government area
- Central West Orana Renewable Energy Zone (see inset)
- NPWS reserve
- State forest

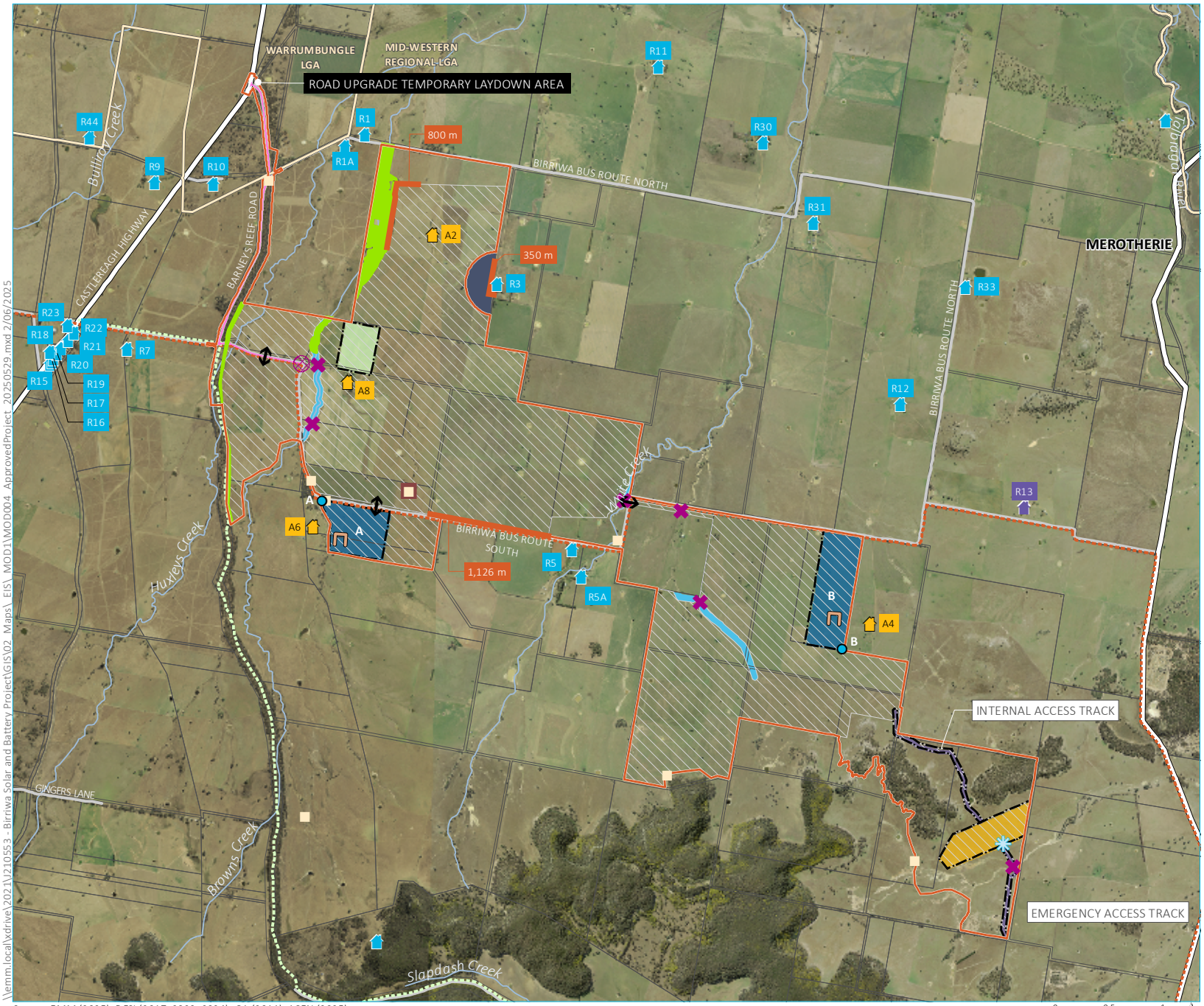
Central West Cycle (CWC) Trail

- CWC main route - Gulgong to Dunedoo
- CWC alternate route - Slap Dash Creek side trail

Regional context

Birriwa Solar and BESS Project - Modification
Figure 1.1

EMM
creating opportunities



KEY

Project layout

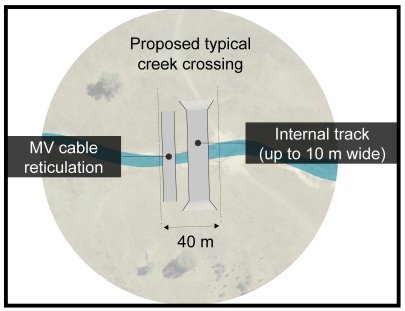
- Project area
- Development footprint
- Road upgrade corridor
- Restricted development area
- Vegetation to be retained
- Potential public road crossing location
- Potential creek crossing point (refer to inset below for indicative design)
- Connection point (option A or B)
- Indicative noise wall location
- Solar panel setback
- Landscape screen planting
- Project access point
- Project emergency access point
- Proposed operational infrastructure area including substation, operational facility and BESS (option A or B)
- Accommodation facility
- Temporary construction compound

Existing environment

- Dwelling not associated with the project
- Dwelling associated with the project
- Dwelling not associated with the project (EnergyCo building)
- Aboriginal heritage site (to be salvaged)
- Aboriginal heritage site (to be avoided)
- Major road
- Minor road
- Named watercourse
- Cadastral boundary
- Local government area boundary

Central West Cycle (CWC) Trail

- CWC main route - Gulgong to Dunedoo
- CWC alternate route - Slap Dash Creek side trail



Approved project

Source: EMM (2025); DFSI (2017, 2023, 2024); GA (2011); ACEN (2025)

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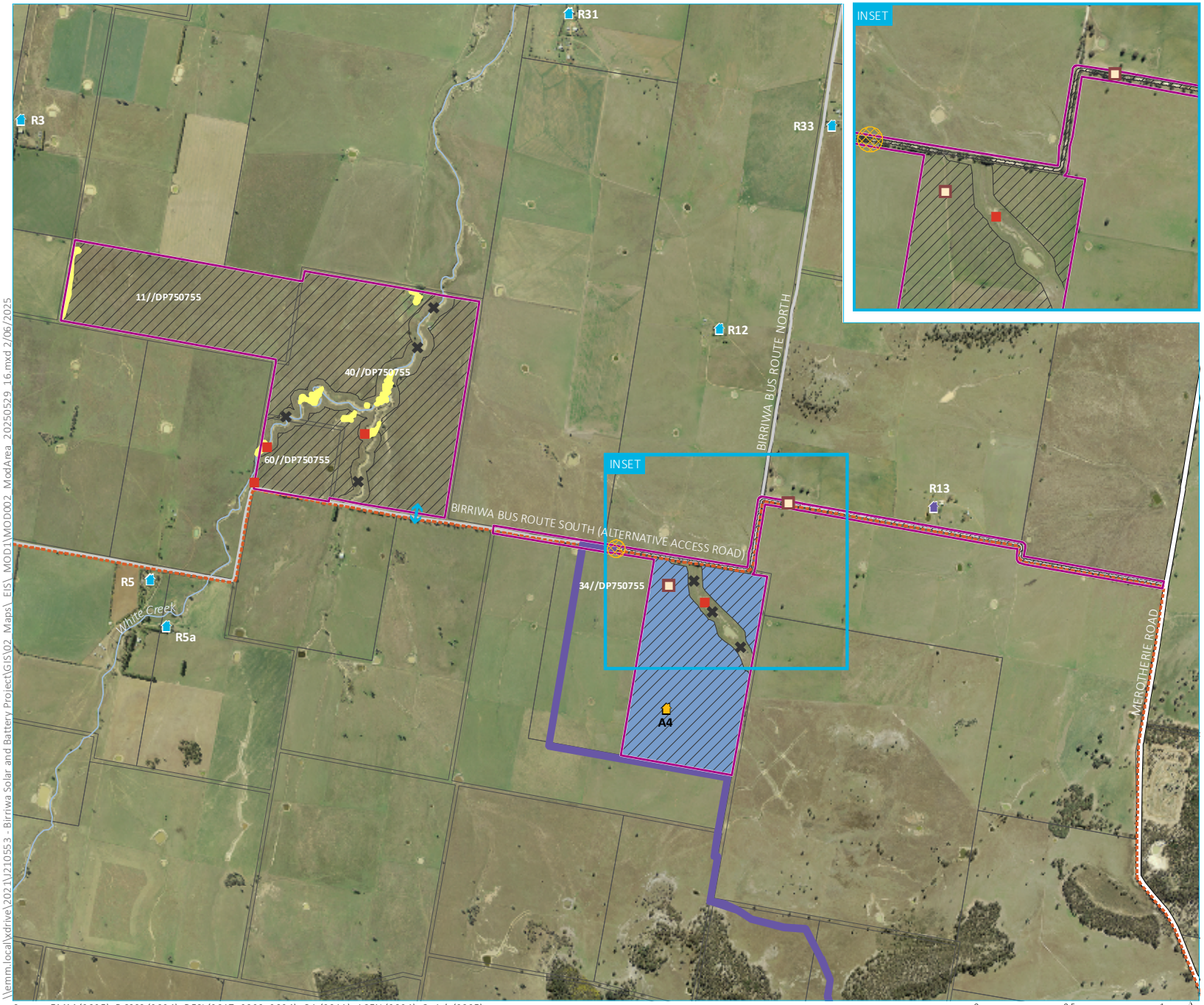
Birriwa Solar and BESS Project - Modification
Figure 1.2

EMM creating opportunities

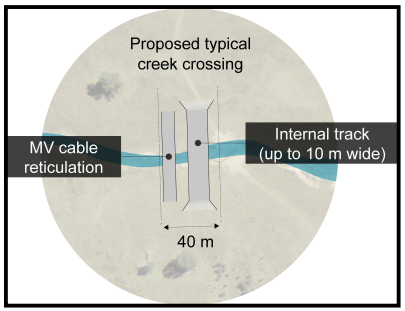


KEY

- Modification area
- Modification development footprint
- Vegetation to be retained
- Secondary access point
- Internal access track
- Proposed extension for operational infrastructure area including substation, operational facility and BESS
- Aboriginal heritage site (to be avoided)
- Aboriginal heritage site (to be salvaged/managed)
- Potential public road crossing location
- Potential creek crossing point (refer to inset below)

Existing environment

- Dwelling not associated with the project
- Dwelling associated with the project
- Dwelling not associated with the project (EnergyCo building)
- Major road
- Minor road
- Named watercourse
- Central West Cycle (CWC) Trail main route - Gulgong to Dunedoo
- Cadastral boundary



Modification area

Source: EMM (2025); DCSSS (2024); DFSI (2017, 2023, 2024); GA (2011); ACEN (2024); OzArk (2025)

0 0.5 1 km

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Birriwa Solar and BESS Project - Modification
Figure 1.3

EMM creating opportunities

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2 Strategic context

2.1 Strategic planning framework

The strategic planning framework as described in the EIS and Amendment Report continues to remain applicable to the modified project. An overview of relevant policies, plans, and strategies and how the project and proposed modification align with these is provided in Table 2.1.

Table 2.1 Alignment with key strategic planning frameworks

Plan, policy or strategy	Description	Alignment with strategic framework
International context		
The Paris Agreement 2015	*The Paris Agreement* is a legally binding international treaty on climate change adopted by 196 parties in 2015, which aims to limit global temperature increase to 1.5°C above pre-industrial levels. As a signatory to the agreement, the Australian Government has committed to reduce greenhouse gas emissions by 43% below 2005 levels by 2030.	The project will contribute to meeting Australia's commitments under *the Paris Agreement* by providing an alternative energy source to energy sourced from fossil fuels, thereby reducing the National Electricity Market's (NEM's) annual greenhouse gas emissions.
National context		
Large-scale Renewable Energy Target	The Australian Government Clean Energy Regulator administers the *Large-scale Renewable Energy Target* which incentivises investment in renewable energy power such as wind and solar farms. The *Large-scale Renewable Energy Target* of 33,000 gigawatt hours of additional renewable electricity generation was met at the end of January 2021 (Clean Energy Regulator 2021). The annual target will remain at 33,000 gigawatt hours until the scheme ends in 2030.	The solar component of the project will have an indicative capacity of around 600 MW and include a BESS of up to 900 MW for a four-hour duration (3,600 MWh), which will make significant contributions towards meeting the Large-scale Renewable Energy Target in future years. In addition, the BESS will be able to store renewable energy to increase market efficiency and enable greater penetration of renewables in the electricity grid.
Integrated System Plan 2024	The Australian Energy Market Operator (AEMO) publishes an inaugural Integrated Systems Plan (ISP), which is updated every two years. The 2024 ISP is a roadmap for the transition of the NEM power system, with a clear plan for essential infrastructure that will meet future energy needs. The key objective is to support the complex and rapid transition of Australia's energy network towards net zero emissions by 2050, develop low-cost, firmed renewable energy and develop upgraded transmission infrastructure to provide consumers in the NEM with secure, clean affordable and reliable power (AEMO 2024). The 2024 ISP identifies that the NEM is forecast to need a seven-fold increase in large scale wind and solar generation by 2050. About 6 GW of capacity of variable renewable energy would need to be added every year, compared to the current rate of almost 4 GW.	The project will contribute to the storage and dispatchability requirements and will therefore support the 2024 ISP.

Plan, policy or strategy	Description	Alignment with strategic framework
Net Zero 2050	In October 2021, The Australian government released its *Long Term Emissions Reduction Plan* to achieve net zero emissions by 2050. The Plan aims at reaching a net zero economy through a technology-based approach, whilst protecting relevant industries, regions and jobs. It is part of an overarching strategy for emission reduction, based on a technology-led approach which includes a Technology Investment Roadmap and its Low Emissions Technology Statements.	The project will reduce greenhouse gas emissions by approximately 6 million tonnes (Mt) (CO_{2e}) over its operational life.
Capacity Investment Scheme	The Capacity Investment Scheme (CIS) aims to build a "more reliable, affordable and resilient energy system for all Australians" (DCCEEW 2025), including 9 GW of clean dispatchable capacity. One of the key goals of the CIS is to integrate renewable energy sources into the grid while ensuring reliability. Once operational, the project would align with this aim and goal by the incorporation of battery storage into the project will enable the storage of renewable energy to increase market efficiency and permit greater penetration of renewables in the electricity grid. The CIS is designed to be technology-neutral, meaning it supports various types of energy capacity that can meet system needs.	The project complements this approach by providing a reliable solution to energy storage and grid management while contributing to and complimenting the diverse mix of clean energy solutions required to meet future demand as coal-generation ceases.
Renewable Energy Act 2000	The *Renewable Energy Act 2000* encourages investment in large-scale renewable power by incentivising renewable energy through a Renewable Energy Certificate Market.	The project will contribute to both the increasing local and global need for such renewable projects, as well as aid in mitigating the issues of global warming and climate change.
Climate Change Act 2022	The *Climate Change Act 2022* sets out Australia's greenhouse gas emissions reduction targets, provide annual climate change statements, confer advisory functions on the Climate Change Authority, and other related purposes.	The project would contribute to the reduction of emissions generated in Australia required in this legislation by contributing zero emission electricity into the grid.
State context		
NSW Electricity Infrastructure Investment Roadmap (DPIE 2020a)	The *NSW Electricity Infrastructure Roadmap* and its implementing legislation the EII Act, coordinates investment in transmission, generation, storage and firming infrastructure as ageing coal-fired generation plants retire. The roadmap includes actions that will deliver "whole-of system" benefits. The roadmap sets out a plan to deliver the state's first five REZs in the Central-West Orana, New England, South-West, Hunter-Central- Coast, and Illawarra regions.	The project is within the CWO REZ and is ideally placed to contribute to the success of the roadmap.
Large-Scale Solar Energy Guideline (DPE 2022a)	The *Large-Scale Solar Energy Guideline* (DPE 2022a) provides the community, industry, applicants, and regulators with guidance on the planning framework for the assessment of large-scale solar projects and identifies the key planning considerations relevant to solar energy development in NSW. It is noted that this guideline was released in August 2022, and therefore the earlier version of these guidelines (DPIE 2018) is referred to in the Secretary's environmental assessment requirements (SEARs) for this project.	Site selection and impact assessment considerations detailed in the guideline have been and will continue to be used to inform the project.

Plan, policy or strategy	Description	Alignment with strategic framework
Net Zero Plan Stage 1: 2020–2030 (DPIE 2020b), Implementation Update (DPIE 2021a), *Net Zero Plan Implementation Update 2022* (DPIE 2022a),	The *Net Zero Plan Stage 1 2020–2030* (DPIE 2020b) outlines the NSW Government's plan to grow the economy and create jobs while helping the state to deliver a 35% cut in emissions compared to 2005 levels. The *Net Zero Plan Stage 1 2020–2030 Implementation Update* (DPIE 2021a) outlines the implementation of the Electricity Infrastructure Roadmap and REZs. The *Net Zero Plan Implementation Update 2022* (DPIE 2022a) provides an update to the implementation of the Electricity Infrastructure Roadmap and REZs. It identifies that the State is projected to reduce its emissions by 70% below 2005 levels by 2035.	The project contributes to Priority 1 of the Plan: "drive uptake of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living." The CWO REZ is also identified in the Plan as critical in replacing retiring coal fired generators in NSW.
Climate Change (Net zero future) Act 2023	Legislates NSW's targets to reduce GHG emissions by 50% by 2030 and 70% by 2035 to achieve net zero GHG emissions by 2050.	The project will contribute to emission reductions required in this legislation through the uptake of renewable energy.
State Infrastructure Strategy 2022 - 2042	Developed by Infrastructure NSW, the 20-year State Infrastructure Strategy is a plan to guide NSW Government investment decisions. The 'Staying Ahead' strategy for 2022–2042 "assesses infrastructure problems and solutions, and provides recommendations to best grow the State's economy, enhance productivity and improve living standards for [the] NSW community" (Infrastructure NSW 2022). The NSW Government is targeting a 50 % cut in emissions by 2030 with a goal of Net Zero emissions by 2050 and the State Infrastructure Strategy outlines a key objective to "achieve an orderly and efficient transition to Net Zero". This objective is supported by a series of recommendations, including the "Steadfast implementation of the NSW Electricity Infrastructure Roadmap in support of reliability and affordability" (Infrastructure NSW 2022).	Solar and BESS projects play a key role in the energy transition, with the State Infrastructure Strategy identifying that "…the continued rapid shift to renewables will create a need to accelerate investment in replacement firming capacity – generally gas peaking generators, batteries and pumped hydro facilities" (Infrastructure NSW 2022). The modification aligns with the State Infrastructure Strategy by providing more of this needed firming capacity.
NSW Electricity Strategy 2019	The *NSW Electricity Strategy* (DPIE 2019b) is the NSW Government's plan for a reliable, affordable and sustainable electricity future that supports a growing economy and sets out an approach to respond to emerging energy security challenges. The Strategy recognises that where variable generators are unable to satisfy demand, other technologies that can provide electricity on demand (such as storage) are required. Principle 1 of the NSW Electricity Strategy acknowledges that renewable electricity generation is the cheapest form of reliable electricity generation and calls upon investment into these technologies to reduce electricity prices and ensure network reliability. The NSW Government's plan for a reliable, affordable, and sustainable electricity future. The purpose is to improve the efficiency and competitiveness of the NSW electricity market through an integrated approach to all demand and supply options. It encourages investment in lower cost generation and energy saving technologies and identifies "delivering more resilient electricity supplies' as a key action".	The project will increase supply of electricity to market and contribute to sustainable electricity outcomes (solar generation and battery storage).

Plan, policy or strategy	Description	Alignment with strategic framework
NSW Energy Security Target and Safeguard 2020	The objective of the *NSW Energy Security Target and Safeguard* (DPIE 2020a) is to give the market certainty on the amount of new electricity generation and distribution capacity that is needed to deliver a reliable energy system over the medium to long term, in response to the retirement of several large coal-fired generators. The NSW Energy Security Target and Safeguard is established under the NSW *Electricity Infrastructure Investment Act 2020* and is equivalent to the maximum demand experienced in NSW every 10 years, plus a reserve margin. AEMO has been appointed as the Energy Security Target Monitor and its first report released in December 2021 (AEMO 2021) predicts a target breach over the 2029–30 period (i.e. that there will be insufficient infrastructure to meet the Energy Security Target). This signals the urgent need for new generation and transmission infrastructure to ensure energy security for NSW consumers.	The project will contribute additional electricity generation to the NEM and will assist in ensuring energy security for NSW consumers.
Local and regional context		
Central West and Orana Regional Plan 2041 (DPE 2022b)	The *Central West and Orana Regional Plan 2041* (the Regional Plan) considers a 20-year timeframe with a focus on the next 5 years. This purpose of the plan is to guide land use planning decisions in the region by the NSW Government, councils and others to the year 2041.	The following objectives of the draft plan are relevant to the project: • Objective 2: Support the State's transition to Net Zero by 2050 and deliver the Central–West Orana Renewable Energy Zone. • Objective 18: Leverage existing industries and employment areas and support new and innovative economic enterprises.
Our Place 2040 Mid-Western Regional Local Strategic Planning Statement (Mid-Western Regional Council 2020)	The Mid-Western Regional Local Strategic Planning Statement sets out the 20-year vision for land use planning in the Mid-Western Regional LGA. Planning Priority 7 of the Local Strategic Planning Statement is to "support the attraction of a diverse range of business and industries". To support this planning priority the *Local Strategic Planning Statement* contains a land use action to "consider renewable energy development in appropriate areas that avoids impacts on the scenic rural landscape and preserves valuable agricultural land."	The project will contribute to Planning Priority 7 of the *Local Strategic Planning Statement* and has been sited to minimise impacts on productive agricultural land and visual amenity, where practicable.

2.2 Site and surrounds

2.2.1 Regional context

The project is on Wiradjuri Country in the localities of Birriwa and Merotherie, approximately 15 km south-east of the township of Dunedoo, in the Central West of NSW. The modification area is within the Mid-Western Regional LGA.

The modification area is within the locality of Birriwa, which has a population of 45 (ABS 2021) and includes a small cluster of residences and rural infrastructure on the Castlereagh Highway approximately 1.4 km west of the study area. Birriwa is situated between Dunedoo (15 km northwest) (population 1,097, ABS 2021), Gulgong (20 km south) (population 2,680, ABS 2021), Coolah (40 km north) (population 1,262, ABS 2021), Mudgee (60 km south) (population 11,457, ABS 2021) and Dubbo (80 km west) (population 43,516, ABS 2021).

Major industry sectors with respect to employment share in the local area include mining, retail trade and health care and social assistance. The agricultural and mining industry sectors are the dominant employment sectors in the regional area. Tourism is also an important and growing industry sector in the Mid-Western Regional LGA.

The project is within the CWO REZ and there are a number of other renewable energy development proposed in the vicinity of the project including Narragamba Solar Farm (in planning), Avonside Solar Farm (in planning), Orana Wind Farm (in planning), Dunedoo Solar Farm (approved in September 2021), Sandy Creek Solar Farm (in planning), Cobbora Solar Farm (in planning-SEARs expired November 2024), Dapper Solar Farm (in planning), Spicers Creek Wind Farm (approved in October 2024), Valley of the Winds Wind Farm (in planning), Mayfair Solar Farm (in planning), Bellambi Heights BESS (approved May 2024), Mavis Solar Farm (in planning), Tallawang Solar Farm (in planning), Stubbo Solar and Battery Project (approved in June 2021), and Central-West Orana REZ Transmission Project (approved).

2.2.2 Local context

The land in the modification development footprint is zoned as RU1 Primary production under the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western Regional LEP) and is predominantly used for agricultural purposes.

Land surrounding the modification and project area is characterised by flat to gently undulating cleared land with scattered rural residences and agricultural buildings and infrastructure (e.g. silos and livestock yards). Areas of native vegetation occur within and surrounding the project area in the form of scattered paddock trees, vegetation along local roads, creek lines and windbreaks. The properties within the modification development footprint are currently primarily used for sheep and cattle grazing as well as low intensity dry land cropping.

There are four associated residences within or in close proximity to the modification area. There are seven non-associated residences within 2.5 km of the modification area, and another nine non-associated residences between 2.5 km and 4 km from the modification area (Figure 1.2).

2.2.3 Modification area

The modification area is shown on Figure 1.3 and is adjacent to the project area (approved project). The modification area includes three additional lots adjacent to the project area within the Mid-Western Regional LGA (Lot 11/DP 750755, Lot 40/DP 750755, Lot 60/DP 750755) and the remaining part of Lot 34/DP 750755, as well as the road upgrade corridor along the portion of Birriwa Bus Route South from Merotherie Road to the proposed alternative access point. The modification area is approximately 257 ha.

The modification area is characterised by flat to gently undulating topography and is predominantly cleared, agricultural land. The modification area is not within any land identified as biophysical strategic agricultural land (BSAL), flood planning area, bushfire prone land, or mine subsidence district.

2.3 Site selection and justification

As part of detailed design works, ACEN investigated the feasibility of including additional land adjacent to the approved project. An area of approximately 257 ha across four lots and Birriwa Bus Route South was identified by ACEN as suitable for inclusion in the modification area following seasonal targeted biodiversity surveys.

Additional land was considered for the project as an opportunity to optimise the project design, to ensure it can consistently generate 600 MW of renewable energy capacity. The modified footprint will enable optimisation of the design of panel rows, allowing for sufficient space for shade and maintenance equipment, and will also enable flexibility in construction. The additional land in Lot 34 provides more space to optimise the BESS layout and accommodate infrastructure associated with an increased storage capacity. This expansion will enhance the project's energy storage potential, offering greater firming support and improved network system strength.

During the preparation of this report, the modification area was refined based on environmental constraints identification (namely riparian buffers and items of Aboriginal cultural heritage significance), stakeholder engagement and consideration of the project infrastructure layout with the objective of maintaining a project that avoids and minimises environmental impacts.

The modification area is considered suitable for solar development as it is:

- in a heavily cleared agricultural landscape
- connected to the approved project
- is accessible using the approved project's primary vehicle access route
- is in proximity to the Birriwa Bus Route South Road, which is proposed to be upgraded and used as an alternative access route for the project.

In relation to the proposed alternative access route, the Network Operator is currently upgrading parts of Merotherie Road between the Golden Highway and the Merotherie Hub as part of the approved CWO REZ Transmission Project (SSI-48323210). This upgrade presents an opportunity for the Birriwa Solar and Battery project to use the future upgraded road as an alternative access route to the project, and therefore ACEN propose to develop an alternative access to the project area from the Golden Highway via Merotherie Road and Birriwa Bus Route South. Site access from this eastern side of the project site will enable more direct access to the accommodation facility and BESS at area B, compared to the approved access arrangements of entering the site from the western side via Barneys Reef Road and traversing the project site to the accommodation facility and BESS. The use of this future upgraded access point also enables the co-location of road upgrade impacts relating to EnergyCo's CWO REZ Transmission Project and the Birriwa project.

The modification is also seeking to increase the approved project's accommodation facility capacity from 500 workers to 650 workers. The additional 150 workers will reside at the approved accommodation facility, which will remain within the approved accommodation footprint. ACEN understands EnergyCo intend on commissioning the CWO REZ transmission line in approximately 2029. The Birriwa Solar and BESS project will be constructed in line with this commissioning date to enable efficient electricity supply to the grid in the REZ. To meet this goal, the intensity of construction will need to increase from what was considered within the EIS for periods of time, necessitating a larger peak construction workforce.

3 Description of the modifications

3.1 Overview of the modification

A comparison between the approved project and the proposed modification is provided in Table 3.1 and an updated project description is provided in Appendix A. An overview of the general layout of the modification is provided as Figure 3.1.

Table 3.1 Comparison of approved project and proposed modification

Element	Approved project	Proposed modification
Project area	1,535 ha	The proposed modification area is approximately 257 ha. The total project area inclusive of the modification would therefore be 1,792 ha.
Project development footprint (impact footprint)	1,197 ha	The modification development footprint associated with the modification area is approximately 216 ha. The total project development area would therefore be 1,413 ha.
Targeted capacity (solar)	600 MW (AC)	No change.
Targeted capacity (BESS)	600 MW for 2 hours	Increase in BESS capacity to approximately 900 MW for a four-hour duration.
PV modules	Approximately 1.2–1.4 million PV modules (solar panels).	No change.
Power conversion units (PCU)	Approximately 80–160 power conversion units will be required.	No change.
BESS design	The BESS will be adjacent to the substation within one of two proposed operational infrastructure areas, as shown in Figure 1.2 (area A or area B), and will be housed within either outdoor standalone racks, shipping containers or dedicated use buildings.	No change at area A. For area B: • Option 1: 900 MW (four-hour duration) at Lot 34/DP750755 (inclusive of the approved area B and adjacent modification area). • Option 2: 600 MW (four-hour duration) at area A, and 300 MW (four-hour duration) at Lot 34/DP750755 (inclusive of the approved area B and adjacent modification area). The operational infrastructure areas are shown in Figure 1.3.
Substation	Two substation location were assessed. The 600 MW transformer yard is proposed to be up to approximately 200 m by 100 m; and the switch yard is proposed to be up to approximately 150 m by 100 m. No component will be higher than the transmission tower, which is expected to be approximately 30 m high.	No change.
Grid connection	The project will connect to the proposed CWO REZ Merotherie Energy Hub being developed by the Energy Corporation of NSW (EnergyCo).	No change.
Construction duration	The anticipated period of construction for the project is approximately 28 months.	No change.

Element	Approved project	Proposed modification
Construction workforce	The project will require a peak construction workforce of up to 500 people (assuming that the peak construction activities of the solar and BESS infrastructure will not occur at the same time).	It is proposed to increase the peak workforce from 500 to 650.
Construction traffic	A maximum of 120 heavy vehicle 'movements' per day.	There is an error in the wording of the consent conditions - "movements" should be changed to "trips". An increase in the maximum daily heavy vehicle trips from 120 to 156 (equating to 312 vehicle movements), split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road.
Construction workforce accommodation	The non-local construction workforce will be accommodated in a temporary accommodation facility that will accommodate up to approximately 500 construction workers.	It is proposed to increase the accommodation facility capacity from 500 workers to 650 workers (up to an additional 150 workers will reside at the accommodation facility in peak construction periods). No change to the accommodation development footprint.
Construction staging	The construction of the project will generally include the following overlapping stages (some of which may be undertaken in parallel): 1. Establishment of internal access tracks for the project. 2. Public road upgrades including public road crossings for the project. 3. Site establishment including security fencing, and bushfire asset protection zones for the project. 4. Minor earthworks including levelling for the prefabricated demountable units for the accommodation facility. 5. Construction of the accommodation facility including delivery and construction of prefabricated demountable units, and utility infrastructure for a capacity of approximately 500 people. 6. Construction of the project, including construction of temporary ancillary facilities, the PV modules, BESS and substation installation. 7. Commissioning and testing of the project.	Minor amendments to the project staging with the public road upgrade of Birriwa Bus Route South and public road crossings occurring first, followed by the establishment of the internal access tracks for the project.
Site access	The primary vehicle access route will be via the Castlereagh Highway, Barneys Reef Road and Birriwa Bus Route South. The primary project access point on Birriwa Bus Route South (at the Barneys Reef Road end) will provide access to the development footprint of the project. An emergency access track will be constructed south of the accommodation facility infrastructure area, suitable for emergency vehicles.	An alternative access route along Birriwa Bus Route South via Merotherie Road, providing access for the construction and operation of the accommodation facility, construction, operation and maintenance of the BESS, and access for operation and maintenance by the Network Operator to EnergyCo's CWO REZ infrastructure located adjacent to and within the project area.

Element	Approved project	Proposed modification
Operational lifespan	The operational lifespan of the project will be in the order of 30 years, unless the solar farm is re-powered at the end of the PV modules' technical life. The BESS's operating life is likely to be 20 years. The accommodation facility will be operational for the duration of the solar and battery project construction phase, which is anticipated to be approximately 28 months.	No change.
Operational workforce	The project will contribute to the employment of up to 20 employees during operation.	No change.
Operational traffic	Regular light vehicle access will be required throughout operations; however, is not anticipated to exceed approximately 20 light vehicles per day. Heavy vehicles may be required occasionally for replacing larger components of project infrastructure including inverters, transformers or components of the BESS.	No change.
Decommissioning	The accommodation facility will be dismantled and the site generally restored to its former condition unless additional approvals are obtained for the facility to accommodate other projects. Once the solar and BESS project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and the development footprint returned to its pre-existing land use, namely suitable for grazing or cropping, or another land use as agreed by the project owner and the landholders at that time. Project decommissioning will require disturbance of the development footprint during the removal of equipment. A significant number of people, including both staff and contractors, and vehicle movements will be required during the decommissioning stage of the project. All infrastructure including above and below ground to be decommissioned and removed to a depth of 500mm, unless the Planning Secretary agrees otherwise.	No change.

3.2 Changes to the project area and development footprint

The approved project area and development footprint will be extended to accommodate the modification area (Figure 1.3). The majority of the modification area is freehold land owned by private landholders and Birriwa Bus Route South Road via Merotherie Road is managed by Mid-Western Regional Council. The additional lot and DPs associated with the project modification and their land ownership status is provided in Table 3.2. As also shown on Figure 1.3, the project area is proposed to be extended across the remaining portion of Lot 34/DP750755, which is already listed in the schedule of lands for the approved project.

Table 3.2 Additions to the schedule of land

Lot / DP	Land owner
11 / DP750755	Private
40 / DP750755	Private
60 / DP750755	Private
34/ DP450755	Private (existing landowner to the approved project)
Birriwa Bus Route South (via Merotherie Road)	Mid-Western Regional Council

The land within the modification area and modification development footprint will form part of the project area and development footprint and will allow for additional space to accommodate the proposed solar and battery project, optimising construction and operational activities.

The proposed modification will increase the extent of:

- the project area by approximately 257 ha to 1,792 ha (an increase of approximately 17%)
- the development footprint by approximately 216 ha to 1,413 ha (an increase of approximately 18%).

3.3 Increase in the capacity and duration of the BESS

It is proposed to increase the storage capacity and duration of the BESS from up to approximately 600 MW for a two-hour duration up to approximately 900 MW for a four-hour duration. The additional capacity will allow the project to increase its energy storage potential, providing additional firming support and greater network system strength.

Two options are proposed for the BESS (see Figure 3.1):

- Option 1: 900 MW (four-hour duration) BESS at lot 34/DP750755. The potential operational infrastructure area for this infrastructure is across the approved area B and into the adjacent modification area
- Option 2: 300 MW (four-hour duration) BESS at lot 34/DP750755 (within the approved area B and/or into the adjacent modification area) and 600 MW (four-hour duration) BESS at area A (as approved).

3.4 Alternative site access

The Network Operator is currently upgrading parts of Merotherie Road between the Golden Highway and the proposed Merotherie Hub as part of the approved CWO REZ Transmission Project (SSI-48323210). This upgrade presents an opportunity for the Birriwa Solar and Battery project to use the future upgraded road as an alternative access route to the project. As such, ACEN propose to develop an alternative access to the project area from the Golden Highway via Merotherie Road and Birriwa Bus Route South. The proposed alternative access on Birriwa Bus Route South is shown in Figure 3.1.

The approved project's primary vehicle access point will remain the same, as described in section 6.2.3 of the Amendment Report (EMM 2024); that is, via Barneys Reef Road onto Birriwa Bus Route South. The alternative access on Birriwa Bus Route South via Merotherie Road will be used to facilitate heavy and light vehicle access during:

- construction and operation of the accommodation facility
- construction, operation and maintenance of the approved BESS

- access for operation and maintenance by the Network Operator to EnergyCo's CWO REZ infrastructure located adjacent to and within the project area.

No change is proposed as part of the modification to oversize overmass (OSOM) vehicle movements, which will access the site via the approved primary access route only.

To enable the use of this alternative access via Merotherie Road, an upgrade to part of the existing Birriwa Bus Route South Road will be required. The road upgrade corridor is the area of direct impact for public road upgrade works along the access route, which comprises part of Birriwa Bus Route South (connecting the proposed alternative access point to the project with Merotherie Road). It also includes a public road crossing along Birriwa Bus Route South to allow construction and operation traffic to access different areas of the project with limited impacts on Birriwa Bus Route South.

The intersection at Merotherie Road/Birriwa Bus Route South and a section of Birriwa Bus Route South will require an upgrade to provide safe access to the development footprint during the project construction, to the satisfaction of Mid-Western Regional Council.

The Golden Highway/Merotherie Road intersection and the section of Merotherie Road between Golden Highway and Birriwa Bus Route South is currently being upgraded as part of the approved EnergyCo CWO REZ Transmission Project.

An alternative access provides a number of benefits. The alternative access route would provide access to the accommodation facility and BESS without having to rely on access across the approved project area. In addition, the co-location of road upgrade impacts across the CWO REZ Transmission Project and ACEN's projects along Merotherie Road and Birriwa Bus Route South would allow better management of construction traffic impacts.

3.5 Increase in construction workforce and capacity of the accommodation facility

The approved accommodation facility for the Project is for a workforce of 500 with additional capacity to expand to 1,000 if required to cater for other projects. ACEN proposes to increase the approved project's accommodation facility capacity from 500 workers to 650 workers, within the approved accommodation footprint (up to an additional 150 workers will reside at the accommodation facility in peak construction periods).

In the development application and accompanying EIS and Amendment Report for the project, when determining the required peak construction workforce numbers, it was assumed there would be minimal overlap between construction of the solar component and the BESS component of the project. In line with ACEN's recent Access Rights obligations for the project, construction timelines are now better defined and will require an overlap of construction of the project components, leading to an increase in the required peak construction workforce and therefore an increase in accommodation capacity from 500 to 650 beds.

This capacity increase also enables opportunities for potential sharing of the accommodation with other ACEN projects in the CWO REZ, in particular the recently approved Valley of the Winds Project.

The peak construction workforce will be required for short periods of time throughout the construction period such as during the establishment of the accommodation facility. The anticipated period of construction for the accommodation facility will be over a period of approximately 3 to 7 months (10 to 28 weeks) within a four-year construction window for the project. Note, this construction period will be determined once a supplier has been selected and contracts executed.

3.6 Increase in the maximum heavy vehicle trips

Condition B1 of Schedule 2 of SSD-29508870 provides the heavy vehicle restrictions for the approved project during construction, upgrading and decommissioning. The condition restricts the development to 120 heavy vehicle movements per day. However, the EIS (EMM 2022, see Table 6.5) and the Amendment Report (EMM 2023a, see Table 6.5) state that the estimated daily heavy vehicles travelling to the site (i.e. vehicle trips) is 120 (or 240 movements). ACEN seeks correction of the wording in the consent conditions from "vehicle movements" to "vehicle trips".

The increase in the peak construction workforce and capacity of the accommodation facility will necessitate an increase in the number of heavy vehicle movements for the project. As part of the modification, the peak construction workforce is proposed to increase by up to 30%, from 500 to 650 construction workers. Therefore, heavy vehicle movements are also anticipated to be 30% greater than approved, at 156 daily heavy vehicle trips (312 movements), including up to 90 on Merotherie Road and Birriwa Bus Route South. This is a result of:

- additional peak traffic for the construction of the larger workforce accommodation facility – noting that up 90 heavy vehicles a day along Merotherie Road and Birriwa Bus Route South are expected to be required for delivery of the accommodation units, over a limited number of days only
- additional peak traffic for the construction of the bigger BESS – noting that up to 90 heavy vehicles a day along Merotherie Road and Birriwa Bus Route South are expected to be required for the delivery of the BESS containerised units, over a limited number of days only
- details of traffic, including timing of peak traffic along Merotherie Road and Birriwa Bus Route South will be provided in the Traffic Management Plan prior to construction commencement.

The heavy vehicle movements to and from the site will be split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road. The proposed alternative access will be used primarily for pre-construction and construction access to the accommodation facility and BESS, while the approved access will be primarily used for construction of the solar infrastructure and BESS.

The likely traffic distribution in terms of site access during the various stages of the modified project is described as follows:

- Alternative access: Golden Highway – Merotherie Road - Birriwa Bus Route South route:
  - construction of the accommodation facility - light and heavy vehicles
  - BESS construction - heavy vehicles (excluding heavy vehicles requiring an escort)
  - solar and BESS construction - light vehicles
  - operation of the accommodation facility - light and heavy vehicles.
- Approved access: Castlereagh Road – Barneys Beef Road – Birriwa Bus Route South:
  - solar and BESS construction – light and heavy vehicles (including heavy vehicles requiring an escort).

It is anticipated that up to 90 heavy vehicles of the 156 will access the site per day via the alternative Merotherie Road access during peak periods. These peak movements via the alternative access will not coincide with the peak movements along the approved access route via Barneys Reef Road, such that the combined total heavy vehicles travelling to and from the site on any given day during pre-construction and construction will not exceed 156 (i.e. 312 movements). Noting, that Barneys Reef Road will be used for heavy vehicles requiring an escort. Such vehicles (OSOM) will travel to site via the approved, access of Barneys Reef Road/Birriwa Bus Route South.

No changes are proposed to the approved volume of heavy vehicles that may access the site via the approved access route off Barneys Reef Road (120 heavy vehicles, or 240 movements). Where these peak movements are required along Barneys Reef Road, movements along Merotherie Road will be such that they do not exceed the total of 156 trips/312 movements.

3.7 Construction staging

The construction of the project will generally include the following overlapping stages, some of which may be undertaken in parallel (note: bold text is associated with the modification):

Early works:

1. Public road upgrade of **Birriwa Bus Route South** for the project.
2. Establishment of internal access tracks for the project.
3. Site establishment including security fencing, and bushfire asset protection zones for the project.
4. Earthworks including levelling for the prefabricated demountable units for the accommodation facility.

Construction of the accommodation facility:

5. Construction of the accommodation facility including delivery and construction of prefabricated demountable units, and utility infrastructure for a capacity of **approximately 650 people**. The demountable units may be constructed in stages of up to the **650-person capacity** as construction of the project progresses.

Construction of the project:

6. **Construction of solar and BESS including public road upgrade of Barneys Reef Road, as per development consent.**

Project commissioning:

7. Final commissioning and testing of the project.

In relation to timing of the above construction activities, indicative timing is as follows:

- construction of the accommodation facility: Approximately May 2026 until around August 2027. Construction will be in stages with use and expansion to the maximum capacity of 650 beds occurring in parallel throughout the construction period of the project
- construction of Birriwa Solar and Battery Project: Approximately September 2027 until end of 2029.

3.8 Modification category

The proposed changes to the project can be classified as a modification, given that:

- the nature of the project, being a solar and BESS development, does not change
- the solar capacity of the project does not change
- the approved associated infrastructure and grid connection does not change
- the approved operational lifespan does not change

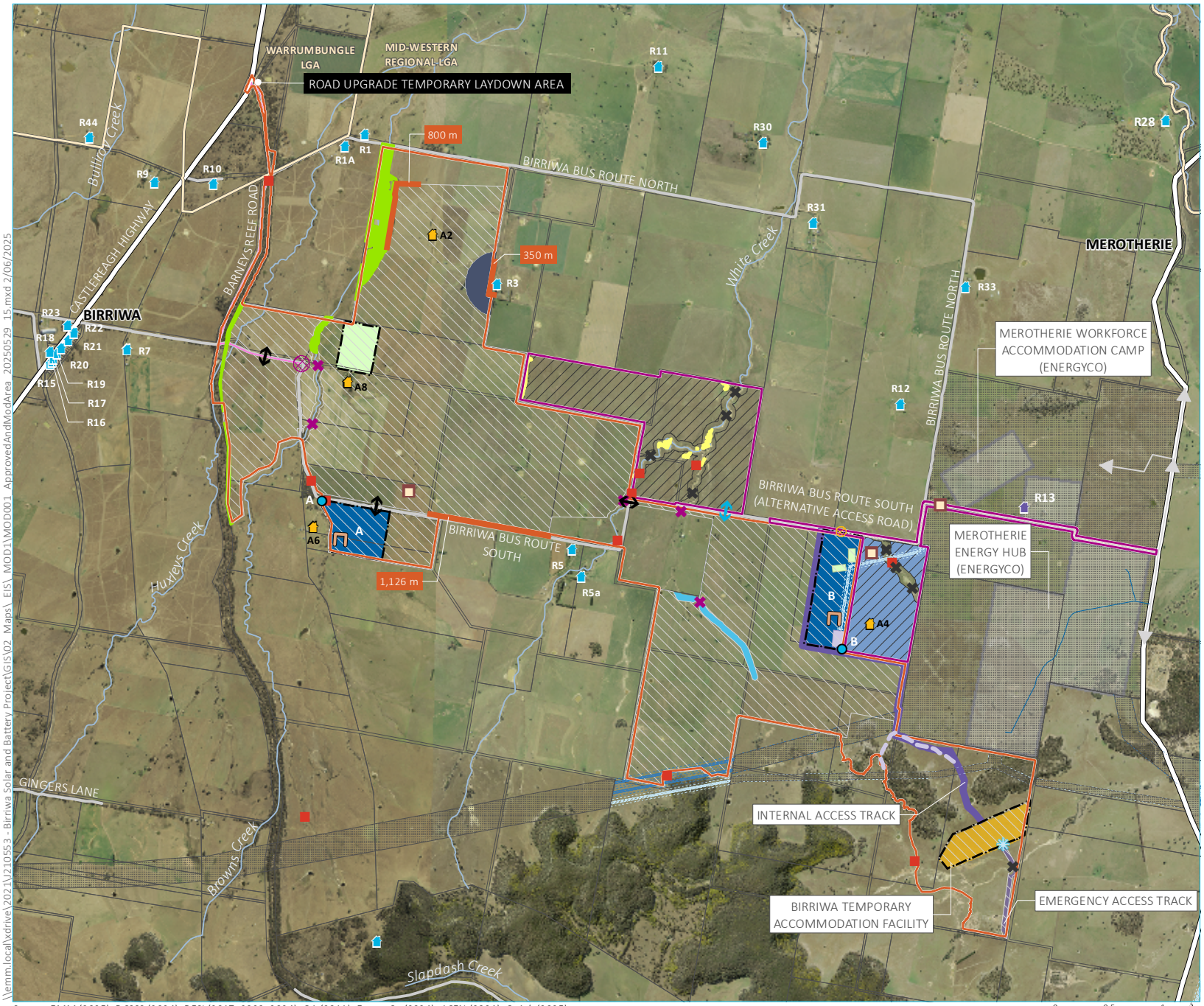
- the layout remains materially the same, with a small (18%) increase in the footprint of the project
- as demonstrated in this modification report, the modification will result in minimal environmental impacts beyond those previously assessed and approved under SSD-29508870
- the proposed modifications remain generally in accordance with the EIS and the current development consent conditions, with the exception of the abovementioned proposed changes.

As such, it is considered that the modified development will remain substantially the same development for which consent was originally granted.

3.9 Conditions of consent

The following amendments to SSD-29508870 conditions of consent are required to reflect the proposed modifications:

- Condition A5 of Schedule 2 – amend to the battery storage total delivery capacity to 900 MW.
- Condition B1 of Schedule 2 – amend from "movements" to "trips" in relation to heavy vehicle generation. Increase the total number of daily vehicle movements to and from the site during pre-construction and construction, from 120 to 156 daily heavy vehicle trips, split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road.
- Condition B3 of Schedule 2 – amend to allow heavy vehicles travelling to site to use Merotherie Road and Birriwa Bus Route South.
- Condition B4 of Schedule 2 – amend to allow vehicles travelling to site to use Merotherie Road and Birriwa Bus Route South.
- Condition B5 of Schedule 2 – amend to reference two access points on Birriwa Bus Route South.
- Condition B9 (a)(i) and (ii) of Schedule 2 – amend to include the section of Birriwa Bus Route South associated with the alternative access to Merotherie Road.
- Condition B19 of Schedule 2 – amend the ecosystem credit requirements to align with the additional credits triggered by the inclusion of the modification area in the development footprint.
- Appendix 1 (general layout of development) – replace with modified general layout, as per Figure 3.1.
- Appendix 2 (schedule of land) – amendments to the schedule of land to include four land parcels associated with the modification area (Table 3.2).
- Appendix 3 (indicative subdivision plan) – amendments to Option B of the subdivision plan, as per Figure A.3.
- Appendix 5 (road upgrades and site access) – addition of Merotherie road / Birriwa Bus Route South intersection as site access and associated road upgrades.
- Appendix 6 (heritage items) – update study area on supporting figure and Aboriginal heritage items in Table 1 and Table 2.



KEY

Approved project layout

- Project area
- Development footprint
- Restricted development area
- Road upgrade corridor
- Vegetation to be retained
- Potential creek crossing point
- Potential public road crossing location
- Connection point (option A or B)
- Indicative noise wall location
- Solar panel setback
- Landscape screen planting
- Project access point
- Emergency access point
- Operational infrastructure area including substation, operational facility and BESS (Option A or B)
- Birriwa temporary accommodation facility
- Temporary construction compound

Modification project layout

- Modification area
- Modification development footprint
- Vegetation to be retained
- Secondary access point
- Internal access track
- Potential creek crossing point
- Potential public road crossing location
- Proposed extension for operational infrastructure area including substation, operational facility and BESS

EnergyCo infrastructure

- 500 kV transmission line
- 330 kV transmission line
- Permanent access easement
- Access in/out
- Access road
- Brake and winch site
- 330 kV switching station
- Indicative construction easement (adjacent property)
- Merotherie Energy Hub and workforce accommodation camp

Existing environment

- Dwelling not associated with the project
- Dwelling not associated with the project (EnergyCo building)
- Dwelling associated with the project
- Aboriginal heritage site (to be avoided)
- Aboriginal heritage site (to be salvaged/managed)
- Local government area boundary
- Major road
- Minor road

Source: EMM (2025); DCSSS (2024); DFSI (2017, 2023, 2024); GA (2011); EnergyCo (2024); ACEN (2024); OzArk (2025)

0 0.5 1 km

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The approved project and the modification area

Birriwa Solar and BESS Project - Modification
Figure 3.1

EMM
creating opportunities

4 Statutory context

4.1 Introduction

This section describes the relevant Commonwealth and State legislation and regulatory framework under which the proposed modification will be assessed and determined. A detailed statutory compliance table is provided as Appendix B.

4.2 Power to grant approval

Under section 4.55 of the EP&A Act, a consent authority may modify an SSD development consent provided the development to which the consent as modified relates is substantially the same as the development for which the consent was originally granted. A modification under section 4.55(2) of the EP&A Act is the appropriate pathway given that:

- the nature of the project, being a solar and BESS development, remains the same
- the solar capacity of the project remains the same
- the approved associated infrastructure and grid connection remains the same
- the approved operational lifespan remains the same
- the layout remains materially the same, with a small (18%) increase in the footprint of the project
- as demonstrated in this modification report, the modification will result in minimal environmental impacts beyond those previously assessed and approved under SSD-29508870.

As the modified development will remain substantially the same development for which consent was originally granted, the modification can be considered under section 4.55 of the EP&A Act.

The Minister for Planning is the consent authority for the modification application. However, the Minister has delegated this authority to officers within the Department of Planning, Housing and Infrastructure (DPHI) where no reportable political donations disclosures have been made. ACEN has not made reportable political donations.

4.3 Permissibility

The solar and BESS development footprint in its entirety, as well as the accommodation area, is zoned RU1 Primary production under the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western Regional LEP). The project's primary access route is also zoned RU1 under the Mid-Western Regional LEP and the *Warrumbungle Local Environmental Plan 2013* (Warrumbungle LEP).

The project is characterised as 'electricity generating works' under the Mid-Western Regional LEP and is permitted with consent on land zoned as RU1.

Section 2.36(9) of *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) states that development for the purpose of an electricity generating works are permitted within 'prescribed zones' (i.e. RU1 under the SEPP). Therefore, the project is permissible with consent.

4.4 NSW Environmental Planning and Assessment Act 1979

Compliance of the proposed modification with the requirements of section 4.55(2) of the EP&A Act is summarised Table 4.1.

Table 4.1 EP&A Act section 4.55(2) requirements

Section 4.55(2) requirement	Comment
Modification of consent – generally A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if—	
(a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and	The proposed modification is consistent with the objectives of SSD-29508870, being the construction and operation of a solar and BESS project. A comparison between the project as approved originally and the project as proposed to be modified is provided in Table 3.1 and demonstrates that the modified project is substantially the same as that which was originally approved.
(b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and	ACEN has consulted with DPHI as part of the preparation of this modification report. DPHI confirmed the approval pathway for the modification is by way of section 4.55(2) of the EP&A Act. Further consultation information is provided in Section 5.
(c) it has notified the application in accordance with— (i) the regulations, if the regulations so require, or (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and	Section 106 of the NSW Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) relates to the notification requirements associated with section 4.55(2) modifications for SSD. Notice of the application must be published on DPHI's website. DPHI must also cause notice of the modification application to be given to each person who made a submission in relation to the original development application. This modification report will be placed on public exhibition by DPHI.
(d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.	Any submissions made concerning the proposed modification will be reviewed by DPHI and forwarded to ACEN to consider and respond to (via a submissions report).

4.5 NSW Environmental Planning and Assessment Regulation 2021

In accordance with section 99 of the EP&A Regulation, this modification report has been prepared in the approved form, contains all of the information and documents required by the approved form, the EP&A Act and the EP&A Regulation and will be submitted on the NSW Planning Portal. As the project is SSD, this modification report also includes the particulars of the nature of the proposed modification (Section 3) and has regard to *State Significant Development Guidelines – Preparing a Modification Report* (DPE 2022c).

Section 100 of the EP&A Regulation states the required information a modification application must include. An outline of where this information has been addressed is provided in Table 4.2.

Table 4.2 EP&A Regulation section 100 requirements

Consideration	Section in Modification
Content of modification application (1) A modification application must contain the following information—	
(a) the name and address of the applicant,	Section 1.3
(b) a description of the development that will be carried out under the development consent,	Section 3
(c) the address and folio identifier of the land on which the development will be carried out,	Section 3.2 and Appendix A
(d) a description of the modification to the development consent, including the name, number and date of plans that have changed, to enable the consent authority to compare the development with the development originally approved,	Sections 3.1 and 3.5
(e) whether the modification is intended to— (i) merely correct a minor error, misdescription or miscalculation, or (ii) have another effect specified in the modification application,	Section 3.1
(f) a description of the expected impacts of the modification,	Section 6
(g) an undertaking that the modified development will remain substantially the same as the development originally approved,	Table 4.1
(h) for a modification application that is accompanied by a biodiversity development assessment report—the biodiversity credits information,	Section 6.1 and Appendix E and Appendix F
(i) if the applicant is not the owner of the land—a statement that the owner consents to the making of the modification application,	The modification application has been made with the consent of the owner of the land which has been provided separately to DPHI.
(j) whether the modification application is being made to— (i) the Court under the Act, section 4.55, or (ii) the consent authority under the Act, section 4.56.	ACEN proposes to modify the consent under section 4.55(2) of the Act.

5 Engagement

5.1 Introduction

This section describes the engagement that has been undertaken since determination of the project, the key matters raised, how these matters have been addressed, and the plans for future stakeholder engagement. Consultation materials are provided in Appendix D.

5.2 Engagement carried out

Stakeholder engagement has been comprehensive and reflects the importance ACEN places on this aspect of its business. Since the determination of this project, ACEN has continued to engage with stakeholders including local authorities, government agencies, the local community and neighbouring landowners. A summary of the consultation and engagement undertaken following the project approval and during the preparation of this modification report is provided in Table 5.1.

Table 5.1 Summary of engagement carried out during preparation of modification report

Stakeholder group	Date	Method	Engagement activities and purpose
DPHI	3 December 2024	Meeting	Introduction to the proposed modification.
DPHI	4 February 2025	Email	Provision of introductory presentation to DPHI including draft figures showing the proposed Modification project layout in relation to the Approved project layout and EnergyCo infrastructure.
DPHI	Ongoing monthly meetings	Meeting	Monthly ACEN meetings with DPHI to discuss ACEN's portfolio of projects in planning.
CPHR	3 April 2025	Meeting	A meeting was held with North West division of Conservation Programs, Heritage and Regulation Group (CPHR) of the Department of Climate Change, Energy, Environment and Water (DCCEEW). The purpose of the meeting was to introduce CPHR to the modification and agree on an approach to the BDAR.
DPHI	11 April 2025	Email	Letter sent via email to DPHI outlining the approach preparing the BDAR.
DPHI	22 May 2025	Meeting	Modification application pre-lodgement meeting.
Local community	23 October 2024	Phone call	Initial discussion about the project modification with project neighbours.
Local community	12 November 2024 21 November 2024 22 January 2025 30 April 2025	Newspaper advertisement (Dunedoo District Diary)	Advertisement in local paper advising of proposed modification and invitation to meet the project team at the Gulgong office, and invitation to contact ACEN.
Local community	23 October 2024 23 January 2025 30 April 2025	Website and Facebook update	Updated project website to include new factsheets, project update and revised maps relating to the project modification application. Reminder regarding the drop-in session for 29 January 2025 and 6 May 2025.

Stakeholder group	Date	Method	Engagement activities and purpose
Local community	23 October 2024	Social media	Updates to the project's Facebook page relating to the project modification and linking to updated project website.
Local community	29 January 2025 6 May 2025	Drop-in session	Drop-in session to ACEN's Gulgong office to learn more about the project modification application and meet the project team. Announced via the Dunedoo District Diary on 22 January 2025 and 30 April 2025.
Central West Cycle Trail (CWCT) representatives	30 January 2025	In-person meeting in Mudgee	To discuss the potential impacts of the project on the CWCT and opportunities to mitigate impacts.
CWCT representatives	13 March 2025	In-person meeting on-site (Birriwa Bus Route South)	Site visit with representatives of the CWCT.
CWCT representatives	2 May 2025	Meeting	To discuss project update and proposed traffic mitigation measures on Birriwa Bus Route South.
CWCT representatives	29 May 2025	Email	Correspondence with CWCT representatives regarding the traffic mitigation measures and welcoming any comments on the measures proposed.
CWCT representatives	2 June 2025	Phone call	Feedback on proposed traffic mitigation measures and discussion on next stages of engagement.
Mid-Western Regional Council	On-going	Phone	Regular updates and discussion of issues in relation to the project, nearby residents and community contributions as part of the project's Social Investment Program (SIP).
Mid-Western Regional Council	23 October 2024	Meeting	Initial discussion about the project modification
Mid-Western Regional Council	6 March 2025	Email	Email with proposed Birriwa Bus Route South upgrade design for discussion at on-site meeting.
Mid-Western Regional Council	13 March 2025	In-person meeting on-site	Site visit with Council representatives to discuss ACEN's commitments for the proposed upgrade of Birriwa Bus Route South.
Mid-Western Regional Council	25 March 2025	Email and letter	Letter regarding commitments for the upgrade of Birriwa Bus Route South.
Mid-Western Regional Council	28 April 2025	Email and notification	Email received from Mid-Western Regional Council with an attached notification outlining the early works and site compound establishment to be carried out at Birriwa for the Port to REZ program on behalf of EnergyCo.
Warrumbungle Shire Council	17 December 2024	Meeting	Initial discussion about the project modification
Warrumbungle Shire Council	29 April 2025	Email	Invitation to the drop-in session on 5 May and a separate meeting via Microsoft Teams on 8 May 2025.
Warrumbungle Shire Council	8 May 2024	Meeting	Project modification update prior to submission to DPHI.

Stakeholder group	Date	Method	Engagement activities and purpose
Registered Aboriginal Parties	3 October 2024	Email and letter	Advised RAPs of the project and invited to review the Aboriginal Cultural Heritage Assessment (ACHA).
Existing host landowners	On-going	Phone, in-person meetings	Advised existing host landowners of the project modification and discussion of specific issues related to their property and farming activities.
Existing host landowners	15 October 2024	Meeting	Advised existing host landowners of the project modification.
Existing host landowners	May 2025	In-person meetings	Advised existing host landowners of the project modification.
Nearby residents	On-going	Phone, in-person meetings	Advised nearby landowners within at least 2/3 km of the project modification and discussion of specific issues related to their property and farming activities
Nearby residents	23 October 2024	Phone	Contacted nearby residents of the project to confirm key messages as approved and reiterate medial policy.
Nearby residents	May 2025	Phone	Advised nearby landowners within at least 2/3 km of the project modification and discussion of specific issues related to their property and farming activities
Nearby resident	12 May 2025 23 May 2025	Videocall	To discuss project update and concerns related to traffic along Merotherie Road, bushfire risk and safety with a local resident approximately 5 kms from the project.
EnergyCo and Network Operator	Fortnightly – ongoing	Meetings	Fortnightly trilateral meetings with EnergyCo, the Network Operator (ACEREZ) and ACEN to coordinate interfaces between CWO REZ and the project. This includes cumulative impacts, timing of the CWO REZ, connection to the CWO REZ and regular updates about the project.
EnergyCo	1 May 2025 and follow-up phone calls	Meeting	Discussion on opportunities for ACEN and EnergyCo to work together on further mitigations to biodiversity and heritage impacts along Birriwa Bus Route South.
Network Operator	17 April 2025	Email	Notification provided from ACEREZ to ACEN about the Merotherie Road and Golden Highway intersection upgrade and work planned to occur from 28 April 2025 as part of the CWO Transmission Project.
Network Operator	2 June 2025	Meeting	Modification application pre-lodgement meeting, with a focus on the Network Operator's management plans released at the end of May 2025.
Network Operator	5 June 2025	Meeting	Coordination meeting on issues related to construction activities, including impacts to neighbour residents and CWCT, in the context of the Network Operator's Management Plans released in May 2025.

5.3 Consultation outcomes

5.3.1 Community consultation outcomes

A summary of the key issues raised during the preparation of this modification report, and where each matter has been addressed is included in Table 5.2.

Table 5.2 Key issues identified by the community

Key issue	Summary of matter	Response and where the issue has been addressed
Construction traffic	Concerns related to increased traffic levels during the construction, which may discourage cyclists from using the current routes.	In addition to the proposed traffic control measures targeted for users of the CWCT, ACEN will continue to engage with representative of the CWCT to discuss additional suitable solutions that allow cyclists to continue to enjoy the CWCT in a safe way throughout construction and operation of the project. Social impacts have been addressed in Section 6.7.5 and traffic impacts have been addressed in Section 6.4.
Consultation	Enquiry as to whether there would be further opportunities to provide feedback or continuing consultation with neighbouring communities.	ACEN will continue to engage with the community as detailed design of the project continues. ACEN maintains a website, email address and phone number for community feedback and will continue to provide community notifications as the project proceeds towards construction.
Visual amenity	Concern whether the expanded footprint would result in visual impacts	A visual impact assessment was prepared to support the Modification application and is provided in Appendix G. The assessment concludes that the expanded footprint will not result in any significant increase in visual impacts beyond those already approved. Visual mitigation measures, including vegetative screening where required, will be implemented in line with assessments undertaken during the detailed design phase.
Noise	Concern whether the expanded footprint and/or additional traffic along public roads would result in noise impacts	An updated noise assessment was undertaken as part of the Modification application and is provided in Appendix I. The assessment confirms that the expanded footprint will not result in any exceedance of relevant noise criteria during construction or operation. Noise impacts will continue to be managed under the existing conditions of consent and the Construction Environmental Management Plan.
Cycle traffic	Concern that use of local roads may result in unsafe and unsuitable conditions for cyclists	Significant and ongoing engagement with the CWCT to identify suitable alternative route options during construction and/or to implement traffic mitigation measures to that minimise impacts on any sections of the cycle trail potentially affected by project traffic. Measures will include, but not limited to: • A dedicated phone number will be provided for CWCT users to call to confirm safe passage before using the trail during peak construction periods. This phone number will be listed on a sign approximately 1 km from the start of construction and on the CWCT website. • Safe pull over bays for bicycles will be identified along the construction route, which would move depending on the construction schedule. Other cycleway and traffic controls will be implemented as per mitigation measures identified in Appendix C, mitigation measure TT4.
Traffic	Roads not fit for purpose	Roads will be upgraded in accordance with Austroads specification or as agreed with council in order to accommodate increased traffic.

Key issue	Summary of matter	Response and where the issue has been addressed
Traffic	Concerns related to road upgrades and associated construction vehicle movements and traffic impacts, including dust.	Based on this feedback, and government agency consultation, a cap on traffic movements has been identified and traffic will be split between the two access points including Birriwa Bus Route South Road and Barneys Reef Road. Access to Birriwa Bus Routh South Road via Merotherie Road will enable access to the project for the purpose of constructing and operating the approved temporary accommodation facility, as well as the BESS.
Dust	Concerns related to dust generated by the current CWO REZ construction activities and ACEN's proposal to mitigate dust emissions during construction of the project.	Dust suppression controls will be implemented as per mitigation measures identified in Appendix C, mitigation measure BIO12, AQ1, and AQ6.
Workforce accommodation and behaviours	Community looking to better understand the location of the workforce accommodation and impacts on the surrounding community's resources.	The modification does not propose any change to the location or size of the approved workforce accommodation area. As outlined in Section 6.8 of the Modification Report, workforce accommodation will continue to be managed in accordance with the approved mitigation measures under the existing conditions of consent and the project's Workforce Management Plan (Appendix C, mitigation measure SOC3). The plan includes provisions to manage workforce conduct and minimise impacts on local community resources, including through codes of conduct and engagement with local services. In addition to this ACEN has discussed responses to safety concerns raised by sensitive receptors and have agreed to install a battery powered CCTV system at the gate of their property.

5.3.2 Agency and council consultation outcomes

A summary of the feedback received from government agencies and local councils during preparation of the modification report, and where each matter has been addressed, is summarised in Table 5.3.

Table 5.3 Agency and council consultation outcomes

Agency	Summary of feedback	Response and where the issue has been addressed
Mid-Western Regional Council	Upgrade of Birriwa Bus Route South and road design commitments. Minimisation of impacts with respect to hollow-bearing trees (HBTs), PCTs and heritage sites, while maintaining safety and functionality within the existing road reserve.	ACEN's commitments regarding road design are provided in Appendix H (letter dated 17 April 2025) and are summarised in Section 6.4. Council's position is to generally support a design solution that will minimise the impact on the roadside environment while providing a road design that suits the short-term construction impacts and longer-term operational use of the road. In this regard, it is preferable that the design aligns with Austroads guidelines for road geometry, applying an appropriate AADT for the development and considering both cumulative impacts and baseline rural traffic volumes. Where non-conformances occur due to the need to preserve roadside vegetation, exemptions may be considered—provided they are supported by a comprehensive road safety assessment. It is anticipated that Austroads guidelines will require 3.1 m travel lanes, with shoulder widths adjusted as needed to minimise environmental impact. Added safety features, such as guardrails, should also be considered. The design commitments as outlined in ACEN's letter dated 25 March 2025 are generally accepted; however, Council requires the opportunity to review a draft design, road safety audits, and any requested concessions before endorsing the final design package.
Warrumbungle Shire Council	Council has requested clarity regarding responsibilities for the maintenance of the section of Merotherie Road managed by the Warrumbungle Shire Council, during the construction of the CWO REZ and the project.	During construction and for 12 months following its completion, the Network Operator will be responsible for maintaining the roads. At the end of the construction period, the road will be handed back to Warrumbungle Shire Council in accordance with the agreement between Warrumbungle Shire Council and EnergyCo. The Network Operator also plans to undertake a dilapidation report at the end of the construction period, which will be provided to the Council as part of the agreed Merotherie Road upgrade process. Following the 12-month defects liability period, ongoing maintenance of the road will become the responsibility of Warrumbungle Shire Council.

5.4 Engagement to be carried out

5.4.1 Public exhibition

This modification report is expected to be exhibited on the DPHI major projects website, and the community will be invited to provide submissions. DPHI will publish all submissions received during exhibition on the major projects website and ask ACEN to respond to the issues raised. ACEN will also publicise on the project's Facebook page and the project's website, that the modification report has been submitted and invite the community to provide submissions.

5.4.2 Ongoing community engagement

ACEN will continue to engage with the community and stakeholders throughout the construction and operation of the project. Engagement activities will include, but is not limited to:

- notification to neighbours of any construction activity that may impact them
- engagement with key regulators
- continued operation of a project information line for enquiries and complaints handling procedure
- shop front in Gulgong staffed by community engagement team locally based
- advertisements and project updates on Facebook, project website and the Dunedoo District Diary
- procurement and employment information sessions
- Social Investment Program's ongoing support of not-for-profit organisations and events in the area.

6 Assessment of impacts

6.1 Biodiversity

A Biodiversity Development Assessment Report (BDAR) for the modification has been prepared by EMM and ELA (2025a). The BDAR is provided in Appendix E.

The report provides an assessment of the potential residual impacts of the modification on biodiversity in accordance with the Biodiversity Assessment Method (BAM 2020) under the *NSW Biodiversity Conservation Act 2016* (BC Act), the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Fisheries Management Act 1994* (FM Act). It also documents the strategies implemented to avoid and/or minimise impacts of the modification on threatened biodiversity and describe the biodiversity offset requirements.

The term 'subject land' used in this section is in accordance with the 'subject land' described in the BAM (DPIE 2020d) and includes the area subject to all proposed direct impacts (i.e. the project's 'modification development footprint' as defined above in Section 1.4).

This section provides a summary of the key findings of the BDAR and the aquatic assessment.

6.1.1 Existing environment

i Native and threatened vegetation

The vegetation within the subject land has been classified as containing two PCTs (see Figure 6.1 and Table 6.1).

Table 6.1 Vegetation zones identified within the subject land

Vegetation zone	PCT ID	PCT name	Condition	Extent in direct impact area (ha)
Additional lots (EMM 2025a)				
1	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	66.2
2	-	-	Exotic vegetation (planted trees and pastureland)	145.3
Birriwa Bus Route South (ELA 2025)				
1	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Woodland	1.38
2	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Woodland	0.57
3	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	0.18

Vegetation zone	PCT ID	PCT name	Condition	Extent in direct impact area (ha)
4	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	0.72
Total				**2.85**
Total native vegetation				**69.05**

PCT 277 and PCT 281 within the subject land represents White Box – Yellow Box –Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland) critically endangered ecological community (CEEC) (NSW TSSC 2020) listed under the BC Act (Table 6.2).

Vegetation zones mapped as PCT 277 and PCT 281 within the subject land do not meet the criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC as listed under the EPBC Act.

Table 6.2 Threatened ecological communities recorded in the subject land

Threatened Ecological Community	EPBC Act	BC Act	Associated PCTs and vegetation zones	Additional lots - direct impact (ha)	Birriwa Bus Route South - direct impact (ha)	Total area (ha)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Does not meet criteria for listing	CEEC	PCT 277: DNG	0.0	0.72	0.72
			PCT 277: Woodland	0.0	0.57	0.57
			PCT 281: DNG	66.2	0.18	66.38
			PCT 281: Woodland	0.0	1.38	1.38
Total area (ha)				**66.2**	**2.85**	**69.05**

ii Threatened species

Targeted flora and fauna surveys were conducted across the subject land. The full list of species surveyed is presented in the BDAR in Appendix E. An individual Masked Owl (*Tyto novaehollandiae*) was recorded during call playback and spotlighting surveys conducted for the Birriwa Bus Route South (ELA 2025).

Targeted surveys for microbat species within the Birriwa Bus Route South recorded the presence of three threatened microbat species, with two additional threatened microbat species potentially recorded.

- Large-eared Pied Bat (*Chalinolobus dwyeri*) - positively recorded
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) - positively recorded
- Yellow-bellied Sheath-tailed bat (*Saccolaimus flaviventris*) - positively recorded
- Southern Myotis (*Myotis macropus*) - potentially recorded
- Eastern Cave Bat (*Vespadelus troughtoni*) - potentially recorded.

KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)
- RDP location
- Plot location

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Pasture, Exotic grassland
- Exotic (Planted Vegetation)

Plant community type

PCT 277 | Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Derived native grassland (DNG)
- Woodland

PCT 281 | Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

- Derived native grassland (DNG)
- Woodland

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

GDA 1994 MGA Zone 55

N

Plant community types and vegetation zones – additional lots

Birriwa Solar and BESS Project - Modification
Figure 6.1

EMM
creating opportunities

iii Aquatic ecology

White Creek and its tributaries include two 3rd order streams, which intersect and form a 4th order stream within the subject land (Lots 40 and 60 / DP750755), and multiple unnamed first and second order streams. Huxleys Creek is located north of the subject land but has two smaller unnamed tributaries, which intersect the western extent of the subject land (Lot 11 / DP 750755). These creeks flow in a northerly direction into Talbragar River, approximately 2.5 km from the subject land.

There is one 3rd order and three 1st or 2nd order watercourses on Birriwa Bus Route South. The 3rd order watercourse extends into Lot 34/DP 750755. The 3rd order watercourses meet the definition of key fish habitat (KFH) under the guidelines (Fairfull 2013) and so will be considered KFH for the purposes of the assessment.

The DPI Fisheries spatial portal identifies the nearest major waterway, Talbragar River, as having a poor freshwater fish community status. None of the reaches within the modification development footprint, have been mapped by DPE for fish community status on the DPI Fisheries Spatial Dataset (DPE 2023a). Likewise, none of the waterways in the modification development footprint have been mapped on the NSW River Style map.

White Creek, in addition to Huxleys Creek, is mapped within the freshwater threatened species distribution for the Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) (DPI 2021). Talbragar River to the north-east is also mapped within the freshwater threatened species distribution of the Eel-tailed Catfish (*Tandanus tandanus*).

The waterways within the subject land and assessment area largely lack wooded riparian vegetation, which may support aquatic and terrestrial species. These creeks have a sandy substrate, which is highly erodible and has resulted in the creeks occurring as eroded gullies with limited to no bank vegetation. Additionally, the construction of man-made culverts and roads has significantly altered the flow-regimes of these creeks, with many being completely dry and unable to support any aquatic vegetation or subsequent fauna species (Plate 6.1).

Some aquatic habitat is present within the assessment area as slow-flowing creeks, though these generally lack rocky habitat or substrates able to refuge for aquatic species. However, intermittent pools within the actual subject land generally lack aquatic vegetation, limiting diversity of macrophytes and aquatic species habitat (Plate 6.2).

The creek crossing across Birriwa Bus Route South is generally dry and has some riparian cover with *Eucalyptus* sp. trees lining the creek. Various grasses are present with no permanent aquatic habitat features present (Plate 6.3). A matters of national environmental significance (MNES) search within 10 km of the project shows two species of fish, which may occur or have habitat within the modification development footprint. These include:

- *Galaxias rostratus* (Flathead Galaxias)
- *Macquaria australasica* (Macquarie Perch).

An additional two species may occur within 10 km of the modification development footprint:

- Maccullochella macquariensis (Trout Cod)
- Maccullochella peelii (Murray Cod).

A search of *Atlas of Living Australia* records demonstrates that no threatened species, communities or populations with a potential distribution modelled by DPI Fisheries or the MNES Protected Matters Search Tool occur within 10 km of the modification development footprint.

Plate 6.1 White Creek within the modification area

Plate 6.2 Highly degraded ephemeral aquatic habitat associated with White Creek in the modification area

Plate 6.3 Representative photo of creek at Birriwa Bus Route South creek crossing upstream (left) and downstream (right)

6.1.2 Impact avoidance, minimisation and mitigation

The modification will result in direct and indirect impacts. Measures to avoid and minimise impacts to vegetation were considered during the project refinement process, resulting in avoidance of significant biodiversity values.

Key avoidance measures that have been implemented by ACEN comprise:

- placement of the additional lots entirely within areas of native and exotic grassland
- avoidance of 3.45 ha of PCTs 277 and 281 within the Birriwa Bus Route South, which conform to the BC Act listed critically endangered ecological community of 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
- avoidance of 3.45 ha of PCTs 277 and 281 within the Birriwa Bus Route South, which provides potential habitat for threatened fauna species within the locality, inclusive of foraging habitat for Masked Owl and Southern Myotis
- avoidance of threatened species habitat, including hollow-bearing trees
- public road crossings have been located within the subject land within areas of minimal vegetation, thereby avoiding the need to remove vegetation for these crossings

- refinements to the modification design to avoid impacts to watercourses. Two third order streams within the study area have been excluded from the subject land, thereby avoiding impacts to any associated riparian areas, with the exception of that required for the provision of fencing, access and electrical reticulation (i.e. private internal access roads and electrical cables).

Residual impacts to biodiversity values can be mitigated through pre-clearance surveys, planting locally native species characteristic of Box Gum woodland in future landscaping, retention of logs and debris in the subject land post-construction, and weed hygiene measures. The modification initially encompassed approximately 88.9 ha of PCT 281, including wooded areas. However, the final design has minimised impacts to the TEC by avoiding 3.45 ha of PCTs 277 and 281 along Birriwa Bus Route South. Accordingly, the reduction in impact on Box Gum Woodland and derived native grassland also reduces the impact on native flora and fauna habitat.

Residual impacts to biodiversity values will be mitigated through pre-clearance surveys and weed hygiene measures.

6.1.3 Impact assessment

i Impacts requiring offsets

After avoidance and minimisation, the modified project will result in the required ecosystem credits are summarised in Table 6.3, and species credits are summarised in Table 6.4.

The total offset credit obligation for the approved project and modification is summarised in Table 6.5.

One BC Act listed threatened ecological community (TEC) at risk of SAII occurs within the subject land:

- 66.38 ha of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in a DNG form.

The TEC has been assessed in accordance with section 9.1 of the BAM (DPIE 2020).

The BDAR for the modification has also considered impacts on species and ecological communities listed under the EPBC Act. The proposed modification is not expected to result in significant impacts to MNES including threatened ecological communities and species, and migratory species.

Table 6.3 Modification impacts requiring offset credits – ecosystem credits

Vegetation zone name	Additional lots (EMM 2025a)		Birriwa Bus Route South (ELA 2025)		Total Credits
	Area	Credits	Area	Credits	
281_DNG	66.2	746	0.18	4	750
281_Woodland	-	-	1.38	56	56
277_DNG	-	-	0.72	13	13
277_Woodland	-	-	0.57	12	12
Total		**746**		**85**	**831**

Table 6.4 Modification impacts requiring offset credits – species credits

Species	Additional lots (EMM 2025a)		Birriwa Bus Route South (ELA 2025)		Total Credits
	Area (ha) / individual (HL)	Credits	Area (ha) / individual (HL)	Credits	
Southern Myotis (*Myotis macropus*)	28.12	254	1.71	47	301
Masked Owl (*Tyto novaehollandiae*)	-	-	0.99	30	30
Total					**331**

Table 6.5 Total offset credit obligation for the approved project and modification

Entity	Credits required (approved project)		Credits required (modification)		
	Road upgrade corridor works	Solar project and BESS	Additional lots (modification)	Birriwa Bus Route South upgrade works (modification)	Total
Ecosystem credits					
PCT 281	19	200	746	60	1025
PCT 277	0	0	0	25	25
PCT 80	23	29	0	0	52
Total - ecosystem credits	**42**	**229**	**746**	**85**	**1102**
Species credits					
Large-eared Pied Bat	0	17	0	0	17
Southern Myotis	0	0	254	47	301
Masked Owl	0	0	0	30	30
Koala	38	189	0	0	227
Total - species credits	**38**	**206**	**254**	**77**	**575**

In relation to staging of the project, the proposed access track that links the secondary access point off the Birriwa Bus Route South alternative access to the accommodation facility will be constructed as part of the early works and during the Birriwa Bus Route South upgrade. This access track is within the approved project development footprint and is within vegetation zones that do not require biodiversity offsets.

ii Impacts not requiring offsets

Areas not requiring offsets include exotic vegetation, and areas associated with past grazing and cropping activities. 145.3 ha of vegetation not requiring offset would be cleared for the modification.

iii Aquatic ecology impacts

The construction and operation of creek crossings may have the following impacts on aquatic ecology:

- reduced water quality and subsequent impact on aquatic ecology due to sedimentation associated with earthworks
- reduced water quality and subsequent impact on aquatic ecology due to construction machinery, chemicals and waste
- spread of weeds.

Operational impacts may include:

- accumulation of debris on the upstream side of each crossing may act as a barrier to fish passage
- concentrated flow through culverts may cause scour on the downstream side of crossings.

6.1.4 Biodiversity offset strategy

The project will offset the residual impacts on biodiversity via conservation mechanisms established under the NSW Biodiversity Offset Scheme (BOS). The BOS offset rules are established by the Biodiversity Conservation Regulation 2017 and the mechanisms available to meet offset obligations include:

- retiring like-for-like credits
- payment into the Biodiversity Conservation Fund (BCF).

It is ACEN's intent to upgrade the site access (i.e. undertake road and intersection upgrades) and establish the workforce accommodation facility before the solar component, to enable a staged biodiversity offset delivery model.

6.1.5 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential impacts to biodiversity (BIO7, BIO8, BIO9, BIO10, BIO11, WQ1, WQ2, WQ3, FLO5, FLO6). Additional mitigation measures are outlined in Table 6.6.

ACEN will compensate for the residual impacts through the implementation of a biodiversity offset strategy.

Table 6.6 Biodiversity mitigation measures

ID	Mitigation measures
BIO14	• Regular inspection of waterway crossings for accumulation of debris which block fish passage, and removal of such debris if present.
BIO15	• Implement structural features to dissipate high energy flow. These could include rock baffles or riprap in areas prone to erosion. • Monitor banks and bed for signs of erosion.

6.1.6 Conclusion

The modification will result in an increase in the development footprint requiring additional clearing and associated impacts to native vegetation and fauna. An additional 69.05 ha of native vegetation (PCT 281 and PCT 277) would be cleared as a result of the modification. Areas of high biodiversity value have been avoided as much as possible. To compensate for unavoidable disturbance of native vegetation and threatened species habitat, offsets are proposed.

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The project is not expected to result in significant impacts to MNES including threatened ecological communities and species, and migratory species.

6.2 Aboriginal cultural heritage

6.2.1 Overview

An Aboriginal Cultural Heritage Assessment Report (ACHAR) was prepared by OzArk (2025a) for the modification in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, and the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (the Code of Practice). The ACHAR is provided in Appendix F.

Consultation with the registered Aboriginal parties (RAPs) regarding the project have been ongoing since September 2021. The following RAPs were consulted regarding the proposed modification in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (ACHCRs, DECCW 2010):

- Gallanggabang Aboriginal Corporation
- Mudgee Local Aboriginal Land Council (LALC)
- Murong Gialinga Aboriginal & Torres Strait Islander Corporation
- North-Eastern Wiradjuri
- Paul Brydon
- Stakeholder 1
- Warrabinga Native Title Claimants Aboriginal Corporation
- Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC)
- Woka Aboriginal Corporation.
- Booral Maliyan
- Cindy Foley
- George Flick
- Jeremy Duncan
- Girragirra Murun Aboriginal Corporation
- Gomery Cultural Consultants

- Thomas Dahlstrom
- Wingarra Wilay Aboriginal Corporation.

A copy of the draft ACHA was provided to the RAPs for review, who were reviewing the report at the time of submission of this modification report. The study area adopted for the ACHA is the broader investigation area that was the subject of archaeological survey (Figure 6.2).

6.2.2 Existing environment

The modification area is within the Talbragar - Upper Macquarie Terrace Sands and Gravels landscape. This landscape type is characterised by sandy quaternary alluvial sediments on floodplains and terraces of the Talbragar River, with a general elevation between 350 to 500 m (Mitchell 2002: 99). A portion of the modification area along Birriwa Bus Route South is in the Cope Hills Granite landscape unit, which is characterised by undulating and rolling hills on Carboniferous granite and granodiorite, general elevation 500 to 740 m (Mitchell 2002: 65).

The soils inside the modification area consist of Home Rule and Rouse. The Home Rule soil type is prone to erosion, especially if no surface cover is present. Furthermore, drainage depressions are highly susceptible to gully erosion due to water runoff. The Rouse soil type is prone to sheet and gully erosion (Murphy and Lawrie 1998). Significant erosion of drainage lines is also evident across the modification area as well as the presence of unsealed vehicle tracks and roads including Birriwa Bus Route South.

Most of the modification area has been subject to cropping and/or grazing. Cropping involves ploughing the ground surface, which ultimately affects the integrity of archaeological Aboriginal sites, in particular open camp sites, within the 'plough zone' by moving deposits both horizontally and vertically. The grazing of hoofed livestock significantly shuffles or compacts the ground surface.

There are 130 sites registered in the Aboriginal Heritage Information Management System (AHIMS) within a 10 km by 10 km area surrounding the modification area (Table 6.7). Three previously recorded sites are within the modification area. These sites include two artefact scatters (36-3-4105 [SNI-AS85] and 36-3-4095 [SNI-86]) and a scarred tree (36-3-3918 [Birriwa Bus Route South ST-1]).

Table 6.7 AHIMS sites by site type within 10 km by 10 km area

Site type	Number	Frequency
Isolated find	41	31
Artefact scatter	37	28
Grinding groove	14	11
Modified tree (carved or scarred)	13	10
Artefact site with PAD	9	7
Rock shelter with deposit	5	4
Rock shelter with art	4	3
PAD	3	2
Burial/s	1	1
Ceremony and Dreaming	1	1
Stone arrangement	1	1

Site type	Number	Frequency
Waterhole	1	1
Total	**130**	**100**

The field survey for the modification was undertaken by OzArk on 11 to 12 December 2024 with the assistance of representatives from four RAPs. The survey identified three previously unrecorded sites, all isolated finds (White Creek IF-1, White Creek IF-2 and White Creek IF-3). Of these, two were identified on the immediate bank of White Creek and the third was identified within the channel of an unnamed tributary of White Creek.

The significance assessment of Aboriginal cultural heritage sites recorded within the modification area (three previously recorded and three newly recorded sites) is summarised in Table 6.8.

The survey confirmed that the land within the modification area has been heavily disturbed through agricultural practices, including ploughing, grazing, dams, contour banks and road construction. This confirms that the potential for intact subsurface archaeological deposits is low, and test excavation was not warranted.

Table 6.8 Significance assessment for identified Aboriginal sites

AHIMS ID	Site name	Social or cultural value	Archaeological / scientific value	Aesthetic value	Historic value
36-3-4283	White Creek IF-1	High (provisional)	Low	Low	Nil
36-3-4284	White Creek IF-2	High (provisional)	Low	Low	Nil
36-3-4285	White Creek IF-3	High (provisional)	Low	Low	Nil
36-3-3918	Birriwa Bus Route South ST-1	High (provisional)	Low	Low	Nil
36-3-4095	SNI-AS86	High (provisional)	Low	Low	Nil
36-3-4102	SNI-AS85	High (provisional)	Low	Low	Nil

6.2.3 Impact assessment

Based on the outcomes of the survey, ACEN has refined the modification development (impact) footprint of the solar panels and associated infrastructure to avoid four of the six identified sites; White Creek IF-1, IF-2, IF-3, and site 36-3-4095 (SNI-AS86). Site 36-3-4102 (SNI-AS85) is unable to be avoided.

The dripline of scarred tree site 36-3-3918 (Birriwa Bus Route South ST-1) extends into the development footprint for the Birriwa Bus Route South upgrades; however, there are opportunities to avoid harm to this site through the implementation of management measures such as building the road up at this location as opposed to undertaking any grading within the dripline.

The potential impacts to the identified sites are summarised in Table 6.9.

Table 6.9 Aboriginal cultural heritage impact assessment

AHIMS ID	Site Name	Type of harm	Degree of harm	Consequence of harm
36-3-4283	White Creek IF-1	None	None	No loss of value
36-3-4284	White Creek IF-2	None	None	No loss of value
36-3-4285	White Creek IF-3	None	None	No loss of value
36-3-3918	Birriwa Bus Route South ST-1	Direct	Partial	Partial loss of value

AHIMS ID	Site Name	Type of harm	Degree of harm	Consequence of harm
36-3-4102	SNI-AS85	Direct	Total	Total loss of value
36-3-4095	SNI-AS86	None	None	No loss of value

6.2.4 Management and mitigation

In accordance with Condition B30 of the development consent, a heritage management plan (HMP) will be developed for the project in consultation with RAPs and Heritage NSW, which will include the modification area.

Site 36-3-4102 (SNI-AS85) will be subject to salvage through the recording and collection of surface artefacts prior to construction works commencing.

The scarred tree, 36-3-3918 (Birriwa Bus Route South ST-1), will not be removed; however, ground disturbing works associated with the upgrades along Birriwa Bus Route South may encroach on the dripline of the tree. Should ground disturbing works within this dripline be unavoidable, management of the tree may be required in consultation with RAPs. These management measures may include salvage (i.e. removal of the scarred portion of the tree) or alternate management of the tree should it be preferred to remain *in situ*. The recommended methodology for the salvage will be finalised and documented in the HMP, once the exact nature of impacts is known. If harm to site 36-3-3918 (Birriwa Bus Route South ST-1), can be avoided by the project, the site will also be temporarily fenced while works are being undertaken near the site.

All other identified sites will be avoided. These sites will be protected during construction using high-visibility temporary fencing at a minimum 5 m buffer around the site extents. The location of all sites will be shown on all appropriate plans to ensure that they are not inadvertently harmed.

The updated mitigation measures as a result of the modification is provided in Table 6.10. Updates to the mitigation measures are bolded.

Table 6.10 Aboriginal cultural heritage mitigation measures

ID	Mitigation measure
AH1	Prior to commencement of construction, a HMP will be developed in consultation with DPHI, the RAPs and Heritage NSW.
AH2	During construction, temporary fencing will be installed around sites identified in the study area in the vicinity of the development footprint (Mangarlowe OS-1, Mangarlowe IF-1, **White Creek IF-1, White Creek IF-2, and White Creek IF-3**) and the location of all known sites will be shown on appropriate plans to ensure that they are not inadvertently harmed. **If 36-3-3918 (Birriwa Bus Route South ST-1) can be avoided, the site will be temporarily fenced while works are undertaken near the site.**
AH3	**Two** Aboriginal sites, Mangarlowe IF-2 **and 36-3-4102 (SNI-AS85)**, will be salvaged prior to the commencement of construction. **Should ground disturbing works within the dripline of 36-3-3918 (Birriwa Bus Route South ST-1) be unavoidable, management of the tree may be required in consultation with RAPs. These management measures may include salvage (i.e. removal of the scarred portion of the tree) or alternate management of the tree should it be preferred to remain *in situ*, or alternative measures developed in consultation with RAPs should be followed.** The methodology for collection of this site will be finalised as part of the HMP.
AH4	In the event of discovery of new Aboriginal sites within the study area, the procedure detailed in the project ACHA will be followed. In the event that newly identified sites will be impacted by the construction of the project and cannot be avoided, they will be managed in a manner commensurate with their assessed significance.

6.2.5 Conclusion

Avoidance of Aboriginal cultural heritage values has been a key aspect of the project refinement process. ACEN has refined the modification development footprint of the solar panels and associated infrastructure to avoid identified heritage sites including White Creek IF-1, IF-2, IF-3 and site 36-3-4095. Site 36-3-4102 is unable to be avoided and will be subject to salvage. In addition, the dripline of the scarred tree site 36-3-3918 extends into the development footprint of the Birriwa Bus Route South upgrade; however, there are opportunities to avoid harm to this site through the implementation of management measures in consultation with RAPs.

A HMP will be developed for the project in consultation with DPHI, RAPs and Heritage NSW. The HMP will detail the management of known Aboriginal sites and mitigation measures to further avoid impacts to Aboriginal heritage values in the study area, along with unanticipated finds procedures and training and reporting protocols.

6.3 Landscape and visual

6.3.1 Introduction

A Landscape and Visual Impact Assessment (LVIA) has been prepared by EMM (2025b) and is provided in Appendix G. The LVIA was prepared in accordance with the *Large-Scale Solar Energy Guideline* (DPE 2022a) and the *Technical Supplement – Landscape and Visual Impact Assessment* (DPE 2022g). The LVIA also references techniques and methods outlined *Guidelines for Landscape and Visual Impact Assessment Third Edition* (LIIEMA 2013), and *The Dark Sky Planning Guideline* (DPE 2016).

6.3.2 Existing environment

The visual study area for the modification is in a rural setting. There are 16 non-associated dwellings scattered within 4 km of the modification area. Much of the modification area has been extensively cleared of trees and has been highly modified by historic farming practices.

The main transport infrastructure in the area is made up of the Castlereagh Highway (B55) and the Golden Highway (B84). The Castlereagh Highway runs north-south approximately 3.5 km west of the modification area at the closest point. The Golden Highway runs east-west approximately 4 km north of the modification area.

There is a rail line connecting Birriwa to Dunedoo to the north and Gulgong to the south. The closest point the rail is to the modification is approximately 4 km to the west.

Townships in the region of the modification are characterised by scattered small villages and small rural centres. The closest township to the modification is Birriwa – a small village just over 4 km to the west of the modification area. The larger towns on Dunedoo and Gulgong are located 22 km north-west and south of the modification area, respectively.

The key landscape features remain the same as identified in the EIS (EMM 2022) and Amendment report (EMM 2023a). The modification area has been assessed (independently of the approved project) as having a moderate impact on landscape character. When considered in association with the approved project, the additional landscape character impact of the modification will be insignificant.

6.3.3 Impact assessment

i Private viewpoints

Sixteen private and four public viewpoints were identified in the visual study area. Based on viewshed mapping four private and four public viewpoints were selected for assessment within the LVIA. These viewpoints are shown on Figure 6.2. Potential visual impacts have been assessed as very low for all viewpoints for the modification only, and as low or very low for the approved project combined with the modification as summarised in Table 6.11. The following general points can be made about all assessed viewpoints (excluding R13):

- All viewpoints have been assessed as secondary views from dwellings in rural zones, photographs for all private receivers were taken from locations near the dwelling to ensure a worst-case view of the modification infrastructure was obtained for the photomontages. In all cases views from the house will be significantly less impacted than shown in the photomontages.
- Scenic quality for all viewpoints was rated as low, reflecting their location in mostly flat or undulating terrain that is predominantly cleared for agricultural purposes.

The viewpoint at R13 has not been assessed with the project because it is a building used for the purpose of construction activities associated with the neighbouring CWO REZ Transmission Project and is not a private receiver.

Table 6.11 Visual impact summary for private viewpoints

Representative receptors	Distance (m)	Magnitude rating – modification only	Visual impact rating – modification only	Magnitude rating – approved project and modification	Visual impact rating – approved project and modification	Mitigation strategy
R3	710	Very low	Very low	Low	Low	None needed
R5	740	Very low	Very low	Very low	Very low	None needed
R12	1,240	Very low	Very low	Moderate	Low	None needed
R31	1,600	Very low	Very low	Very low	Very low	None needed
R13	110 (970 to BESS)	N/A	N/A	N/A	N/A	N/A

ii Public viewpoints

The only public viewpoints within the visual study area are the public roads within 2.5 km of the modification infrastructure and include parts of Birriwa Bus Route South, Birriwa Bus Route North, Merotherie Road, and Birkalla Road.

Visual impacts from these locations are not considered significant. Viewshed mapping indicates potential partial visibility of the modification infrastructure based on topography from most locations on these routes. From most locations, views of the modification infrastructure that are not screened by topography will be screened by either existing roadside vegetation and structures, or will already have views of panels installed as part of the approved project. The extent of roadside vegetation is visible on aerial photographs and has been confirmed by field observations. Any views from these roads are usually from moving vehicles with the occupants facing forward, limiting the viewing angle.

iii Glint and glare analysis

A glare analysis was performed using specialised software (ForgeSolar). The calculations were based on the solar array properties outlined in Appendix G. Glare impacts were assessed from surrounding residences within 3 km of the modification area, and from roads within 1 km of the modification area. No glare was predicted for any receptors (public or private).

iv Night time visual impacts

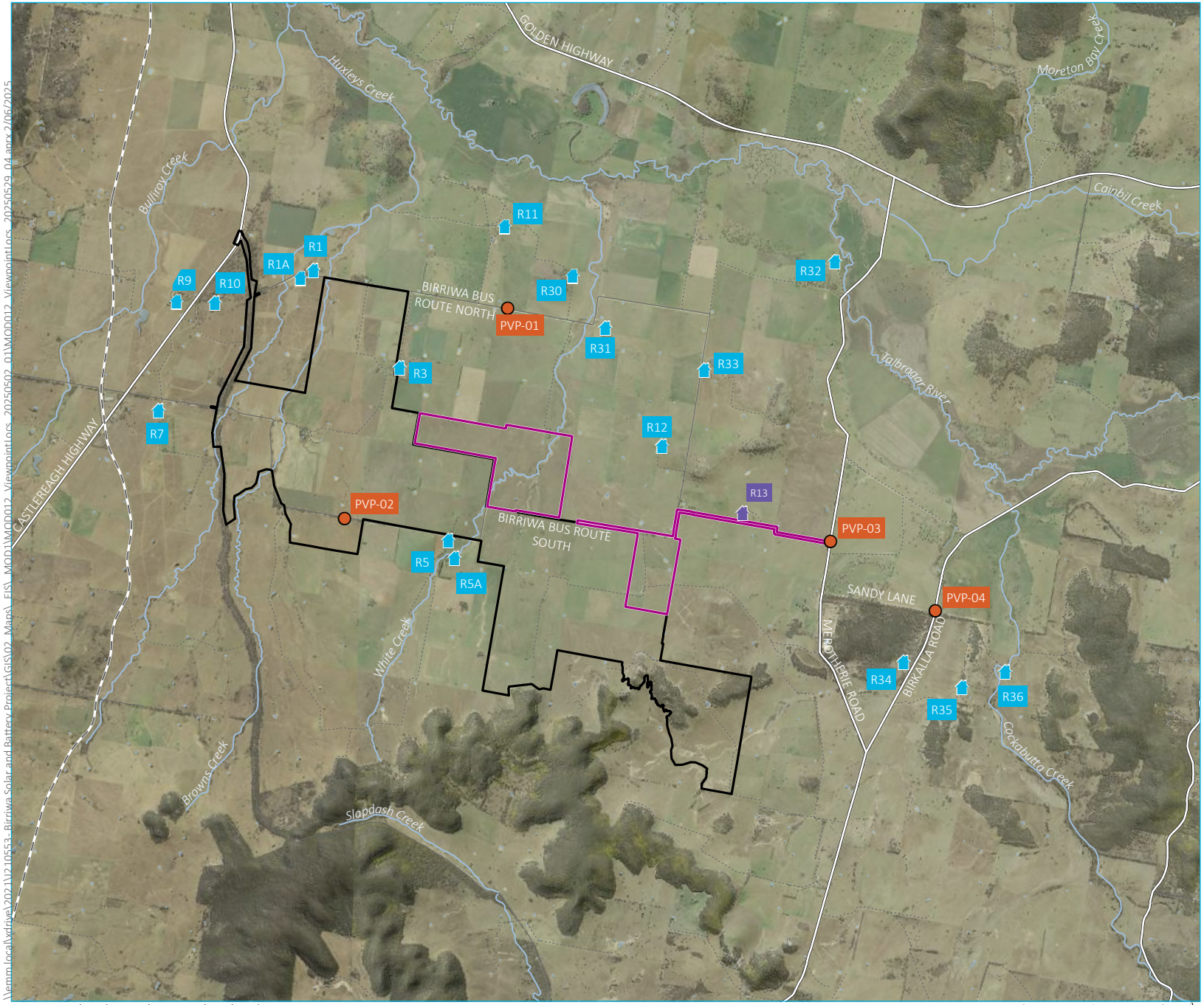
Night time visual impacts would be similar to that assessed in the EIS and Amendment Report.

6.3.4 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential visual impacts. Visual impacts have been rated as very low and no additional mitigation measures are required.

6.3.5 Conclusion

Visual impacts associated with the modification are expected to be very low. Landscape screening identified in the consent conditions is considered appropriate and no additional mitigation measures are required.



KEY

- Modification area
- Approved project area
- Public viewpoint
- Dwelling not associated with the project
- Dwelling not associated with the project (EnergyCo building)

Existing environment

- Rail line
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Waterbody

Source: EMM (2025); DCSSS (2023, 2024); GA (2009)

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Viewpoint locations and receptors

Birriwa Solar and BESS Project- Modification
Figure 6.2

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6.4 Traffic and transport

A Traffic Impact Assessment (TIA) has been prepared by EMM (2025c) and is provided in Appendix H.

6.4.1 Existing environment

i Site access

The project's approved access is via Barneys Reef Road, off the Castlereagh Highway. In addition to the approved access, an alternative access route is proposed off the Golden Highway, Merotherie Road, and Birriwa Bus Route South (Figure 3.1). Key features of these roads are described below:

- Golden Highway – a State road extending between Castlereagh Highway at Dunedoo to the west and New England Highway at Belford to the east. The Golden Highway is a sealed road which generally runs east-west with one lane in each direction. It is approximately 8.5 m wide near Merotherie Road. The posted speed limit is 100 kilometres per hour (km/h) in rural sections of the highway. The Golden Highway is approved for 26 m B-doubles.

- Merotherie Road – a local road between Golden Highway (north) and Barneys Reef Road (south). It is an unsealed road which generally runs north-south with one lane in each direction. Merotherie Road is approximately 8.5 m wide with a default speed limit of 100 km/h (drive to conditions). It is approved for heavy vehicles up to 19 m long under 50 tonnes. The road is currently being upgraded as part of CWO REZ Transmission Project (Merotherie Energy Hub).

- Birriwa Bus Route South – a local road which extends between the Castlereagh Highway and Merotherie Road. Birriwa Bus Route South is an unsealed road and is approximately 5 m wide. The default speed limit is currently 100 km/h and heavy vehicles up to 19 m long under 50 tonnes are approved to use Birriwa Bus Route South.

The Golden Highway/Merotherie Road intersection (shown in Plate 6.4) and the Merotherie Road/Birriwa Bus Route South intersection (shown in Plate 6.5) both have narrow geometry and do not comply with the current Austroads standard. The Network Operator is currently upgrading this intersection and road to comply with relevant standards and in accordance with the Network Operator Transport and Traffic Management Plan and the Merotherie Transport Strategy, where relevant, which were both released in May 2025.

Source: Google maps

Plate 6.4 Golden Highway/Merotherie Road intersection

Source: Google maps

Plate 6.5 Merotherie Road/Birriwa Bus Route South intersection

ii Existing traffic volumes

The Golden Highway/Merotherie Road and Merotherie Road/Birriwa Bus Route South intersections were surveyed between 7:00 am and 6:00 pm on Wednesday, 21 February 2024.

The survey results indicate that the peak hours are:

- Golden Highway/Merotherie Road:
  - AM peak hour: 10.30 am to 11.30 am
  - PM peak hour: 12.00 pm to 1.00 pm
- Merotherie Road/Birriwa Bus Route South:
  - AM peak hour: 7.00 am to 8.00 am
  - PM peak hour: 4.15 pm to 5.15 pm.

The Golden Highway / Merotherie Road intersection carried under 100 vehicles in both the peak hours with a slightly eastbound dominant flow in the AM peak and vice versa in the PM peak. The existing traffic volume at Merotherie Road / Birriwa Bus Route South is very low, with less than five vehicles in both the AM and PM peak hours. As there is no consistent pattern for the existing peak traffic hours due to the rural nature of the locality, the AM and PM peak traffic hours for the Golden Highway / Merotherie Road intersection were applied for both the analysed intersections.

iii Public transport

School buses operate along Golden Highway by Eastend Bus Service. Hodgen's Bus Service (Dunedoo) operates a service along Birriwa Bus Route South and Birriwa Bus Route North providing student transport to local schools in Dunedoo.

iv Active transport

The 58 km Gulgong and Dunedoo Central West Cycling Trail (CWCT) travels via Merotherie Road (south of Birriwa Bus Route South) and Birriwa Bus Route South. As the haulage route intersects with this cycling trail, consultation is ongoing with CWCT.

6.4.2 Impact assessment

i Traffic generation and distribution

a Development year

Based on the current project schedule, the peak construction activities will occur in 2029, and therefore all traffic assessments have been undertaken for that year. As per Transport for NSW (TfNSW) instructions on Castlereagh Highway, a 1.6% per annum linear growth has been applied to the Golden Highway, Merotherie Road and Birriwa Bus Route South.

b Construction of the accommodation facility

The construction of the accommodation facility will occur prior to construction of the BESS component of the project.

As such, traffic associated with the construction of the accommodation facility is not be included in the analysis for the modification.

c Traffic distribution

The heavy vehicle movements to and from the site will be split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road. The proposed alternative access will be used primarily for pre-construction and construction access to the accommodation facility and BESS, while the approved access will be primarily used for construction of the solar infrastructure and BESS.

The likely traffic distribution in terms of site access during the various stages of the project is described below:

- Proposed alternative access: Golden Highway – Merotherie Road - Birriwa Bus Route South route:
  - construction of the accommodation facility - light and heavy vehicles
  - BESS construction - heavy vehicles (excluding heavy vehicles requiring an escort)
  - solar and BESS construction - light vehicles
  - operation of the accommodation facility - light and heavy vehicles.
- Approved access: Castlereagh Highway – Barneys Beef Road – Birriwa Bus Route South:
  - solar and BESS construction – light and heavy vehicles (including heavy vehicles requiring an escort).

d Heavy vehicles for the construction of the solar and BESS

As part of the modification, the peak construction workforce is proposed to increase by up to 30%, from 500 to 650 construction workers. As a conservative approach, heavy vehicle movements are also anticipated to be 30% greater than approved, at 156 daily heavy vehicle trips (312 movements).

It is anticipated that up to 90 heavy vehicles of the 156 will access the site per day via the alternative Merotherie Road access during peak periods. These peak movements via the alternative access will not coincide with the peak movements along the approved access route via Barneys Reef Road, such that the combined total heavy vehicles travelling to and from the site on any given day during pre-construction and construction will not exceed 156 (i.e. 312 movements). Note that Merotherie Road will not be used by heavy vehicles requiring an escort. Such vehicles (OSOM) will travel to site via the approved access of Barneys Reef Road/Birriwa Bus Route South.

No changes are proposed to the approved volume of heavy vehicles that may access the site via the approved access route off Barneys Reef Road (120 heavy vehicles, or 240 movements). Where these peak movements are required along Barneys Reef Road, movements along Merotherie Road will be such that they do not exceed the total of 156 trips / 312 movements to the site.

Notwithstanding the above, this TIA has been undertaken based on the conservative scenario of all heavy vehicles travelling via the alternative Merotherie Road access route during pre-construction and construction, to ensure full sensitivity testing.

e Heavy vehicles for operation of the accommodation facility

This modification is seeking to increase the temporary accommodation facility from 500 construction staff to 650 construction staff and is proposed to be accessed via the alternative access route. Additional heavy vehicle movements associated with the delivery of water and fuel, and the collection of sewage and waste have been included in the assessment.

f Light vehicles

The light vehicle movements during operation of the accommodation facility are the movements that will occur during the construction of the BESS project. This will be the local workers who will drive to site daily (i.e. 10% of the workforce, or 65 daily trips).

ii Traffic movement summary

The traffic movements associated with project are summarised Table 6.12. Key assumptions are:

- for the construction of the BESS and solar infrastructure - 20% of daily heavy vehicles generating during the peak hours
- for the operation of the accommodation facility - 50% of daily heavy vehicles generating during the peak hours
- for the construction of the BESS and solar, light vehicles generation AM peak inbound and PM peak outbound - all movements generating during the AM and PM peak hours.

Table 6.12 Estimated daily and peak hourly vehicle movement/trips for the project

Peak stage of the project	Route	Vehicle type	Daily		Peak hourly			
					AM		PM	
			Trips	Movements	Trips	Movements	Trips	Movements
Pre-construction								
Pre-construction (establishment of the accommodation facility)	Merotherie Rd/Birriwa Bus Route South	Heavy vehicles	90*	180	- *Peak hour will be avoided*	- *Peak hour will be avoided*	- *Peak hour will be avoided*	- *Peak hour will be avoided*
Pre-construction (establishment of the accommodation facility)	Merotherie Rd/Birriwa Bus Route South	Light vehicles	40	80	40	40	40	40
Pre-construction total traffic volumes	**Merotherie Rd/Birriwa Bus Route South**	**Heavy and light vehicles**	**130**	**260**	**40**	**40**	**40**	**40**
Construction								
Construction (solar and BESS)	Castlereagh Hwy/Barneys Reef Rd	Heavy vehicles	66	132	13	26	13	26

Peak stage of the project	Route	Vehicle type	Daily		Peak hourly			
					AM		PM	
			Trips	Movements	Trips	Movements	Trips	Movements
Construction (BESS)	Merotherie Rd/Birriwa Bus Route South	Heavy vehicles	74	148	15	30	15	30
Construction (operation of the accommodation facility during the construction phase of the solar and BESS)	Merotherie Rd/Birriwa Bus Route South	Heavy vehicles	16	32	8	16	8	16
	Merotherie Rd/Birriwa Bus Route South	Light vehicles	65	130	65	65	65	65
Construction total traffic volumes	**Castlereagh Hwy/Barneys Reef Rd**	**Heavy vehicles**	**66**	**132**	**13**	**26**	**13**	**26**
	Merotherie Rd/Birriwa Bus Route South	**Heavy vehicles**	**90**	**310**	**88**	**111**	**88**	**111**
	Merotherie Rd/Birriwa Bus Route South	**Light vehicles**	**65**	**130**	**65**	**65**	**65**	**65**

Note: *It is anticipated that up to 90 heavy vehicles will be required to access the site during pre-construction activities and construction via the alternative Merotherie Road access. It is assumed these movements will not occur during peak hour. The majority of heavy vehicles movements during pre-construction will occur over a few days during the delivery of the accommodation modules.

iii Nearby developments for cumulative traffic impact assessment

a Concurrent projects

The construction of only one project is expected to coincide with the peak construction period of the project in 2029, which is the Sandy Creek Solar Farm and BESS Project. Only the Golden Highway / Merotherie Road intersection has been assessed for cumulative traffic in 2029 with Sandy Creek Solar Farm and BESS Project as there is no other concurrent development traffic along Merotherie Road or Birriwa Bus Route South.

b CWO REZ Transmission Project (Merotherie Hub)

The Traffic and Transport Management Plan (Rev 04[1]) released in May 2025 (ACEREZ 2025) for the CWO REZ Transmission Project provides a detailed timeline of construction for the Merotherie Energy Hub and Merotherie workforce accommodation facility, which are adjacent to the Birriwa Solar and Battery Project. The construction of the Merotherie workforce accommodation facility is anticipated to fall between the period of October 2025 and 2028 (ACEREZ 2025). If this was to extend, or the Applicant was to start construction earlier than planned once detailed design is complete, there is a possibility that the construction of the Birriwa Solar and Battery Project may overlap with the Merotherie Energy Hub and workforce accommodation facility development.

In relation to potential cumulative traffic impacts with the CWO REZ Transmission Project, there are three aspects to consider: the Merotherie Road / Birriwa Bus Route South intersection, the Golden Highway / Merotherie Road intersection, and the required upgrades along Merotherie Road between the Golden Highway and Birriwa Bus Route South.

As discussed in section 4.4 of the TIA (Appendix H), there will be no cumulative traffic or impact associated with Merotherie Road/Birriwa Bus Route South intersection between the Birriwa Solar and Battery Project and the CWO REZ Transmission Project (Merotherie Energy Hub and Merotherie workforce accommodation facility).

The Golden Highway / Merotherie Road intersection is currently being upgraded by the Network Operator as per the Traffic Management Plan (ACEREZ 2025), with a channelised left and right turn bays on the Golden Highway. This is the maximum order of turn treatment as per Austroads. Therefore, if construction traffic movements related to the Birriwa Solar and Battery Project were to coincide with construction of the CWO REZ Transmission Project, given this intersection is being upgraded to the highest level of treatment, no further upgrade would be required.

Similarly, in relation to the upgrade of Merotherie Road (between the Golden Highway and Birriwa Bus Route South), the Austroads road width requirements relating to the cumulative effect of 90 daily vehicles from the Birriwa Solar and Battery Project with the estimated 808 daily traffic volumes from the CWO REZ Project, would remain the same, and no additional upgrade would be required beyond that being undertaken by the Network Operator.

iv Intersection performance

The two key intersections (Golden Highway / Merotherie and Merotherie Road / Birriwa Bus Route South) have been modelled with the SIDRA Intersection 10 software for the following scenarios:

- 2029 (Baseline) – surveyed traffic volumes only with 1.6% per annum linear growth.
- 2029 (Baseline + Construction + Cumulative) – combined surveyed and project traffic volumes.

For the Golden Highway/Merotherie Road intersection, the modelling found that:

- in AM and PM, the intersection performs satisfactorily within capacity with LOS A or B and DoS <0.1 for all scenarios
- in the highest traffic (construction impacts) scenario, the intersection still has approximately 90% additional capacity after accommodating the additional traffic generated by the project.

[1] https://media.caapp.com.au/pdf/ZCcsXctIZH5m/e3eab40e-1ab2-4593-a2da-e0af0d631064/Merotherie%20Transport%20Strategy.pdf

For the Merotherie Road/Birriwa Bus Route South intersection, the modelling found that:

- in AM and PM, the intersection performs satisfactorily within capacity with LOS A or B and DoS <0.1 for all scenarios
- in the highest traffic (construction impacts) scenario, the intersection still has approximately 90% additional capacity after accommodating the additional traffic generated by the project.

v Intersection operation

Intersection operations have been assessed using the 2029 baseline + construction + cumulative traffic volumes to determine the need for additional intersection turning lanes in accordance with the current intersection design standards (Austroads 2023a) *Guide to Road Design Part 4a, Unsignalised and Signalised Intersections.*

The assessment found that both intersections do not meet the minimum requirements. In accordance with Austroads:

- Golden Highway/Merotherie Road intersection (based on cumulative traffic) requires a widened shoulder 35 m in length plus an additional length for tapering. A channelised right turn treatment (CHR) with a short turn lane of 104 m long is also required (to turn right onto Merotherie Road)
- Merotherie Road/Birriwa Bus Route South intersection requires a shoulder treatment (BAR). A 56.5 m long shoulder widening is required.

EnergyCo is upgrading the Golden Highway/Merotherie Road intersection by providing a dedicated left and right turn bays. According to the EnergyCo[2] website, this intersection upgrade has commenced on 28 May 2025 and expected to be completed within five weeks.

Merotherie Road and Birriwa Bus Route South are local roads, the proposed intersection upgrade will be undertaken in consultation with, and to the satisfaction of, Mid Western Regional Council.

vi Road upgrades

Road width design standards for sealed rural roads are defined by the *Austroads Guide to Road Design Part 3: Geometric Design* (Austroads 2023b). The existing road width measurements, as well as the 2024 existing, 2029 baseline and 2029 baseline + construction daily traffic volumes of roads in the external road network, are presented in Table 6.13. As there is no other concurrent development traffic along Merotherie Road or Birriwa Bus Route South, there is no cumulative traffic (refer to Section 6.4.2iii).

[2] https://media.caapp.com.au/pdf/ybs02e/26c1a182-daa2-44aa-ae89-5cbc9f8349c7/Work%20notification%20-%20%20Merotherie%20Road%20and%20Golden%20Highway%20intersection%20upgrade.pdf

Table 6.13 Existing, baseline, baseline + construction daily traffic volumes and corresponding road design standards

Road	2024 existing daily traffic volume	2029 baseline daily traffic volume	2029 baseline + construction daily traffic volume	Existing road width	Relevant design standard in accordance with proposed daily traffic volume	Will existing meet the design standard for proposed traffic?
Merotherie Road (between Golden Highway and Birriwa Bus Route South)	150	162	604	Varies but minimum 8.5 m unsealed	Minimum 7.2 m, up to 8 m wide seal	No
Birriwa Bus Route South (between Merotherie Road and site access)	10	11	453	Varies but minimum 5 m unsealed	Minimum 7.2 m wide seal	No

Note: According to Austroads, a minimum 7.0 m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles).

a Upgrade of Birriwa Bus Route South

An upgrade of Birriwa Bus Route South between the intersection of Merotherie Road and the proposed alternative access point will be required to facilitate project related traffic. The proposed upgrades have been carefully designed to avoid significant impacts on both biodiversity and heritage. ACEN has discussed the required upgrades with Mid Western Regional Council who generally support the design solution, which is:

- in relation to to the road desgin, roadside environment is to be considered
- the road design is to comply with Austroads guideline. Where there is a departure from the guideline, the road design needs to be supported by a Road Safety Audit (RSA)
- council wishes to review the draft design, RSA and any requested concessions before endorsing the final design package.

b Upgrade of Merotherie Road

As part of the approved CWO REZ Transmission Project (SSI-48323210), the Nework Operator is currently upgrading the Golden Highway/Merotherie Road intersection by providing a dedicated left and right turn bays. The Network Operator is also upgrading the relevant section of Merotherie Road to a 9 m seal width, comprising 3.5 m wide travel lanes and 1 m sealed shoulders on both sides. This intersection upgrade and road upgrade is expected to be complete before the commencement of the Birriwa soalr and BESS project.

c Road safety for Golden Highway/Merotherie Road intersection

The sight distances on Golden Highway from Merotherie Road have been estimated based on the line of sight, as shown in Figure 6.3. Based on the sight distance analysis, the sight distances to the left and right both meet the minimum requirement (300 m) as stipulated in Austroads (2023).

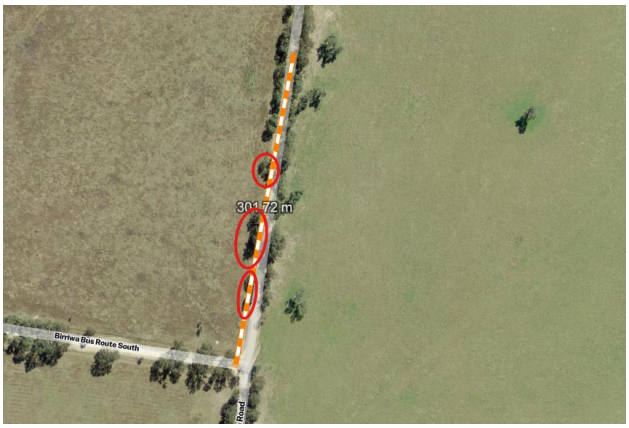
Sight distance to the left (300 m+)

Sight distance to the right (300 m+)

Figure 6.3 Sight distance from Merotherie Road to Golden Highway

d Road safety for Merotherie Road/Birriwa Bus Route South intersection

The sight distances on Merotherie Road from Birriwa Bus Route South have been estimated based on the line of sight, as shown in Figure 6.4. Based on the sight distance analysis, a number of mature trees may require removal on the western side of Merotherie Road as circled in Figure 6.4, as per the final design to the satisfaction of Mid-Western Regional Council.



A 300 m sight distance requirement to the left

A 300 m sight distance requirement to the right

Figure 6.4 Sight distance from Birriwa Bus Route South to Merotherie Road

6.4.3 Management and mitigation

The proposed traffic and transport mitigation measures to be implemented are in Table 6.14. Updates to the mitigation measures as a result of this modification are bolded.

Table 6.14 Traffic and transport mitigation measures

ID	Mitigation measures
TT1	A channelised right turn treatment (CHR) will be installed at the Castlereagh Highway/Barneys Reef Road intersection northbound approach.
TT2	Resurfacing and widening will be completed on Barneys Reef Road and Birriwa Bus Route South in compliance with Austroads rural roads design standards, and in further consultation with relevant authorities during subsequent phases of project design and assessment.
TT3	A detailed TMP will be developed in consultation with **CWCT**, Mid-Western Regional Council and Warrumbungle Shire Council, prior to the commencement of road upgrades and construction of the project. **The TMP will take into consideration the Network Operator's traffic management plan where relevant**. The TMP will include a Driver Code of Conduct addressing: • informing drivers about the school bus routes along Castlereagh Highway, **Golden Highway, Merotherie Road and Birriwa Bus Route South** • direction to avoid compression braking near residential receptors

ID	Mitigation measures
	• direction to avoid trips during school zone times (8.00 am to 9.30 pm and 2.30 pm to 4.00 pm) • in consultation with relevant councils and road authorities, install school bus signs at suitable locations along construction routes if necessary to warn heavy vehicle drivers of student drop-off and pick-up area • responding to local climate conditions that may affect road safety such as fog, dust and wet weather. The TMP will be prepared by suitably qualified persons in accordance with the TfNSW (2022) *Traffic Control at Work Sites Manual*.
TT4	**ACEN are committed to implementing traffic mitigation measures to minimise impacts on any part of the cycle trail that may be affected by project traffic. This could include:** • in consultation with the CWC Trail Inc, a signage plan will be prepared, highlighting the CWCT within and in the vicinity of the project • within the site induction and driver's code of conduct, the CWCT will be highlighted to increase awareness of cyclists' presence in the area • in site-specific circumstances, e.g. peak construction activities, a traffic controller may be required to manage the vehicular traffic and cyclists which is subject to site supervisor's safety assessment and discretion • **a dedicated phone number will be provided for CWCT users to call to confirm safe passage before using the trail during peak construction periods. This phone number will be listed on a sign approximately 1 km from the start of construction and on the CWCT website** • **safe pull over bays for bicycles will be identified along the construction route, which would move depending on the construction schedule** • **provision of speed management strategies.**
TT5	A permit will be obtained (from NHVR) to allow oversize or overmass vehicles to use the road network as part of construction.
TT6	ACEN will design up to three public road crossings to Mid-Western Regional Council's satisfaction, generally in accordance with the design considerations approved at the traffic committee on 17 June 2022.
TT7	A road maintenance program will be developed in consultation with the relevant road authorities to be undertaken during construction and will include route inspections of all the affected local roads. Any new road pavement damage which occurs to these roads during the project construction period from construction activities, which represent a potential traffic safety risk to the travelling public, will be restored to their pre-construction condition at the completion of construction.
TT8	**Project traffic will not use Golden Highway / Merotherie Road intersection or Merotherie Road until these have been upgraded as part of EnergyCo CWO Renewable Energy Zone Transmission project (Merotherie Energy Hub).**
TT9	**ACEN proposes to undertake the Merotherie Road/Birriwa Bus Route South Road intersection upgrade, and upgrade to Birriwa Bus Route South Road to the satisfaction of the Mid-Western Regional Council and in consultation with the Network Operator.**
TT10	**ACEN will upgrade the portion of Birriwa Bus Route South between Merotherie Road and the proposed alternative access point as per Mid-Western Regional Council's requirements.**

6.4.4 Conclusion

The modification seeks an increase in the number of project related vehicles by up to 30% (i.e. a total of 156 daily heavy vehicle 'trips', or 312 heavy vehicle 'movements'), and an alternative access route along Merotherie Road and Birriwa Bus Route South.

Road and intersection upgrades will be required to accommodate the increased traffic associated with the construction phase. EnergyCo will undertake the Golden Highway / Merotherie Road intersection upgrade and the Merotherie Road upgrade as part of the EnergyCo CWO REZ Transmission project. ACEN will undertake the Merotherie Road / Birriwa Bus Route South intersection upgrade, and upgrade to Birriwa Bus Route South, in consultation with Mid-Western Regional Council.

A traffic management plan (TMP), including a Driver Code of Conduct, will be prepared prior to commencement of road upgrades and project construction, which will incorporate traffic measures to be implemented throughout the project's construction period.

6.5 Noise and vibration

6.5.1 Introduction

A Noise and Vibration Impact Assessment (NVIA) has been prepared by EMM (2025d) and is provided in Appendix I. The key changes to the project proposed by the modification relative to noise are:

- increased area of panels, and therefore both construction and operational noise impacts have been considered
- increased operational area and capacity of the BESS at area B
- road traffic noise associated with the proposed alternative access route along Merotherie Road/Birriwa Bus Route South.

6.5.2 Existing environment

The existing environment remains consistent with that described in the EIS and Amendment Report for the project. Surrounding land uses are predominately rural and agricultural uses. Ambient noise levels would be controlled by natural elements and limited human activity including traffic and agricultural activities.

There is one associated receiver located within the proposed modification boundary of Lot 34/DP 750755. This residence has entered into a landholder agreement with ACEN.

Consistent with the NVIA prepared as part of the EIS (EMM 2022), the minimum background noise thresholds of the *Noise Policy for Industry* (NPfI, EPA 2017) have been adopted on the basis that land use is largely rural with limited traffic and industry. The minimum thresholds in the NPfI are:

- Day: 35 dB
- Evening: 30 dB
- Night: 30 dB.

6.5.3 Assessment criteria

There are no changes to the assessment criteria for non-associated residences as provided in the EIS and Amendment Report.

Where noise levels above the project noise trigger levels (PNTLs) are predicted, all feasible and reasonable mitigation are to be considered for the project to reduce noise levels towards the PNTLs, before any residual impacts are determined and addressed.

6.5.4 Impact assessment

i Construction noise

Construction noise levels have been predicted using a computer-generated model that calculates total noise levels at each assessment location from the concurrent operation of multiple noise sources. Predicted noise levels over a typical worst case 15-minute scenario have been modelled and assessed for comparison against the relevant noise management levels (NMLs). Plant and equipment items, sound power levels and quantities adopted in the noise modelling are provided in Appendix I.

Construction works will be undertaken during standard hours of 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday. Commissioning activities that are inaudible at non-associated residences may be carried out outside the approved hours, with written approval of the Planning Secretary.

The results of the modelling demonstrate predictions comply with the construction NML for all assessment locations during daytime standard construction hours, with the proposed modification predicted to have negligible or reduced change to noise impacts compared to that predicted in the EIS (EMM 2022) at the majority of assessment locations. The one exception is at R23, where noise impacts are predicted to be greater than those predicted in the EIS by 6 dB. However, the modified predicted noise level of 28 dB is 12 dB below the PNTL of 40 dB and is within the assigned limits of the project under the ICNG.

ii Construction vibration

As part of this modification, there are no proposed construction intensive activities within a distance of less than 100 m from the nearest sensitive receivers. As such, there is not expected to be any change in construction vibration impacts from the approved project.

iii Operational noise

Two locations for the BESS were modelled as part of the original NVIA (600 MW BESS at location A and/or B). However, this modification proposes the following scenarios:

- Scenario 1: 600 MW BESS at location A (as approved) and a 300 MW BESS at location B.
- Scenario 2: 900 MW BESS located across location B and into the remainder of Lot 34. Note, there is no BESS at location A.

Scenario 2 has been assessed and modelled for this modification. With regards to scenario 1, a 600 MW BESS at location A has been approved. Given the distance between operational infrastructure areas at location A and B, the addition of a 300 MW BESS at location B under scenario 1 is not expected to result in any change in noise levels near location A and therefore has not been modelled within this report.

During operation, noise emissions from the BESS facility will primarily be related to fixed plant and equipment including tracker motors, battery cubicles, inverters, light vehicle and heavy vehicle (LV/HV) transformers and HV transformers. The results of the modelling demonstrate predictions of compliance with the PNTLs for all assessment locations from the BESS facility (including the increased capacity).

iv Road traffic noise

There is one non-associated residence within 600 m of the segments of Merotherie Road and Birriwa Bus Route South that will be used by project-related vehicles to access the development footprint (R32, off Merotherie Road). Based on proposed traffic volumes on these roads, traffic noise levels at this closest non-associated receiver are predicted to be below the relevant criterion of 50 dBA.

Road traffic noise level predictions for peak construction traffic on Golden Highway were carried out. Consideration was given to noise levels at distances reflective of the nearest residences to the Golden Highway in the vicinity of the turn-off to Merotherie Road (approximately 250 m from the road edge). External daytime noise was predicted to be below the daytime limits for arterial roads and highways, and the relative increase was predicted to be below 2 dB, in compliance with the Road Noise Policy (DECCW 2011).

6.5.5 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential noise and vibration impacts. No additional mitigation measures are required for the modification.

6.5.6 Conclusion

Noise emissions for the modified project were modelled and identified that construction noise, operational noise emissions and road traffic noise will comply with all relevant criteria. The noise management measures identified in the consent conditions are considered appropriate and no additional mitigation measures are required.

6.6 Surface water, flooding and erosion

6.6.1 Introduction

A qualitative water resource assessment has been prepared to assess the impacts of the proposed modification on watercourses, downstream systems and associated groundwater resources. Alluvium prepared a water quality impact assessment (WQIA) (2022a) and hydrology and flood risk assessment (HFRA) (2022b) for the EIS. The studies concluded that the approved project will not result in significant impacts to surface water or groundwater resources in the local area.

6.6.2 Existing environment

i Climate

Using the Köppen classification scheme, the study area is situated in the temperate zone, and the climate is characterised by hot, dry summers and cold winters. Maximum temperatures typically exceed 30°C during summer and fall to around 15°C during winter; minimum temperatures are typically around 16°C during summer and below 5°C in winter. Average annual rainfall of approximately 610 millimetres per year (mm/yr) is far exceeded by annual pan evaporation of around 1,700 mm/yr based on data from Bureau of Meteorology (BoM 2024) (No. 64009) Dunedoo Post Office Station, located approximately 16.5 km north-west of the project. This general climatic condition results in low surface water availability and watercourse flow regimes that are typically ephemeral in nature.

Using the BoM seasonal rainfall mapping (based on data 1900 to 1999), the study area is situated in the uniform rainfall zone which does not follow a strongly seasonal pattern. However, analysis of mean monthly climate data indicates that rainfall is typically higher in summer, with a mean monthly rainfall of 60 mm in summer and 45 mm in winter. Potential evaporation (PET) follows the annual temperature pattern and is higher during the summer months and lower during winter.

ii Catchment and watercourses

The project is in the Macquarie-Bogan River catchment and the project area is traversed by several northerly flowing drainage lines associated with Huxleys Creek and White Creek (see Figure 6.5). Downstream of the site Huxleys Creek flows into Bulliroy Creek before joining the Talbragar River approximately 4 km north-west of the project. White Creek joins the Talbragar River approximately 3.5 km to the north of the site.

These creek systems form an ephemeral network of typically northerly flowing and heavily modified drainage lines that rise to the south of the project. Upper catchment areas drain the forested foothills located between Birriwa and Barneys Creek, and lower catchment areas are characterised by low-lying wide floodplains extensively cleared for cropping, grazing and agricultural purposes.

Huxleys Creek and its main tributary Browns Creek drain the western half of the project area. An unnamed tributary of Huxleys Creek drains the central part of the project area, and White Creek and tributaries drain the eastern half. The accommodation facility area located in the south-east corner of the approved project area are located in an area drained by an easterly flowing unnamed tributary of Cockabutta Creek. This tributary has an existing crossing outside the approved project area associated with Merotherie Road.

iii Slope and rainfall erosivity erosion hazard analysis

The modification area generally has a low erosion hazard based on mean slope (2.3%), though there are areas of steep slopes that will present a high erosion hazard (maximum slope of 32%). These areas are generally restricted to incised channels where several White Creek tributaries converge at the centre of the modification area. These areas have been avoided by the project design as restricted development areas, which would reduce areas likely to be subject to higher erosion potential.

Erosion and sedimentation have been considered further in the Soils, Land and Agricultural Impact Assessment (Minesoils 2025) and summarised in Section 6.7.3iii.

iv Geomorphology

The NSW River Styles Database (DPIE 2019c) provides an overview of geomorphic watercourse character, behaviour, condition and recovery potential throughout NSW.

Huxley Creek and Browns Creek are both characterised as channelised fill, in generally poor condition with low recovery potential. Where it runs through the approved development footprint and the modification footprint, White Creek is characterised as low sinuosity fine grained and in generally poor condition with low recovery potential. The documented watercourse conditions indicate a degraded system.

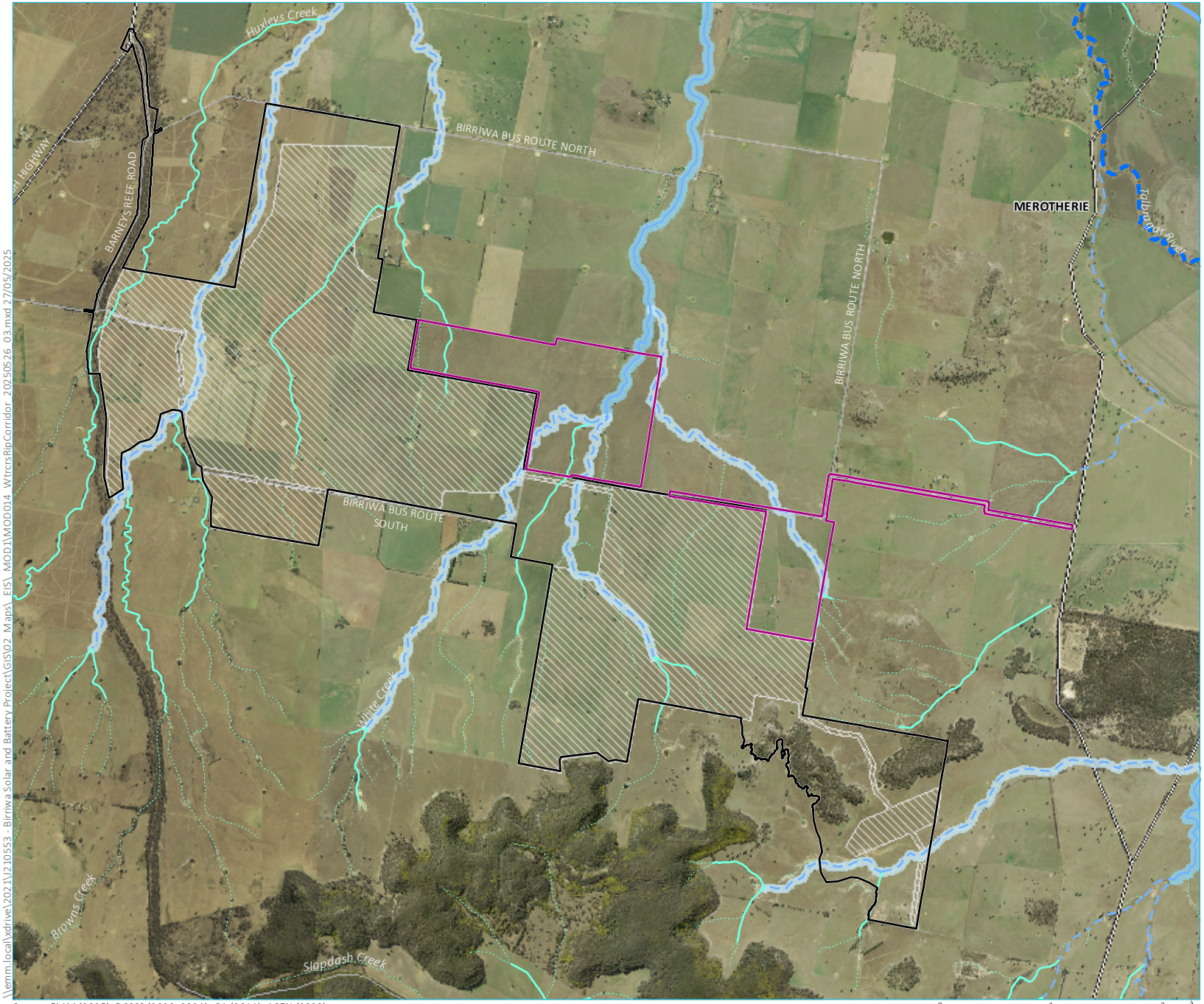
The waterways within the approved development footprint were previously assessed to largely lack wooded riparian vegetation which may support aquatic and terrestrial species and provide in-stream shading (EIS 2022) and potentially provide bank stabilisation. Some riparian remnants associated with 3rd order and above tributaries of White Creek are restricted to land parcels located to the east and centre of the modification footprint. Consistent with approved project areas, these riparian remnants have been excluded from the development footprint via riparian corridor buffers and expansion of the restricted development areas along these higher order reaches. Hence additional impacts to riparian vegetation associated with the modification will be avoided with the exception of that required for the provision of fencing, access and electrical reticulation (i.e. private internal access roads and electrical cables).

As described in Section 6.1.1iii, aquatic habitat within these creeks is typically limited due to the lack of rocky substrate to provide refuge for aquatic species. Intermittent pools occur which provide aquatic vegetation in the form of sedges, rushes and a limited diversity of macrophytes.

v Flooding

The hydraulic flood modelling presented in Alluvium 2022 provides an assessment of flood risk in both the approved project and proposed modification areas. The assessment concluded that the approved project will not store or divert flow and will not alter the hydraulic function in floodways and therefore will not change the nature of flooding on site, which is predominantly experienced as overland sheet flow. The study also concluded that no increase in runoff outside the development footprint is anticipated and floodplain storage is preserved (Alluvium 2022b).

Flood risk in the modification area is considered comparable to adjacent areas within the approved development footprint for events up to the 1% annual exceedance probability (AEP) with existing flood conditions (Figure 6.6 and Figure 6.7). Flood depths of greater than 0.3 m that occur in the modification area are generally restricted to riparian corridors associated with 3rd order and higher watercourses.



KEY

- Modification area
- Approved project area
- Approved development footprint

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order
- River corridor buffer (3rd order)
- River corridor buffer (4th order)

Existing environment

- Major road
- Minor road

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2023)

0 1 2 km

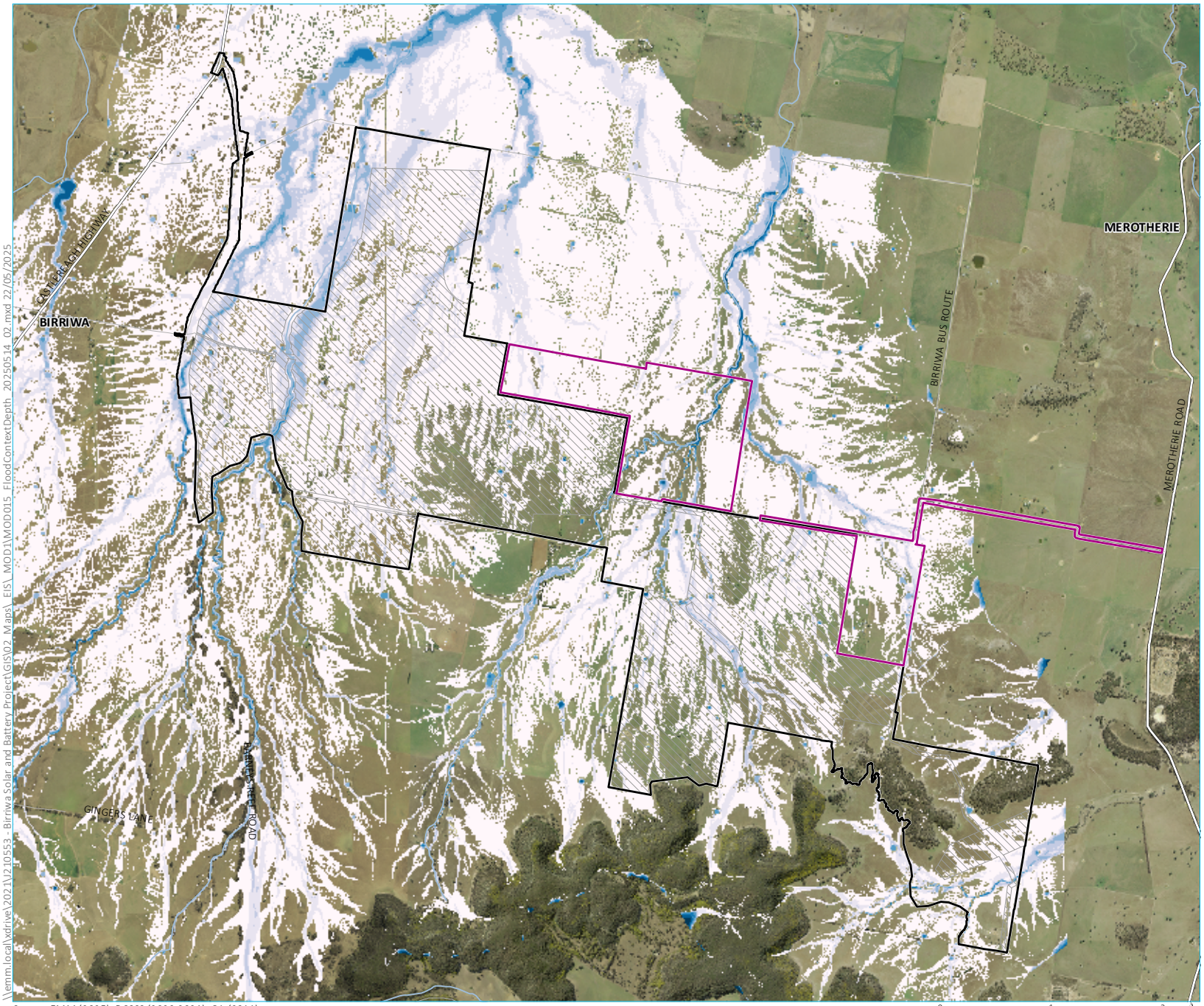
GDA 1994 MGA Zone 55

N

Water courses and riparian corridor buffer distances

Birriwa Solar and BESS Project - Modification
Figure 6.5

EMM creating opportunities



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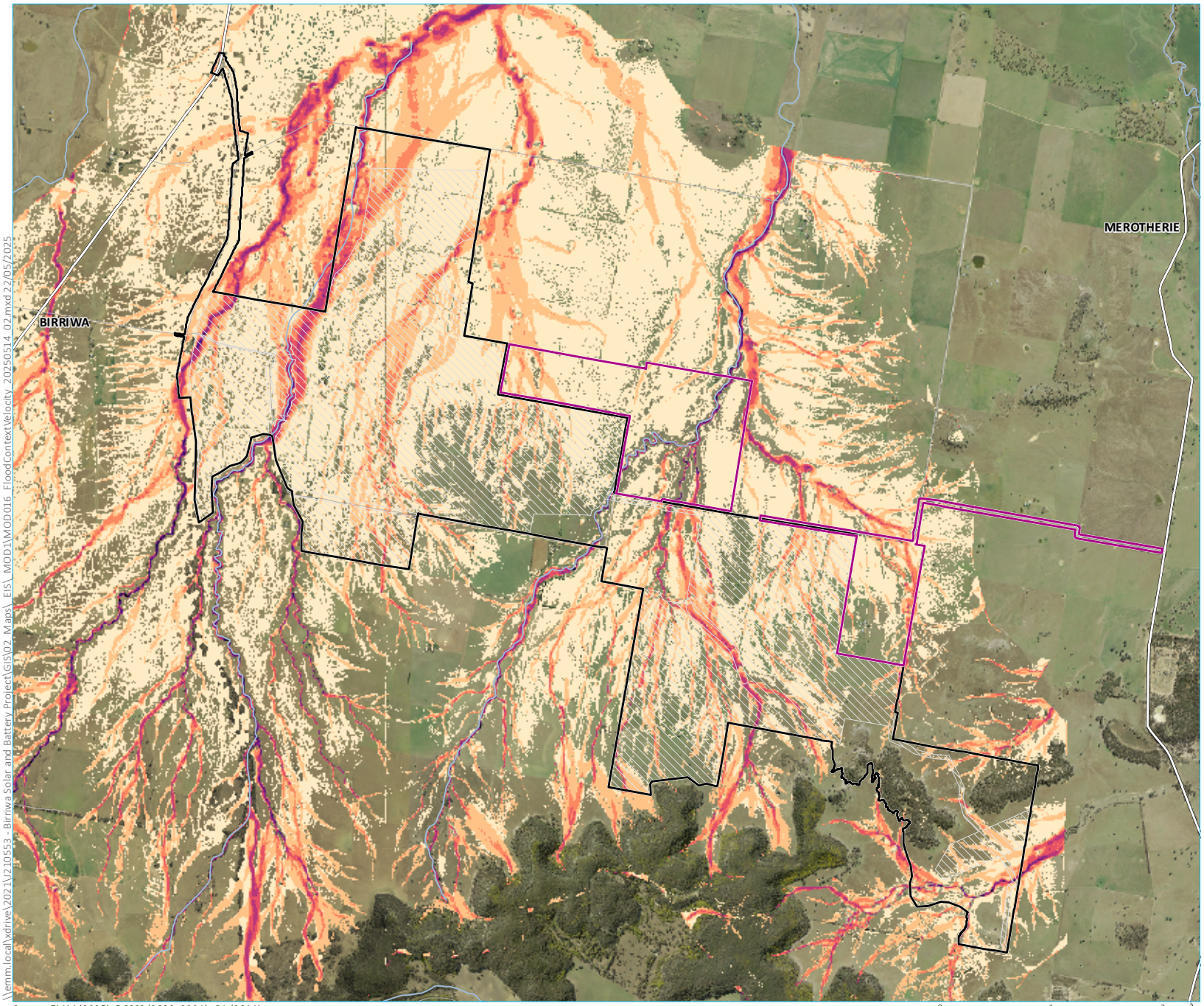
Source: EMM (2025); DCSSS (2023,2024); GA (2011)

Flood depth 1% AEP

Birriwa Solar and BESS Project - Modification
Figure 6.6

EMM
creating opportunities



KEY

- Modification area
- Approved project area
- Approved development footprint

Existing environment

- Major road
- Minor road
- Watercourse

Maximum water velocity (m/s)

- < 0.25
- 0.25-0.5
- 0.5-0.75
- 0.75-1
- 1-1.5
- 1.5-2
- 2-2.5
- 2.5-3
- > 3

Flood velocity 1% AEP

Source: EMM (2025); DCSSS (2023, 2024); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 55

N

Birriwa Solar and BESS Project - Modification
Figure 6.7

EMM
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vi Surface water quality

The water quality impact assessment (WQIA) (Alluvium 2022a) provides an assessment of changes to water quality for the approved project. The Source catchment modelling results predict a negligible rise in annual total nitrogen (TN) loads (1%), and a decrease in annual loading of total phosphorous (TP) (-4%) and total suspended solids (TSS) (-4%) associated with the approved project.

This result is likely to be conservative based on the model assumptions considered including the pollution attributes assigned to different land use categories in a developed scenario. It is expected that with the implementation of the appropriate management measures the modification is not anticipated to have negative water quality impacts. Any additional risk of impacts to surface water quality associated with the modification are considered minor and manageable under existing and approved project management and mitigation measures.

There are no new water quality monitoring datasets available for the watercourses within or in close proximity to the modification area. It is expected that White Creek and Huxley Creek are likely to have water quality characteristics typical of an upland watercourse in accordance with the default guideline water quality values under ANZG (2018). Although it was noted that due to existing and historical farming and land management practices, removal of riparian vegetation, and the soil conditions in the surrounding area and upstream catchment, water quality levels may reflect some land degradation and be representative of water quality typical of stock or primary industries.

Water quality monitoring undertaken for the Macquarie-Castlereagh catchment, reported in Macquarie-Castlereagh Water Resource Plan Surface water resource description (DPIE 2020c) provides some insight to historical water quality issues in the regional catchment. The report suggests that water quality at the gauging station on Talbragar River at Elong Elong (Station 421042) between the years of 2010 to 2015 was generally poor when assessed against water quality parameters including nutrients, turbidity and total suspended solids (TSS), electrical conductivity (EC), dissolved oxygen (DO) and pH. Water quality problems within the catchment have been historically associated with landform adjustment and/or degradation and the alteration of natural flow regimes.

vii Groundwater resources and consumptive use

The project is located in the Lachlan Fold Belt Murray Darling Basin (MDB) groundwater source. The Lachlan Fold Belt consists of strongly deformed/metamorphosed marine sedimentary rocks, cherts, siltstones and mafic volcanic basalts and rhyolites, and plutonic granitic intrusions. The surface geology (based on regional mapping and not specific investigation activities undertaken within the study area) comprises of some Quaternary-aged alluvium associated with Huxley Creek, which becomes more extensive to the north in association with the Talbragar River. Away from these thicker sequences colluvium is extensive across the project area. To the south basaltic intrusions are present and erosion has reduced these rocks into peneplains, plateaus and valley fills at the base of the extended ridgeline formation of Barneys Reef.

Groundwater residence time within the alluvium is expected to be relatively short, with ongoing discharge to riparian areas and watercourses. Groundwater flow local to the study area is likely to follow topographic relief towards drainage lines and generally north towards Talbragar River.

A total of 14 groundwater bores are registered within the BoM's National Groundwater Information System within a 2 km buffer of the approved project area (Figure 6.8). These bores range in depth from 3.7 to 114.3 metres below ground level (mbgl) with an average depth of 58 mbgl. Eleven of the bores are listed as water supply bores. Nine of the bores have unknown status, one is proposed, one is removed, and one is abandoned. The two functioning bores are constructed to 3.7 and 50 mbgl. Unknown bores GW006099.1.1 (53.3 mbgl) and GW052517.1.1 (88.2 mbgl) are located inside the approved project area, and proposed bore GW800590.1.1 (72 mbgl) is located inside the modification area.

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2023)

Groundwater bores

Birriwa Solar and BESS Project - Modification
Figure 6.8

EMM
creating opportunities

6.6.3 Impact assessment

i Catchment and watercourses

The land parcels associated with the modification are drained by White Creek and the unnamed tributary of Huxleys Creek. One of the modification land parcels located at the centre of the project is intersected by a 4th order reach of White Creek where maximum setback distances will apply. A 3rd order tributary of White Creek also traverses the eastern portion of the modification area (proposed for additional BESS infrastructure) and setback distances will also apply, as shown on Figure 1.3.

ii Slope and rainfall erosivity erosion hazard analysis

This assessment confirms no significant changes to erosion hazard are anticipated under the modification. Erosion and sediment control measures would be implemented to minimise the potential for erosion and sedimentation during construction. Once construction has been completed, the ground cover vegetation would be progressively re-established and therefore significant impacts to soils are not expected.

Additional impacts to soils associated with the modification are considered minor and manageable under existing and approved project management and mitigation measures outlined in the EIS and the Soil, Land and Agriculture Impact Assessment (Minesoils 2025).

iii Geomorphology

The modification will avoid placement of infrastructure within non-minor watercourses with the exception of that required for the provision of fencing, access and electrical reticulation and therefore there are no significant changes to geomorphology anticipated. A number of watercourse crossings may be required with the potential impacts to geomorphology associated with these considered minor and manageable under existing and approved project management and mitigation measures.

iv Flooding

The modification is unlikely to directly increase erosion or sediment loading (through increased velocity and scour) to watercourses passing through the development footprint. The volume of runoff and the velocity of flow will not change significantly, as the vegetation is expected to provide similar levels of hydraulic roughness in the catchment. The modification does not include any additional areas associated with higher flood hazard identified along Huxleys Creek, which is already being avoided by the project as this has been defined as a restricted development area.

No significant changes to flood risk are anticipated under the modification. The flood depth for the 1% AEP does show some flood risk to the operational infrastructure areas (including BESS locations) up to 0.5 to 1 m maximum water depth in parts generally associated with drainage lines and the tributary of White Creek. Impacts to flood risk associated with the modification are considered minor and manageable. Management measures are provided in Section 6.6.4.

v Surface water quantity

The WQIA (Alluvium 2022a) provided an assessment of changes to water quantity and water quality for the approved project. The source catchment modelling results predicted a slight increase (5%) in long-term flows discharged from the study area for the approved project.

Rainfall runoff characteristics for solar arrays are expected to emulate areas of grazing and so are assigned the same runoff characteristics in the Source model. Rural residential land use by comparison has a lower runoff potential, and urban land use has a high runoff potential. The operational infrastructure associated with the substation, demountable and permanent offices, and BESS are assigned urban land use runoff characteristics i.e. high runoff potential. Therefore, the primary reason for the predicted increase in catchment runoff resulting from the approved development is attributed to the decrease in rural residential land use and an increase in operational infrastructure (Alluvium 2022a).

The modification does not propose to install any new operational infrastructure which would result in additional increases in long-term flows predicted by modelling. The current land use in the modification area is a mixture of cropping, grazing and rural residential, consistent with the pre-development land use in adjoining land parcels within the approved development footprint.

The maximum expansion area proposed under the modification represents a 17 increase to the approved project area (1,535 ha). Hence a proportional increase in the long-term flows discharged from the study area would be an additional 1% (6% in total).

Incremental changes to downstream flow regimes are considered consistent with the approved project and will not significantly impact adjacent licensed water users or basic landholder rights during construction or operation. Any additional risk of impacts to surface water quantity associated with the modification are considered minor and manageable under existing and approved project management and mitigation measures.

vi Water use

The Amendment Submissions Report (EMM 2023b) outlined the options being investigated that are available to the project for sourcing water to meet the required demand include the following:

1. Purchase water from commercial suppliers of treated wastewater, trucked to the site.

2. Source the water from the regulated Cudgegong River (downstream Windemere Dam) – a water access licence (WAL) would need to be established and permanent water entitlement or temporary allocation purchased from the market. In addition, a water supply works and use approval would need to be granted to install the necessary pump/pipe and infrastructure.

3. Source water from the existing farm dams within the study area for non-potable construction purposes, to minimise the use of imported water and in accordance with the harvestable rights provisions. There is likely to be limited water supply and security of supply associated with this option.

4. Use recycled water where practicable from other industrial facilities, such as concrete batching plants in the region.

5. Source water from existing groundwater bores via purchasing WAL entitlement or allocation available on the market or entering into an agreement with relevant landholders.

6. Install new groundwater bores within or near to the project site and purchase a WAL entitlement or allocation from the market to use this water for the project.

7. A combination of the above options.

Water sources will be determined in consultation with suppliers and landholders and be subject to availability. ACEN is in discussion with landholders with existing WALs and bores on their properties to supply water to the project.

Water requirements for the existing project are anticipated to be:

- construction (over a 28-month construction period): 323 megalitres (ML)
- operations (assuming a 30-year operational life and an allowance of 1 ML for fire protection): 225 ML.

Given the increased project area proposed under the modification, the following increases to water requirement for the project have been predicted:

- construction (assuming 28-month construction period): 392 ML (+21% compared to approved project)
- no change in operational water demands.

vii Groundwater resources

Despite the presence of a shallow bore, the depth distribution of bores in the area does not suggest the presence of a productive, laterally extensive shallow aquifer. The approved project is not anticipated to intersect groundwater or impact on groundwater dependent ecosystems, with no additional changes to groundwater infiltration or extraction proposed as part of the modification. The deepest infrastructure to be installed would be the steel piles, to a depth of around 1 to 3 m, which is likely to be above the regional groundwater system. Any localised interception of groundwater will be monitored and managed within the construction water management system. Where interception exceeds 3 ML, a groundwater licence will be required.

6.6.4 Management and mitigation

The project identifies environmental and land use constraints associated with water resources that inform the design of the development footprint. These avoidance areas ensure a high level of protection of environmental values, primarily by:

- minimising the number of proposed waterway crossings
    - watercourse crossings will be designed generally in accordance with *Policy and Guidelines for Fish-Friendly Waterway Crossings* (DPI 2003), *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI 2013) and *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018)
- maintaining appropriate buffers for riparian corridors
    - suitable riparian corridor buffers have been adopted to protect watercourse function and values and preserve vegetated riparian zones
- avoiding areas with higher flood hazard.

The mitigation measures outlined in the EIS and Amendment Report largely remain relevant to the modification. Amendments to the mitigation measures are provided in Table 6.15.

Table 6.15 Water resources mitigation measures

ID	Mitigation measures
FLO4	BESS components will be located on pad areas and aligned with local overland flow paths to prevent flows being redirected. **Where flood prone areas cannot be avoided in the operational infrastructure area and BESS locations, it is recommended that BESS pads would be flattened and constructed with a freeboard of 0.3 m from the 1% AEP flood event height.**

6.6.5 Conclusion

The modification is not expected to have a significant impact on water resources in the local area. Riparian corridor buffers have been adopted in the project design to protect watercourses. There may be some minor flood risk to the operational infrastructure areas in parts generally associated with drainage lines and the tributary of White Creek. These risks are considered to be minor and manageable with implementation of a freeboard allowance when constructing BESS pads and a clean water diversion around the development in operational infrastructure areas.

6.7 Land use, soils and agriculture

6.7.1 Introduction

A Soil, Land and Agriculture Impact Assessment was prepared by Minesoils (2025) for the modification area in accordance with relevant guidelines including *Land and Soil Capability Assessment Scheme* (LSC Scheme) (NSW OEH 2012), *Large-Scale Solar Energy Guidelines* (LSSE Guidelines) (DPE 2022a), and the NSW Department of Primary Industry's *Land Use Conflict Risk Assessment Guide* (DPI 2011). The Soil, Land and Agriculture Impact Assessment is provided in Appendix J.

6.7.2 Existing environment

i Site characteristics and land use

The modification area contains extensive areas subject to modified and improved pastures, with a varying range in ground cover level. Very few isolated trees occur sporadically throughout the modification area.

The modification area is within a generally flat to slightly undulating landscape. Sheet and gullying erosion was observed throughout the modification area, indicating dispersive soils, with the most extreme gullying observed along White Creek.

The modification area and surrounding areas are dominated by farming land uses with associated dwellings common. The modification area is subject to livestock grazing on modified pastures and fodder crops, supporting sheep and lambs, and Angus cattle and calves, which are grazed on rotation for breeding and fattening.

ii Land and soil capability

Land capability, as detailed in LSC Scheme, is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources. The NSW regional based maps of LSC indicate the modification area consists of LSC class 5: moderate low capability land, which has high limitations for high impact land uses. These limitations need to be carefully managed to prevent long term degradation.

The soil survey undertaken for the modification identified two dominant soil mapping units (see Figure 6.9). Soil Unit 1 covers approximately 231 ha and is comprised of Sodosols which generally have low fertility and high erodibility. Soil Unit 2 covers approximately 26 ha and is comprised of Chromosols which generally have moderate fertility and low erodibility.

Site observation and soil survey results indicate that there are significant erosion (sheet and gully) and sedimentation issues across Soil Unit 1, and a high risk of dispersion. Erosion and sedimentation issues were not evident in Soil Unit 2, and there is a negligible dispersion risk.

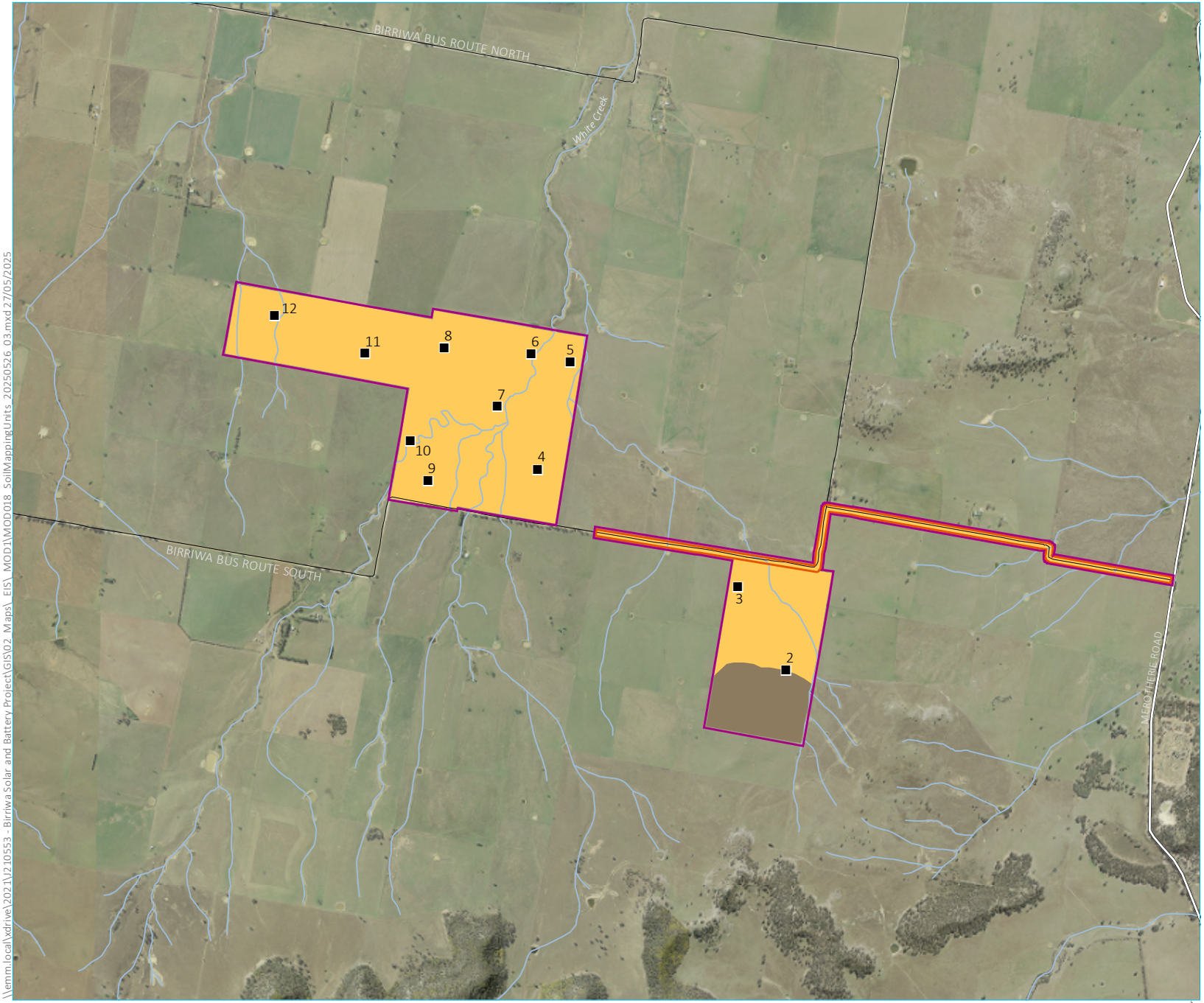
There was no evidence of acid sulfate soils (ASS) across the modification area.

The verified LSC classes present within the modification area are shown on Figure 6.10 and include:

- LSC class 4: moderate capability land – covering approximately 37 ha
- LSC class 5: moderately low capability land – covering 220 ha.

LSC class 4 land has moderate to high limitations for high-impact land uses and will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. The defining constraints to this land class within the modification area are water erosion, soil structure decline, soil acidity, soil depths and waterlogging.

LSC class 5 land has high limitations for high-impact land uses, which will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The defining constraints to this land class within the modification area are water erosion and soil acidity.



KEY

- Modification area
- Birriwa Bus Route South (Assessed by ELA)
- Soil survey location

Soil unit

- Soil Unit 1 - Sodosols
- Soil Unit 2 - Chromosols

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 1 2 km

GDA 1994 MGA Zone 55

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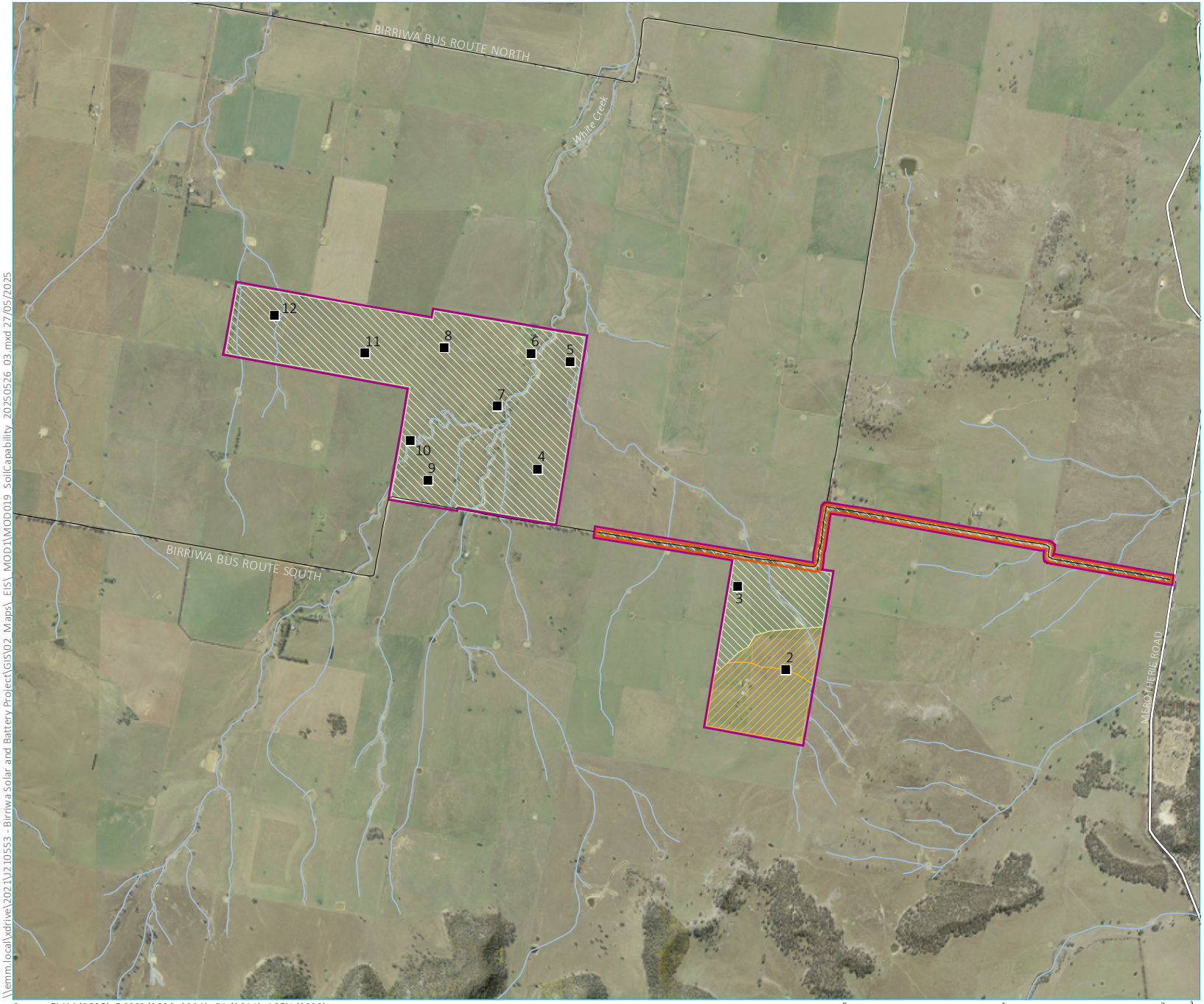
Soil mapping units

Birriwa Solar and BESS Project - Modification

Figure 6.9

EMM creating opportunities



KEY

- Modification area
- Birriwa Bus Route South (Assessed by ELA)
- Soil survey location

Verified land and soil capability

- LSC Class 4
- LSC Class 5

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 1 2 km

GDA 1994 MGA Zone 55

N

Verified land and soil capability

Birriwa Solar and BESS Project - Modification

Figure 6.10

EMM creating opportunities

6.7.3 Impact assessment

i Land used for agriculture

The modification will be undertaken on an area of up to 257 ha of land that is currently subject to agriculture land use. ACEN will continue to explore opportunities with landholders to support co-location of livestock grazing with the solar project operation.

It is anticipated that agricultural land use will be re-established over the entire modification area at the time of decommissioning and rehabilitation (unless otherwise agreed with the landowner and/or regulatory authorities). There will be no permanent decrease in land available for agriculture use.

Current agricultural land use immediate to the modification area, and in the broader project locality, will not change as a result of the proposed modification, and there will be no fragmentation or displacement of existing agricultural industries.

ii Agricultural productivity

The modification will result in the temporary removal of potential primary productivity of up to $85,033 per year for the duration of the project. Due to the minimal disturbance to the landform, following the life of the project, all land removed from agriculture will be returned to agricultural use (subject to agreement with landholders), with anticipated mitigation controls available to ensure no reductions in land and soil capability. Agricultural enterprises can then re-commence at an equivalent agricultural productivity.

Agricultural productivity of land outside of the modification area will not be affected by the proposed modification as the associated agricultural resources will not be affected. Therefore, the proposed modification will not negatively impact any existing agricultural enterprise outside of the modification area.

Due to the limited reduction in agricultural activity as a result of the project, and given the nature and scale of the established agricultural industries within the region and wider state, there will be no impact to critical mass thresholds of agricultural enterprises needed to attract and maintain investment in agricultural industries and infrastructure.

iii Agricultural resources

Over the majority of the modification area, soils will be subject to minor disturbance as part of the construction or maintenance of solar arrays and electrical cabling trenches. In areas where earthworks are necessary for construction of the BESS, other site facilities or access tracks, soils will be subject to higher impact disturbance.

All soil that is proposed to be disturbed as a result of the proposed modification will be stripped and re-used during construction and/or rehabilitation in order to mitigate long term effects on soil resources during operation.

Overall, the impacts to the soils of the solar array component of the modification area are expected to be largely minimal and temporary. The impacts to the soils of the BESS component of the modification area are expected to be heightened due to the nature of earthworks expected to be required. However, these can also be considered temporary given the available mitigation measures.

It is anticipated there will be no permanent impacts on LSC classes within the modification area as a result of the proposed modification

There is a high potential risk for dispersion where sodic soils (i.e. Soil Unit 1: Sodosols) are disturbed by construction efforts within the modification area. However, due to the very gently undulating nature of the landform, the risk of erosion and sedimentation impacts on agriculture as a result of the project is low.

The proposed modification will have a negligible impact on local and regional agricultural infrastructure. There will be negligible impacts on the road and rail network that connects the agricultural industry to markets, services and suppliers.

iv Other potential impacts on agriculture

Additional weeds, as well as pest species, could be inadvertently brought into the modification area with imported materials, machinery, or allowed to invade naturally through removal or damage of current vegetation and cessation of grazing activity.

It is considered that biosecurity risks as a result of the proposed modification are low and impacts to agricultural resources and enterprises within the region are unlikely to be experienced.

Construction and decommissioning activities have the potential to increase dust through movement of traffic on unsealed roads on dry days, vegetation removal, and localised dust emissions generated by land disturbance.

During operations, ongoing maintenance of infrastructures and land will result in very minor, localised vehicle emissions and generation of dust from vehicles travelling along unsealed internal access tracks.

The roads in proximity to the project are anticipated to experience an increase in traffic volumes during the peak construction period. However, the traffic impacts of the proposed modification are not likely to have consequences on agricultural enterprises within the project locality.

Noise levels during construction and operation are predicted to comply with noise criteria. Generally, agriculture is only impacted by noise when constantly high noise levels or sudden loud noise leads to a decrease in animal production through increased livestock stress. Noise levels on non-associated properties adjacent to the project are not predicted to exceed levels known to impacts cattle. As such, livestock and other agricultural resources are unlikely to be impacted by noise due to the project.

v Cumulative agricultural impacts

The proposed modification has the potential to generate cumulative impacts with the approved project, as well as other existing, approved or proposed developments in the region, which are numerous and detailed in the EIS (EMM 2022) and this modification report for the project. These generally consist of other renewables developments within the REZ.

In the context of agriculture, increased cumulative impacts including changes to land used for agriculture, localised productivity, secondary productivity and some agricultural support services are likely to be experienced. This will be a result of agriculture land use being inhibited by landform modification and infrastructure, such as the development footprints for mining leases, BESSs, and solar farms. However, given the nature and scale of the established agricultural industries within the region, significant impacts to critical mass thresholds and regional agricultural infrastructure are unlikely to occur in the foreseeable future.

On a broader scale, the cumulative risk to agricultural land and productivity across NSW because of large-scale solar development is estimated to be very low (DPE 2022). The Australian Energy Market Operator estimates that NSW will need approximately 20,000 MW of large-scale solar generation by 2050. This would require approximately 40,000 ha of land or only 0.06% of rural land in NSW. Even in the highly unlikely scenario that all of NSW's solar generation were located on important agricultural land (this land covers around 13.8% of the state and is 6 to 7 times more agriculturally productive than the remaining 86.2% of the state) only 0.4% of this land would be required (DPE 2022).

6.7.4 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential impacts to land use, soils and agriculture, as summarised in Table 6.16. No additional mitigation measures as a result of the modification are required.

Table 6.16 Land use, soils and agriculture mitigation measures

ID	Mitigation measures
LR3	• Agriculture land use will be re-established over all agricultural land removed from agriculture at the time of decommissioning (unless otherwise agreed with the landowner and/or regulatory authorities). • The modification area will be returned to an approximately equivalent potential agricultural productivity following the project via soil management and LSC class reinstatement. • Stock fences, dams and irrigation infrastructure to be reinstated during decommissioning to suit post-project land use as required.
LR4	• All soil that is proposed to be disturbed as a result of the proposed modification will be handled in accordance with the SWMP which will include soil management measures relating to soil stripping, stockpiling, respread/reuse, and land rehabilitation. This will inform the construction environmental management plan (CEMP), operational environmental management plan (OEMP) and a decommissioning and rehabilitation plan. • All disturbed land within the modification area will be returned to an equivalent LSC class following the end of life for the project, through site rehabilitation and good soil management practices in accordance with the surface water management plan (SWMP) prepared for the project. • All soil resources within the modification area are to be managed throughout construction, operation and decommissioning phases of the project in accordance with a SWMP which should include erosion and sediment control recommendations.
LR5	Pest species will be managed in accordance with a detailed protocol relating to weed and pest control.
LR6	Biosecurity will be managed in accordance with a detailed protocol relating to biosecurity.

6.7.5 Conclusion

The modification will be undertaken on an area of up to 257 ha of land that is currently subject to agriculture land use. Following decommissioning and rehabilitation, it is expected that there will be no permanent decrease in land available for agriculture use.

6.8 Social

A Social Impact Assessment (SIA) has been prepared by EMM (2025e) and is provided in Appendix K. The SIA was prepared in accordance with the *Social Impact Assessment Guideline for State Significant Projects* (SIA Guideline 2023) (DPE 2023c), the *Technical Supplement: Social Impact Assessment Guideline for State significant Projects* (SIA Technical Supplement 2023) (DPE 2023d), and the *Cumulative Impact Assessment Guidelines for State Significant Projects* (DPE 2022f).

6.8.1 Existing environment

The existing environment remains consistent with that described in the EIS and Amendment Report for the project.

6.8.2 Impact assessment

Potential social impacts have been assessed based on the change to, or the perceived change to, the social and biophysical environment as understood through the project. These include benefits (i.e. positive social impacts) and negative social impacts.

The key potential social impacts and benefits are summarised in Table 6.17. The assessment uses the terms unmitigated and mitigated when referring to negative impacts, and un-enhanced or enhanced when referring to positive impacts. Detailed discussion of all identified potential impacts and the risk rating framework adopted for assessment of potential social impacts are provided in Appendix K.

Table 6.17 Summary of social impacts and benefits

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Project planning					
Lack of trust in decision-making systems The modification may negatively affect existing community sentiment associated with a lack of trust in decision-making systems Affected parties: Residents of the local area Extent: Local area					
Decision-making systems D01	Local stakeholders engaged expressed an inability to distinguish between projects in the local area. EnergyCo's CWO transmission line project is situated adjacent to the project site and has commenced construction, bringing this project front of mind for all landholders and nearby neighbours engaged for the modification. Consultation was perceived to be a 'waste of time' as feedback was not being considered and changes were not made to the project, or have not been communicated to stakeholders.	Unmitigated: Medium Mitigated: Medium	Medium	Ongoing engagement with key local stakeholders to provide updates on proposed mitigations and design considerations. In addition to mitigations proposed, the NSW government and particularly EnergyCo and the Network Operator have a role in ensuring that approval processes sufficiently consider impacts on communities, per relevant regional plans and strategies.	Medium
Pre-approvals and construction					
Health and wellbeing impact due to project related stress and anxiety The modification may negatively affect existing community sentiment associated with stress and anxiety related to the project Affected parties: Associated and non-associated landholders and broader communities of the local area Extent: Local area					
Health and Wellbeing HW05	During 2025 engagement, frustration was expressed by several stakeholders relating to mitigations proposed for an alternate CWCT route and a perceived lack of progress on consideration of these mitigations. Stress relating to a perceived lack of updates regarding project changes was noted by several local stakeholders. A lack of coordination between proponents was noted as a source of frustration.	Unmitigated: Medium Mitigated: Medium	Medium	ACEN has engaged and will continue to engage in frequent and tailored communication with associated and non-associated landholders. This will ensure individuals are kept informed of the project and provided with an opportunity to ask questions or raise issues and concerns.	Medium

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Construction					
Accessibility of community infrastructure and services Affected parties: Landholders, residents of the local area, workforce Extent: Local area					
Accessibility A03	With the proposed modification it is anticipated there will be up to 650 non-local project workers accommodated on site during the construction phase of the project. During 2025 engagement, it was noted that there are no GP services in Gulgong. However, stakeholders noted that the addition of 150 workers would not change the demand for health services as medical services will be provided onsite. Change in the demand for emergency services by the project is considered negligible.	Unmitigated: Medium Mitigated: Low	Medium	Provision of onsite medical services, and recruiting staff from urban areas, as well as communicating with key stakeholders, and advocating for a strategic approach to management of cumulative demand.	Low
Livelihood benefit for enhanced employment opportunities for underrepresented groups Affected parties: Underrepresented groups, including youth, people over 65, people with a disability, Aboriginal and Torres strait Islander People Extent: Local and regional area					
Livelihoods L02	There are 2,736 residents recorded in the regional area identifying as Aboriginal and/or Torres Strait Islander, The modification proposes an additional 30% construction workers, or 150 workers. As such, there is potential for increased livelihood benefit relating to employment opportunities for underrepresented groups.	Unenhanced: Medium Enhanced: High	Medium	Enhancements would align with the amended project, and include: • prioritising hiring or upskilling of workers residing within the local area • developing a Local Participation Plan and an Aboriginal Participation Plan (APP) that commits to employment.	High

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Livelihood impacts relating to limited workforce supply and job competition Affected parties: Local businesses servicing the project and local residents who use those local services required of the project Extent: Local area and regional area					
Livelihoods L03	The modification seeks an additional 150 workers for construction phase, with an assumed 10% local worker cohort (15 workers). The increase is noted as small in the local and regional context. However, engagement in 2025 noted ongoing shortages of tradespeople and service industry workers.	Unmitigated: Medium Mitigated: Medium	Medium	As noted in the Amendment SIA, mitigations include: • ACEN will ensure that project workforce and subcontracting needs are clearly communicated to subcontractors, so that impacts to their existing business can be avoided through mitigations such as communicating delays to customers or hiring of additional employees. ACEN remain committed to: • prioritising hiring or upskilling of workers residing within the local area • developing a Local Participation Plan and an APP that commits to employment and investment in job readiness by ACEN and its contracting partners. The APP will be supported by the Construction Phase SEP.	Medium

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Changes in amenity due to generation of dust, noise and vibration and lighting Affected parties: Near neighbours, particularly those with residences closest to the local road network and modified project area Extent: Immediate surrounds of study area					
Surroundings S01	Noise: Noise and vibration impacts from construction and operation of the proposed modification are predicted to satisfy all relevant noise and vibration criteria for operation. Impacts from construction noise and vibration are consistent with the previous assessment completed as part of the Noise and Vibration Impact Assessment (NVIA). Visual: The visual impact rating for all receptors closest to the area of proposed new panels is very low. Dust: there are no changes proposed to construction methodology, however community feedback noted ongoing concerns relating to dust impacts in the local area.	Unmitigated: Medium Mitigated: Medium	Unmitigated: Medium	As previously committed to, ACEN will implement a Complaints and Grievances Procedure. The procedure will provide an opportunity for stakeholders to raise complaints, grievances, and provide feedback. The procedure will facilitate the timely response and enable the monitoring and reporting of grievances and ACEN response. In relation to glint and glare impacts, glare impacts can be eliminated by a combination of considered site design at detail design stage and use of backtracking tailored for specific areas of panels and / or at specific times to avoid impacts on identified receivers. To address community feedback, further mitigation measures will be implemented including a cap on traffic movements. Traffic will be split between the two access points including Birriwa Bus Route South Road and Barneys Reef Road. Access to Birriwa Bus Routh South Road via Merotherie Road will enable access to the project for the purpose of constructing and operating the approved temporary accommodation facility, as well as the BESS. Dust suppression controls will be implemented as per mitigation measures identified in Appendix C, mitigation measure BIO12, AQ1, and AQ6.	Mitigated: Medium

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Safety risks for transport network users There will be possible impacts associated with travel of 150 additional workers to the accommodation facility, during road improvements on Birriwa Bus Route South, and potential effects on the CWCT Affected parties: Landholders, residents of the local area, workforce, road users Extent: Regional area					
Health and wellbeing HW01	The modification seeks an increase in the number of project related vehicles by up to 30% (i.e. a total of 156 daily heavy vehicle trips, or 312 heavy vehicle movements), split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road. Incorporation of Birriwa Bus Route South from the Golden Highway via Merotherie Road as an alternative access route for the project will distribute the area of disturbance associated with project traffic more widely in the local area, and increase the area impacted by road improvement works. While road upgrades are undertaken, there is a potential for construction to create changed road conditions and increased risk for road users. Additional travel due to the additional 150 workers at the temporary accommodation facility will also increase usage of the road. Engagement for the project in 2023 revealed that existing conditions along this road are poor, and a key concern for local residents related to road safety due to increased vehicle movements within the local road network during construction. Project engagement in 2025 found that the alternative access route for the project will not significantly affect the local school bus service as it is only a portion of the bus route. However, increased traffic was noted as a safety concern relating to the movement of stock and oversized machinery within the local area. Other feedback noted that Birriwa Bus Route South is currently used by local landholders and the CWCT also intersects with the project access route along this impacted section of Birriwa Bus Route South. A key local organisation noted that road upgrades, including a lane for cyclists, will result in this section of CWCT becoming unpleasant. Enforcement of the Driver Code of Conduct was also questioned.	Unmitigated: High Mitigated: Medium	Unmitigated: High	A detailed construction traffic management plan (CTMP) will be developed and implemented for all phases of the project and will involve engagement with school bus operators, CWCT, MWRC, WSC and TfNSW. The CTMP will include a Driver Code of Conduct. For the modification, road upgrades will be undertaken across the immediate transport route including: • Golden Highway/Merotherie Road intersection • Merotherie Road/Birriwa Bus Route South intersection • Merotherie Road • Birriwa Bus Route South. The CTMP will include a Driver Code of Conduct and will include direction for drivers on the road to not travel within 100 m of, or overtake, cyclists on Birriwa Bus Route South. In addition to the proposed traffic control measures targeted for users of the CWCT, ACEN has engaged and will continue to engage with representatives of the CWCT to identify suitable alternative route options that allow cyclists to continue to enjoy the CWCT in a safe way throughout construction and operation of the project.	Mitigated: Medium

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
				Such measures will include, but not limited to: • A dedicated phone number will be provided for CWCT users to call to confirm safe passage before using the trail during peak construction periods. This phone number would be listed on a sign approximately 1 km from the start of construction and on the CWCT website. • Safe pull over bays for bicycles will be identified along the construction route, which would move depending on the construction schedule.	

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Risks associated with an increase in population in an isolated location, close to rural properties Affected parties: Landholders, residents of the local area, workforce Extent: Local area					
Health and wellbeing HW03	The modification will temporarily increase the population residing within the site by 150 personnel, increasing the population outside of local town centres, in addition to the 500 people already expected to be introduced by the project. This represents a temporary 12.8% increase to the population of the local area. The EIS SIA reported that the introduction of new groups of (people to an area can alter existing values, sense of community and overall social cohesion. Engagement undertaken in 2022 and 2023 found these communities experienced difficulties protecting their sense of community, identity and social cohesion during times of rapid population change. Engagement undertaken in 2025 indicated an additional 150 workers would not affect the potential social change relating to social cohesion. Personal safety concerns were raised by several landholders, who questioned the adequacy of security to be provided by the project at the temporary accommodation facility. The temporary accommodation facility will be a licensed premises, removing demand from workers to travel to Gulgong for this purpose. One landholder expressed concern relating to the security of expensive agricultural equipment that are kept in unlocked sheds.	Unmitigated: Medium Mitigated: Low	Unmitigated: Medium	As per recommendations made in the Addendum SIA, it is suggested that the implementation of safety measures within the facility, including adequate fencing and worker training, as well as complaints reporting processes for nearby landholders, will work towards addressing impacts from the project workforce increases proposed. Security personnel will be onsite 24 hours every day to ensure the safety of workers and the surrounding community. Security officers will be responsible for monitoring access to and from the site and managing people within the site. This includes mobile security checks of the accommodation facility and the site perimeter, crowd control for social areas, incident control and emergency response. Officers will have a relevant security licence and will be first aid certified.	Mitigated: Low

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Construction and operation					
Impacts to nearby agricultural producers The amendment will result in a slight increase to the project disturbance footprint and may also decrease the previously anticipated effects of vehicle travel, following construction of road improvements Affected parties: Local farmers Extent: Local area					
Livelihoods L04	The Land and Soil Assessment (Minesoils 2025) found that the impacts of the modification will not be significant on the agricultural productivity of land in and surrounding the modification area. Th assessment found that the modification will result in: • temporary removal of up to 257 ha of land from agricultural land use for the duration of the project • temporary removal of potential agricultural primary productivity to the estimated value of up to $61,423 per year for the duration of the project • temporary impacts on soil resources and Land and Soil Capability (LSC) classes 4 and 5 within the Modification Area where surface disturbance occurs. The temporary impacts on agriculture listed above are considered negligible in the context of the gross commodity values and land use coverage of the agricultural enterprises and industries operating within the Mid-West Regional LGA. Given the nature and scale of the established agricultural industries within the region and wider state, there will be no impact to critical mass thresholds of agricultural enterprises needed to attract and maintain investment in agricultural industries and infrastructure. At the scale of the enterprises operating within the modification area, the anticipated impacts are considered offset as the involved landowners would be financially compensated.	Unmitigated: Medium Mitigated: Low	Unmitigated: Low	As identified in the previous SIAs, ACEN will implement measures including: • landholder agreements for associated and non-associated landholders • engage in frequent communication with landholders and ensure early provision of information regarding the predicted construction impacts to prepare landholders for impacts that cannot be fully mitigated and to provide an opportunity for landholder feedback and engagement • implement gate and property access procedures, specific to individual landholder needs and requests. These measures will also address potential impacts of conflicting land uses related to the accommodation facility.	Mitigated: Low

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Impact to surroundings from changes in ecological values and natural assets Affected parties: Associated and non-associated landholders. Broader community. People with attachment to the locality. Environmental groups and organisations Extent: Within the development footprint					
Surroundings S03	The Biodiversity Development Assessment Report (BDAR) (EMM 2025) identified that the modification will result in direct impacts to 67.93 ha of Rough-Barked Apple – Red Gum – Yellow Box woodland and 1.1 ha of Blakely's Red Gum – Yellow Box grassy tall woodland – both representing a critically endangered ecological community (CEEC) listed under the *Biodiversity Conservation Act 2016.* Community engagement during previous stages of the project indicates strong community ties to the ecology of the region. Engagement for the modification indicates community concern for 300-year-old gum trees proposed to be removed for the project road upgrades, removing habitat for wildlife such as birdlife, goannas, wombats and echidnas. There are few trees in the local area due to previous land clearing for agricultural activities.	Unmitigated: Medium Mitigated: Low	Unmitigated: Medium	Biodiversity offsets will be implemented to adequately offset the residual biodiversity impacts of the modification.	Mitigated: Low
Life of project					
Livelihood benefit related to use of local goods and services Affected parties: Businesses within the local and regional area Extent: Local area and regional area					
L01	The modification seeks an additional 150 construction workers, including an assumed 90% non-local worker cohort (135 workers). Due to the temporary accommodation facility being a licensed premises and the expected shift cycle assuming minimal days off, opportunity to purchase goods and services locally will be limited.	Unenhanced: High Enhanced: High	Unenhanced: Medium	Non-local workers will have access to transport from the site to Gulgong during their time off increasing opportunity to purchase goods and services locally.	Enhanced: Medium

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Change to land use results in a sense of loss of cultural heritage for Aboriginal and Torres Strait Islander people Affected parties: Aboriginal and Torres Strait Islander People Extent: Local area					
Culture C01	Aboriginal people may experience intangible cultural impacts, due to their connection to the local area, as a result of potential disturbance of cultural sites. Aboriginal Cultural Heritage Assessment (ACHA) found six Aboriginal sites in the modification area. In regards to cultural significance, there may be places with intangible cultural significance within the modification area, although no specific locations have so far been identified by the Aboriginal community. Four sites will be avoided and one will be harmed, and one (a scar tree) may experience some impact. One is an artefact scatter and will be salvaged. The other is a scar tree along Birriwa Bus Route South and will not be removed. However ground disturbing works associated with the upgrades along Birriwa Bus Route South may encroach on the dripline of the tree. Feedback received during consultation of registered Aboriginal parties (RAPs) for the modification noted the importance of preserving the cultural and environmental integrity of watercourses, including those in the modification area, which hold significant value to the overall heritage landscape. Concerns related to transparency were noted, with a request for clear, respectful and ongoing engagement with Warrabinga Wiradjuri #7 Native Title Claimants.	Unmitigated: High Mitigated: Medium	Medium	Should ground disturbing works within this dripline be unavoidable, management of the tree may be required in consultation with registered Aboriginal parties (RAPs). These management measures may include salvage (i.e. removal of the scarred portion of the tree) or alternate management of the tree should it be preferred to remain *in situ*. The recommended methodology for the salvage would be finalised after the approvals process and documented in the Aboriginal and Cultural Heritage Management Plan (ACHMP), once the exact nature of impacts is known. In response to feedback from RAPs, the proposed storage location for salvaged material is to be agreed in consultation with Traditional Owners and Registered Aboriginal Parties, with a preference for storage on Country where appropriate and culturally safe. The ACHMP will also include a clear plan for the cultural management and healing of Country in relation to desecration of Site 36-03-3918. Any works in proximity will be conducted under strict cultural supervision. In regard to monitoring and compliance, RAPs will be involved in all stages of implementation to ensure compliance with the ACHMP. This includes regular walkover inspections, provision of monthly updates and inclusion of RAPs in all decisions relating to cultural salvage, site protection and mitigation measures.	Low

Social impact category and Addendum SIA reference	Impact assessment	Significance (as assessed in Addendum SIA)	Modification significance (unmitigated / unenhanced)	Mitigation measures	Significance (mitigated / enhanced)
Long-term safety benefits associated with improvements to Birriwa Bus Route South Affected parties: Landholders, residents of the local area, workforce, road users Extent: Regional area					
Health and wellbeing HW06	As identified above, existing road conditions along Birriwa Bus Route South are a key concern for local landholders. The proposed modification incorporates enhancements to Birriwa Bus Routh South from the Golden Highway via Merotherie Road as an alternative access route, including a public road crossing. Engagement during 2025 noted perceived minimal social benefit for local residents as a result of the proposed road upgrade. This was due to the perception that the current condition of Birriwa Bus Route South is sufficient for local traffic and that road upgrades are for the project, It was also perceived that the project road upgrades will increase traffic, reducing the benefit for local residents.	N/A	Low	Enhancements recommended to mitigate safety risks, as outlined in HW01 above.	Low

Specific cumulative issues cited during the SIA consultations included:

- the recent increase in dust, noise and lighting from buses and worker vehicles perceived to be impacting local residents along Merotherie Road and Birriwa Bus Route South (associated with EnergyCo's CWO transmission line project)
- challenges relating to moving stock locally (along Birriwa Bus Route North to Birriwa Bus Route South) have been experienced, permissible under their 10 km council permit. A number of stakeholders interviewed stated it is no longer possible to move stock on this route due to the increase in traffic from the cumulative projects
- property values were also noted as a cumulative impact with a nearby neighbour stating they were unable to sell their property due to being situated adjacent to a CWO project. It was also expressed that several families have moved out of the local area due to lack of availability of housing, with rental leases not being renewed
- frustration regarding the lack of coordination between proponents relating to potential mitigations and community benefits.

6.8.3 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential social impacts. There are no additional mitigations proposed to address cumulative impacts over those proposed in the Addendum SIA as these are considered sufficient to address the identified project impacts.

6.8.4 Conclusion

The SIA concluded that the assessed impacts and benefits identified due to the modification area minor. There was one impact where ratings changed:

- Cultural impacts relating to loss of cultural heritage was assessed as medium (unmitigated) and low (mitigated).

There was one benefit where ratings changed:

- Livelihood benefit related to use of goods and services was assessed as medium (unenhanced) and medium (enhanced) from high.

The modification creates one new benefit:

- Potential long-term benefits associated with improvements to Birriwa Bus Route South was assessed. This new benefit was rated as low (unenhanced) and low (enhanced).

There are no High or Very High mitigated impacts.

6.9 Hazards

A preliminary hazard analysis (PHA) was prepared by Sherpa Consulting Pty Ltd (Sherpa 2022) for the approved project. To assess the increased BESS capacity for the modification, an addendum to the PHA has been prepared by Sherpa (2025) and is provided in Appendix L.

The addendum assumed no change to the containerised battery enclosure assessed as part of the original PHA (Sherpa 2022), and no change to the hazard identification (HAZID).

6.9.1 Preliminary hazard analysis

i Consequence analysis

To inform the risk assessment, consequence analysis was undertaken for events with the potential to result in propagation and/or off-site impact. The scope of the consequence analysis included battery thermal runaway (pre-ignition), and propagated battery thermal runaway resulting in a fully developed fire. Heat radiation and toxic gas dispersion impacts were modelled.

For a battery unit on fire scenario, the impact distance is approximately 24 m accounting for both heat radiation and dispersion of toxic product of combustion. This was used to determine potential for off-site impact based on separation distance to the nearest modification development footprint boundary.

The nearest receptor to the operational infrastructure area associated with Lot 34/DP 750755 (R12) is located at least 1.2 km away from the modification development footprint boundary. Off-site impact to the nearest residential receptors is not expected based on the separation distance from the nearest battery unit.

ii BESS separation distances

In addition to demonstrating that the fire risks from the BESS can comply with the DPHI HIPAP No. 4 land use safety planning risk criteria, PHAs for renewable energy projects with a BESS facility with capacity exceeding 30 MW include an additional requirement to 'consider all recent standards and codes and verify the separation distances to onsite or off-site receptors to prevent fire propagation'. This requirement is intended to ensure that fire risks from the BESS have been considered in the design.

The available area in the Area B operational infrastructure area is 56.2 ha. The indicative layout of the operational infrastructure area, including the BESS, on-site substation, site offices and amenities, operations and maintenance buildings and workshop, has not been finalised. The required land for the proposed BESS capacity (900 MW / 3600 MWh) is 22.4 ha, accounting for only 40% of the available area. The remaining area will be available for other supporting infrastructure. A minimum of 10 m asset protection zone (APZ) will be provided for all structures and associated buildings / infrastructure.

iii Risk assessment

Assessment against the HIPAP No. 4 qualitative land use planning risk criteria is provided in the Addendum PHA. The assessment identifies that the modification is compliant, in particular:

- based on the completed consequence analysis for a battery unit on fire and the recommended setback to the development footprint boundary, the effects from a battery unit on fire are not expected to result in significant off-site impacts (i.e. serious injury due to heat radiation or irritation from toxic combustion products)
- events with high probability of occurrence are expected to be contained within the boundaries of the project area
- there are no hazardous developments in the vicinity of the project.

6.9.2 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential hazards. Additional mitigation measures are outlined in Table 6.18.

Table 6.18 Hazards and risk mitigation measures

ID	Mitigation measure
HR11	To minimise the potential for off-site impacts, based on the consequence analysis for a battery unit on fire, a minimum setback of 24 m between the development footprint boundary and the closest battery unit.
HR12	Upon any significant modifications made to the project's design, the PHA should be reviewed and updated as required to ensure that the aspects considered (e.g. control measures, clearances between battery units, separation distance to off-site receptors) and assessments made in this report are still valid. Similarly, once the project's design is finalised and the battery OEM is selected, the PHA should be revisited and updated as required.

6.9.3 Conclusion

Public safety risks, hazards and risks associated with project infrastructure, will be mitigated through design of buildings, construction areas and other assets to include appropriate bushfire protection measures (e.g. asset protection zones), and emergency access and evacuation protocols, which will be developed as part of the emergency response plan.

6.10 Historical heritage

An Historical Heritage Assessment Report (HHAR) was prepared by OzArk (2025b) for the modification area and is provided in Appendix M.

6.10.1 Existing environment

There are no items listed on the National Heritage List, Commonwealth Heritage List or State Heritage Register within 5 km of the modification area.

The closest locally listed item to the modification area is the 'Birriwa Private Cemetery', Item #I1 on the Warrumbungle LEP 2013. 'Birriwa Private Cemetery' is approximately 5 km north-west of the modification area.

Field survey identified three items with potential local heritage significance:

- dilapidated residence
- shearers shed
- 20th century homestead.

These items were assessed in accordance with *Assessing heritage significance. Guidelines for assessing places and objects against the Heritage Council of NSW criteria* (DPE 2023b) and The *Burra Charter. The Australia ICOMOS Charter for Places of Cultural Significance* (the Burra Charter). All sites have been assessed as having no historic heritage significance.

6.10.2 Impact assessment

Given the distance and nature of the project, there will be no impacts to the 'Birriwa Private Cemetery'.

All heritage items identified by field survey have been assessed as having no historic heritage significance, and therefore no heritage values will be impacted by the modification.

6.10.3 Management and mitigation

Mitigation measures as outlined in the EIS and Amendment Report remain relevant to the mitigation of potential impacts to historical heritage. No additional mitigation measures are required.

6.10.4 Conclusion

The project will not impact any historical heritage sites and no additional mitigation measures are required for the modification.

6.11 Bushfire

Cool Burn Pty Ltd (Cool Burn) prepared the bushfire assessment report for the approved project (Cool Burn 2022) and provided bushfire planning advice for the modification (Cool Burn 2025). The bushfire planning advice is provided in the Addendum Bushfire Assessment Report (Cool Burn 2025) in Appendix N.

The proposed extensions for the solar array infrastructure extend into similar / same bushfire prone vegetation landscape (agricultural grazing/cropping and classified as grassland on low slopes). There will be no apparent increase in the level of risk associated with this proposed modification if the existing bushfire mitigation actions are applied (i.e. 10 m asset protection zone (APZ) to the interface between the grasslands and the outer / perimeter infrastructure).

The approved BESS sites Area A and Area B and the proposed extension into Lot 34/DP 750755 will attain an APZ and achieve a bushfire attack level of BAL12.5. The bushfire prone vegetation surrounding these locations are predominantly grassland and a 20 m APZ between the surrounding grasslands and the outer/perimeter infrastructure would satisfy this performance measure.

The existing recommended and proposed water supplies and the access provisions (Cool Burn 2022) will be satisfactory for bushfire mitigation purposes. No additional mitigation measures are required.

7 Justification of the modified project

This section provides a justification and evaluation of the modified project as a whole, having regard to the economic, environmental, and social impacts and benefits of the modified project and the principles of ecologically sustainable development (ESD).

7.1 Evaluation

ACEN has approval to develop the Birriwa Solar and Battery Project, a large-scale solar PV electricity generation facility along with battery storage and associated infrastructure, including the construction of a temporary accommodation facility. Based on the impact assessment findings for the modification (Section 6), the proposed modification will result in minor changes to environmental and social values compared to the approved project and is considered to be substantially the same development for which consent was originally granted.

The potential impacts are summarised as follows:

- Biodiversity – The modification will result in an increase in the development footprint requiring additional clearing and associated impacts to native vegetation and fauna. An additional 69.05 ha of native vegetation would be cleared as a result of the modification. Areas of high biodiversity value have been avoided as much as possible. To compensate for unavoidable disturbance of native vegetation and threatened species habitat, offsets are proposed.

- Aboriginal cultural heritage – Avoidance of Aboriginal cultural heritage values has been a key aspect of the project refinement process. ACEN has refined the modification development footprint of the solar panels and associated infrastructure to avoid identified heritage sites including White Creek IF-1, IF-2, IF-3 and site 36-3-4095. Site 36-3-4102 is unable to be avoided and will be subject to salvage. In addition, the dripline of the scarred tree site 36-3-3918 extends into the development footprint of the Birriwa Bus Route South upgrade; however, there are opportunities to avoid harm to this site through the implementation of management measures in consultation with RAPs.

- Visual – Visual impacts associated with the modification are expected to be very low. Landscape screening identified in the consent conditions is considered appropriate and no additional mitigation measures are required.

- Traffic – The modification seeks an increase in the number of project related vehicles by up to 30% (i.e. a total of 156 daily heavy vehicle 'trips', or 312 heavy vehicle 'movements'), and an alternative access route along Merotherie Road and Birriwa Bus Route South. Road and intersection upgrades will be required to accommodate the increased traffic associated with the construction phase. EnergyCo will undertake the Golden Highway/Merotherie Road intersection upgrade and the Merotherie Road upgrade as part of the EnergyCo CWO REZ Transmission project. ACEN will undertake the Merotherie Road/Birriwa Bus Route South intersection upgrade, and upgrade to Birriwa Bus Route South, in consultation with Mid-Western Regional Council.

- Noise and vibration – Noise emissions for the modified project were modelled and identified that construction noise, operational noise emissions and road traffic noise would comply with all relevant criteria. The noise management measures identified in the consent conditions are considered appropriate and no additional mitigation measures are required.

- Surface water and flooding – Riparian corridor buffers have been adopted in the project design to protect watercourses. There may be some minor flood risk to the operational infrastructure areas in parts generally associated with drainage lines and the tributary of White Creek. These risks are considered to be minor and manageable with implementation of a freeboard allowance when constructing BESS pads and a clean water diversion around the development in operational infrastructure areas.

- Land use, soils and agriculture – The modification will be undertaken on an area of up to 257 ha of land that is currently subject to agriculture land use. Following decommissioning and rehabilitation, it is expected that there will be no permanent decrease in land available for agriculture use.

- Social – The modification would result in only minor changes to the impacts or benefits of the project. One new benefit was identified with the potential for long term benefits associated with improvements to Birriwa Bus Route South.

- Hazards and risk – Public safety risks, including bushfire, hazards and risks associated with project infrastructure, will be mitigated through design of buildings, construction areas and other assets to include appropriate bushfire protection measures (e.g. asset protection zones), and emergency access and evacuation protocols, which will be developed as part of the emergency response plan.

- Historical heritage – The project will not impact any historical heritage sites.

7.2 Benefits

The project (as modified), in conjunction with other large-scale renewable energy projects, has potential to fill the need for replacement power as ageing coal-fired generators face closure. The project is consistent with relevant Commonwealth, State, regional and local strategic plans and polices, in particular the *NSW Electricity Infrastructure Roadmap*, which sets out the plan to deliver REZs in NSW. The project will contribute to the energy generation and storage targets for the CWO REZ, with an indicative capacity of around 600 MW and storage of approximately 900 MW for a four-hour duration.

Modifying the project area and development footprint across additional neighbouring lots will enable flexibility in design and construction, optimisation of the solar array and BESS layout, and will allow sufficient space for maintenance. The additional land will allow the project to increase its energy storage potential, providing additional firming support and greater network system strength.

An alternative access provides a number of benefits. The alternative access route will provide access to the accommodation facility and BESS without having to rely on access across the approved project area. In addition, the co-location of road upgrade impacts across the CWO REZ Transmission Project and ACEN's projects along Merotherie Road and Birriwa Bus Route South would allow better management of construction traffic impacts.

The project (as modified) will provide economic benefits and stimulus to the local region and generate up to approximately 650 jobs during construction and approximately 20 full time equivalent jobs throughout operations. The project will provide ongoing economic benefits for both the local economy within the Mid-Western Regional LGA and the Warrumbungle Shire LGA and more broadly, the regional economy within the Central West.

ACEN will work in partnership with Mid-Western Regional Council and the local community to ensure that, as far as possible, the benefits of the projected economic growth in the region are maximised and impacts minimised.

7.3 Conclusion

The approved Birriwa Solar and BESS Project will play an important part in achieving the objectives of the CWO REZ by contributing to the continued growth of renewable energy generation and storage capacity. The project will provide economic benefits for both the local economy within the Mid-Western Regional LGA and the Warrumbungle Shire LGA and more broadly, the regional economy within the Central West.

ACEN is seeking to modify SSD-29508870 under section 4.55(2) of the EP&A Act. The modification will enable flexibility in design and construction and optimisation of the solar array layout, increase the project's energy storage potential providing additional firming support and greater network system strength, increase employment opportunities during the peak construction period, allow sufficient space for maintenance, and provide an alternative access route to the project.

A range of assessments have been undertaken to support the modification. These assessments show that the modification will result in minimal environmental impacts beyond those previously assessed and approved under SSD-29508870. The modified project will comply with all relevant government legislation, plans, policies and guidelines.

The project (as modified) will remain substantially the same development for which consent was originally granted. As such, it is considered that the modification can be approved pursuant to section 4.55(2) of the EP&A Act.

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Appendix A
Updated project description

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A.1 Overview

The project involves the development, construction and operation of a solar PV electricity generation facility and BESS, which consists of PV modules, trackers, batteries, inverters, transformers and associated infrastructure, as well as the construction and operation of a temporary accommodation facility to accommodate the construction workforce required for the project.

The impact footprint provided in Figure A.1 incorporates the land required for the:

- development footprint, including:
    - PV modules and associated mounting infrastructure including tracking systems
    - operational infrastructure area (including substation, BESS and ancillary infrastructure including an operations and control building)
    - electrical collection and conversion systems
    - underground and aboveground cables
    - parking and internal access roads
    - security fencing
    - a temporary construction compound including laydown area
    - accommodation facility
    - access track from the accommodation facility to the solar and BESS study area
    - emergency access track providing a secondary access from the accommodation facility
- road upgrade corridor**s** (i.e. area of direct impact for public road upgrade works)
- construction footprint of public road crossings (i.e. area of direct impact for public road crossings).

During the preparation of the EIS, Amendment Report and Modification Report, the development footprint within the study area was refined based on environmental constraints identification, stakeholder engagement, community consultation and design of project infrastructure, with the objective of developing an efficient project that avoids and minimises environmental and social impacts.

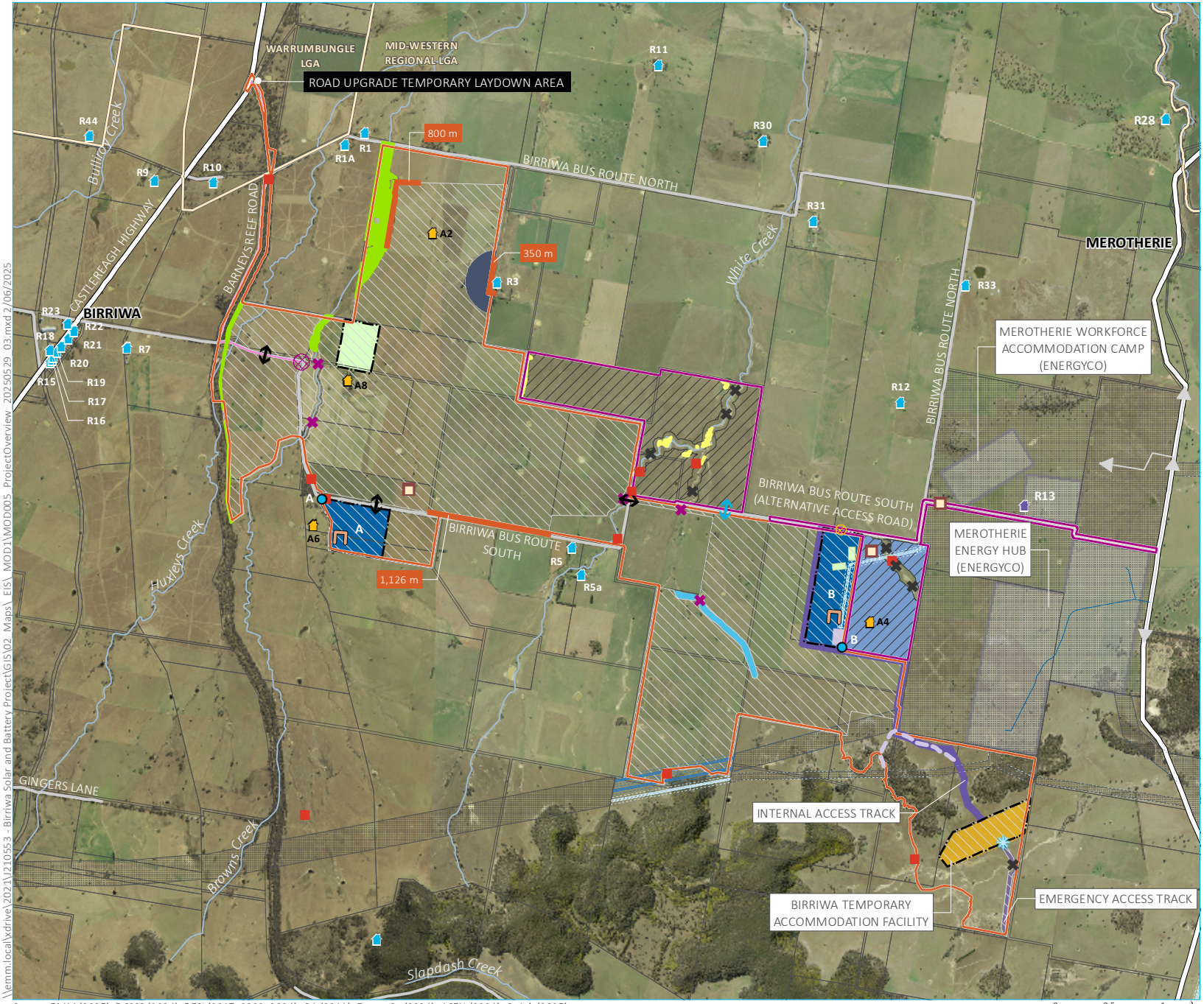
The project will have a targeted 'sent out' electricity generating capacity of 600 MW (AC) and up to 900 MW energy storage for up to 4 hours (3,600 MWh). The final number of PV modules within the development footprint will be dependent on detailed design, availability and commercial considerations at the time of construction.

The project will connect to the proposed Merotherie Energy Hub via one of two indicative connection points (refer to Figure A.1). The exact location of the interface point between the project and the Merotherie Energy Hub is currently being defined in consultation with EnergyCo.

The development footprint will be accessed via the Castlereagh Highway, Barneys Reef Road and Birriwa Bus Route. From the main project site access point, private internal roads will be used to traverse the development footprint. A section of Barneys Reef Road and Birriwa Bus Route South will require upgrades to provide safe access to the development footprint during construction of the project.

An alternative access route will provide access from the Golden Highway, Merotherie Road and Birriwa Bus Route South. This access route will be used for the construction and operation of the accommodation facility, the construction, operation and maintenance of the approved BESS, and will provide access for operation and maintenance by the Network Operator to EnergyCo's CWO REZ infrastructure.

ACEN will upgrade the Merotherie Road /Birriwa Bus Route South intersection and the portion of Birriwa Bus Route South between Merotherie Road and the proposed alternative access point. The Golden Highway / Merotherie Road intersection and Merotherie Road is currently being upgraded by the Network Operator as part of the approved CWO Renewable Energy Zone Transmission project (Merotherie Energy Hub).



KEY

Approved project layout

- Project area
- Development footprint
- Restricted development area
- Road upgrade corridor
- Vegetation to be retained
- Potential creek crossing point
- Potential public road crossing location
- Connection point (option A or B)
- Indicative noise wall location
- Solar panel setback
- Landscape screen planting
- Project access point
- Emergency access point
- Operational infrastructure area including substation, operational facility and BESS (Option A or B)
- Birriwa temporary accommodation facility
- Temporary construction compound

Modification project layout

- Modification area
- Modification development footprint
- Vegetation to be retained
- Secondary access point
- Internal access track
- Potential creek crossing point
- Potential public road crossing location
- Proposed extension for operational infrastructure area including substation, operational facility and BESS

EnergyCo infrastructure

- 500 kV transmission line
- 330 kV transmission line
- Permanent access easement
- Access in/out
- Access road
- Brake and winch site
- 330 kV switching station
- Indicative construction easement (adjacent property)
- Merotherie Energy Hub and workforce accommodation camp

Existing environment

- Dwelling not associated with the project
- Dwelling not associated with the project (EnergyCo building)
- Dwelling associated with the project
- Aboriginal heritage site (to be avoided)
- Aboriginal heritage site (to be salvaged/managed)
- Local government area boundary
- Major road
- Minor road

Project overview

Birriwa Solar and BESS Project - Modification
Figure A.1

Source: EMM (2025); DCSSS (2024); DFSI (2017, 2023, 2024); GA (2011); EnergyCo (2024); ACEN (2024); OzArk (2025)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

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A.2 Project area

The project area is around 1,792 ha (inclusive of the approved project area and the modification area) and extends (wholly or partly) over 24 freehold land parcels and one parcel of Crown land. A schedule of lands for the project area is provided in Table A.1 and shown in Figure A.2.

Table A.1 Involved lots within the project area

Project infrastructure component	Lot	Deposited plan (DP)
Solar and BESS study area	82	DP750755
	70	DP750755
	54	DP750755
	48	DP750755
	47	DP750755
	45	DP750755
	43	DP750755
	39	DP750755
	37	DP750755
	36	DP750755
	35	DP750755
	34	DP750755
	32	DP750755
	31	DP750755
	30	DP750755
	16	DP750755
	12	DP750755
	1	DP1004819
	11	DP750755
	40	DP750755
	60	DP750755
	34	DP750755
	One parcel of Crown land 15 parcels of Crown land (paper roads) 13 parcels of Local Government roads	-
Accommodation facility study area	53	DP750755
	55	DP750755
	Parcels of Crown land (paper roads) – refer to Figure A.2	-

Note: The schedule of lands is also taken to include any crown land and road reserves contained within the study area.

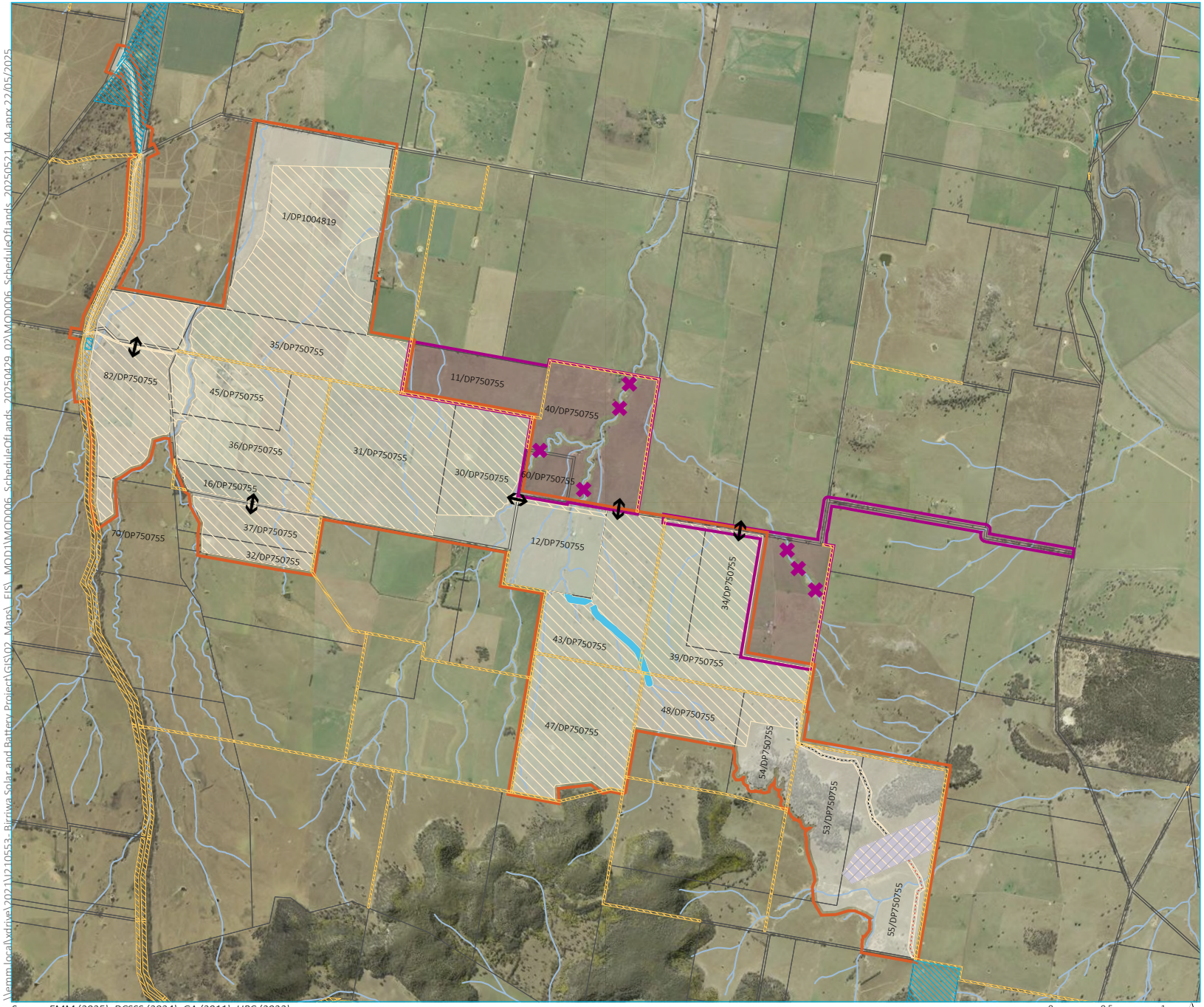
The project development footprint sits within the study area and is the maximum extent of ground disturbing works associated with the construction and operation of the project. The project development footprint has been reduced in size from that originally considered in response to engagement with local residents, and the outcomes of environmental assessments and constraints identification, and comprises:

- the solar and BESS development footprint (area to be developed within land where ACEN hold landholder agreements)
- road upgrade corridor**s** (area of direct impact for public road upgrade works along the access route**s**)
- construction footprint of public road crossings (area of direct impact for construction of public road crossings to allow construction and operational traffic and cable crossings between different land parcels)
- accommodation facility development footprint (area comprising the operational components of the accommodation facility, access track from solar and BESS study area to the accommodation facility, and an emergency access track).

In addition, restricted development areas have been identified which include land within the project development footprint where disturbance will be avoided, wherever possible, with the exception of that required for the provision of fencing, access and electrical reticulation (i.e. private internal access roads and electrical cables).

As described in the EIS (EIS section 2.5), a number of alternative arrangements have been considered throughout the project refinement process for the placement of internal access roads, as well as the proposed footprints for the substation and BESS infrastructure. ACEN has adopted a flexible approach to design for this infrastructure to ensure that the final location can respond to identified social and environmental impacts and constraints.

As described in Chapter 4 of the EIS, the land on which the onsite substation is constructed may require subdivision depending on the final design of infrastructure. At the end of the operational life of the grid substation, the infrastructure on the subdivided lot will be decommissioned and the lot will be reconsolidated back into the residual lot. Once the final location of the onsite substation is determined, the proposed subdivision will be the subject of ongoing discussion with Mid-Western Regional Council, DPHI and the project landholders. The proposed subdivision is shown in Figure A.3 including indicative areas of existing and proposed subdivided lots.



KEY

- Approved project area (offset for visual display)
- Modification area
- Crown land (lot)
- Crown land (road)
- Accommodation facility infrastructure area
- Accommodation facility development footprint
- Solar and BESS develoment footprint
- Restricted development area
- Access track
- Emergency access track
- Potential creek crossing point
- Potential public road crossing location

Existing environment

- Watercourse/drainage line
- Travelling stock reserve
- Cadastral boundary

Source: EMM (2025); DCSSS (2024); GA (2011); UPC (2023)

0 0.5 1 km

GDA 1994 MGA Zone 55

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Schedule of lands within the project area

Birriwa Solar and BESS Project- Modification

Figure A.2

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Source: EMM (2025); DCSSS (2024); GA (2011); ACEN (2023)

BESS subdivision

Birriwa Solar and BESS Project - Modification
Figure A.3

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A.3 Physical layout and design

The project is subject to detailed design. Aspects of the project (including the siting of project elements and construction methodology) are subject to change during the detailed design process but will otherwise not lie beyond the development footprint identified on Figure A.1. The EIS, Amendment Report and Modification Report have been based on consideration of reasonable worse case environmental impacts to allow flexibility in design and construction methodology. The road corridor upgrade and public road crossings have been based on concept design plan**s** (refer to EIS Appendix C and Appendix H of this modification report).

A.3.1 Project components

i PV modules

The project will involve the installation of rows of PV modules (solar panels) mounted on trackers, with multiple rows making up 'power blocks' or 'arrays' that are connected into a power conversion unit (PCU). The exact number of PV modules and the final configuration will not be determined until the detailed design stage after development approval is granted; however, based on a 600 MW (AC) facility, it is anticipated that there will be approximately 1.2 to 1.4 million PV modules.

The final electricity generation capacity will also be determined separately through formal consultation with EnergyCo, the to-be-appointed Network Operator of the CWO REZ and the Australian Energy Market Operator and possibly TransGrid, in a distinct connection study process, which will be subject to the capacity limits of the CWO REZ T-Link. As the CWO REZ infrastructure is being developed by EnergyCo on a greenfield basis and the project has been shortlisted by EnergyCo as a Candidate Foundation Generator (CFG) project as part of its recent process, ACEN has every reason to believe that the targeted 600 MW will be achievable. However, considering the early stage of the EnergyCo CFG process and the bespoke connection process that is envisaged as part of this, the MW capacity of the project should not be fixed with regards to the project approval. Regardless, all PV modules will be contained within the development footprint.

The project involves the use of a single axis tracking system. An example of the type of PV modules mounted on a single axis tracking system that may be used is provided in Plate A.1. The PV modules will be installed on racking frames fixed onto a horizontal tracker tube, with this mounted on top of vertical piles driven or screwed into the ground. The PV modules will be installed in rows generally spaced between 8 m and 12 m apart depending on the tracking system selected, the configuration of the panels on the trackers and the final design. The rows of PV modules will be aligned in a north-south direction, allowing the panels to rotate from east to west during the day, tracking the sun's movement.

The PV modules will be up to 1.2 m from the ground when in the horizontal position, while the lower edge of each PV module will be no less than 0.3 m from the ground or above the flood depth level at the maximum tilt angle. The maximum height of the modules to the higher edge from ground level at the maximum tilt angle is expected to be 4.7 m, which is assuming a '2 in portrait' (2P) configuration (i.e. worst case assumption for visual impact assessment). Examples of '1 in portrait' (1P) and 2P configurations are shown in Plate A.1 and Plate A.2.

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

Source: NexTracker (2018)

Plate A.1 Example of a PV module layout (2 in portrait or 2P configuration)

Source: NexTracker (2018)

Plate A.2 Example of a PV module layout (1 in portrait or 1P configuration)

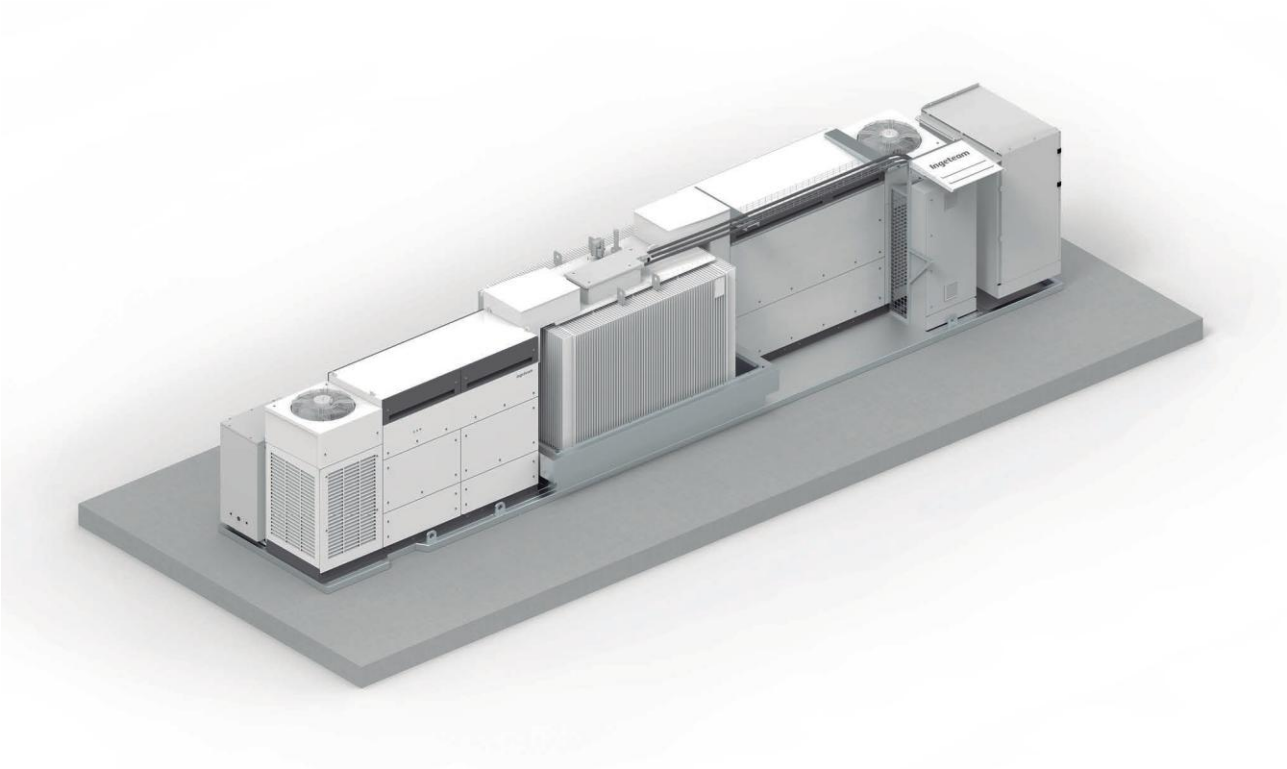
ii Power conversion units

The power conversion units (PCUs) comprise three main components (inverters, transformers and a ring main unit) and are designed to convert the DC electricity generated by the PV modules into AC form, which is compatible with the national electricity grid. The PCUs will also increase the voltage of the electricity from 11 kV, which is the typical voltage of the DC system prior to conversion to AC; that is, the electricity generated by the PV modules and the multiple strings collected in Combiner Boxes, converted to AC power and stepped up to 33 kV by the PCUs for transmission to the substation via medium voltage cables buried underground.

The exact dimensions and configuration of the PCUs will be determined during detailed design and the original equipment manufacturers (OEMs) active in the market are constantly developing new products with slightly different MW capacities, designs and dimensions. The PCUs are typically either containerised (20 ft or 40 ft shipping containers) or a skid-mounted or "outdoor" design, which is with the cabinets and transformers mounted on either a steel platform or a thin concrete pad.

An example of what the PCUs may look like within the development footprint is provided in Plate A.3. This particular example, which might be deployed but has not been chosen and is provided for illustrative purposes only, is an outdoor design mounted on a steel skid with dimensions of approximately 8 m in length by 2.6 m wide by 2.7 m high. The exact manufacturer and model to be used will be determined as part of the grid connection studies and the detailed design and procurement phase.

The quantity of PCUs required will be determined during detailed design; however, based on a 600 MW facility and the current range of products in the market that are relevant for this project, it is anticipated that approximately 80 to 160 PCUs will be required, depending on the final design and procurement decisions made at the time of construction.



Source: Ingeteam (2022)

Plate A.3 Example of a PCU mounted on a galvanized steel skid

iii Electrical reticulation cable network

A medium voltage (MV) cable reticulation network will be required to transport the electricity around the PV module arrays. If underground, cables of either 11 kV, 22 kV or 33 kV will be installed at a depth of at least 600 millimetres (mm) and will be designed and fitted in accordance with relevant Australian industry standards. Electricity from the MV cable network will be stepped up to high voltage (HV) at the substation.

Overhead transmission lines may also be required to transport electricity within the development footprint and restricted areas. The alignment of the overhead transmission lines and design, height and style of the structures required to support them will be determined during the detailed design stage of the project. The easement and distance between each structure required for the overhead transmission lines will be dependent on the type of structure selected.

Small corridors for MV cabling may be required between land parcels in the study area. Disturbance associated with these cabling corridors will be within the development footprint or the construction footprint of public road crossings (Figure A.1). The exact alignments will be determined during detailed design.

As part of the MV cable reticulation network development, waterway crossings will also be required. Waterway crossings will be constructed within the restricted development area (Figure A.1); however, their exact location will be determined during detailed design. It is assumed that each crossing will require a disturbance corridor of up to 40 m wide (including road and cable corridors), which has been allowed for in the biodiversity assessment for the project. All waterway crossings will comply with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI 2003) and *Guidelines for Watercourse Crossings on Waterfront Land* (DPI 2012).

iv Operational infrastructure area

An operational infrastructure area will be constructed at one of two location options within the development footprint (Figure A.1) and will include the BESS, substation and supporting infrastructure.

a Battery energy storage system

The purpose of the BESS will be to support the transmission network via the Frequency Control and Ancillary Services (FCAS) markets, introduce a dispatchable capability to the project's energy generation profile and allow for revenue diversification. Depending on the choice of inverters for the BESS it may also provide system strength related services to support the solar farm's operation in the network, if required in the future.

In relation to the capacity of the BESS, it is noted that while a 600 MW capacity system was approved, the project design initially included a BESS with a 1,000 MW capacity/1,000 MWh system. For the purposes of the impact assessment within this EIS a 1,000 MW/1,000 MWh system was initially assessed. However, following the results of predicted exceedances of the relevant noise criteria at some non-associated residents at a higher storage capacity, the capacity of the BESS was revised and reduced to 600 MW for a 2-hour duration (1,200 MWh). The modification revised the capacity of the BESS again to 900 MW for up to four-hour duration (3,600 MWh). A higher capacity of 1,000 MW was assumed for the purposes of estimating the required construction workforce for the project, which then defines the traffic assumptions and workforce assessed as part of the traffic and social impact assessment respectively.

The project includes a BESS of up to 900 MW capacity, with a storage duration of up to four hours. The specific technology, MW rated capacity and energy storage of the proposed BESS will be determined during the detailed design stage of the project and will be dependent on a number of commercial and financial considerations. Primarily, market need is what will dictate the final MW and MWh energy storage configuration, as a battery designed to primarily provide FCAS services for example requires only a short duration, whereas a battery designed for "generation-shifting" of the solar component of the project would logically have a longer duration with the MW capacity possibly aligned with an offtake (Power Purchasing Agreement). The sizing of the BESS may also be driven by government policy given the current focus on mechanisms to ensure reliability and dispatchability of renewable energy power generation, including the Energy Security Board's consultation on the design of a capacity mechanism.

The BESS will be adjacent to the substation within the proposed operational infrastructure areas (Figure A.1) and will be housed within either outdoor standalone racks, shipping containers or dedicated use buildings. The specific design details for the BESS and their respective enclosure types have not been confirmed.

Each of the operational infrastructure areas presented in Figure A.1 provide adequate flexibility for design and siting of the applicable BESS at each location. A containerised battery enclosure option has been selected as the preferred option. The indicative footprint size and infrastructure height for the BESS structures are summarised in Table A.2. These dimensions should be considered indicative only. Exact dimensions will be refined during the detailed design stage of the project.

Table A.2 BESS design - indicative footprint and infrastructure height

BESS design	Indicative footprint	Height of dominant infrastructure	Maximum height of infrastructure
Containerised	22.4 ha	3.8 m	25 m (lightning protection)

The major components for BESS design include:

- Batteries – the specific battery module manufacturer and model has not been selected; however, it will likely be a type of lithium-ion battery
- Inverters – convert the DC electricity generated by the PV modules into AC. Potential use of grid forming inverters is to be considered once the grid connection studies are commenced as part of the EnergyCo process
- Transformers – typically integrated with the PCUs along with the inverters; the exact configuration (size, design, etc.) of the transformers will be subject to the type and size of battery racks used and the BESS configuration
- Heating ventilation air conditioning (HVACs) – used as part of the BESS to maintain the batteries at a temperature that will optimise their lifetime and performance
- Fire protection – fire protection systems will be installed and could include automatic gas fire extinguishing systems, thermal sensors and/or smoke and temperature detectors connected to a fire control panel.

As noted above, the specific design details for the BESS have not been confirmed and will not be known until the completion of the detailed design stage of the project.

b Substation

Electricity from the medium voltage electrical reticulation cable network will be increased to high voltage electricity at the substation, to match the voltage of the network at the connection point. The substation will sit within one of the two nominated operational infrastructure areas (Figure A.1).

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

The 600 MW transformer yard is proposed to be up to approximately 200 m by 100 m; and the switch yard is proposed to be up to approximately 150 m by 100 m. No component will be higher than the transmission tower, which is expected to be approximately 30 m high.

From the substation, electricity generated by the project will be injected into the grid at the development footprint boundary via one of two indicative connection points (Figure A.1). The exact location of the interface point between the project and the Merotherie Energy Hub are being defined in consultation with EnergyCo.

c Ancillary infrastructure

In addition to the BESS and substation, the operational infrastructure area will house:

- a workshop and associated infrastructure
- a temperature-controlled spare parts storage facility
- staff office, operations and control room, meeting facilities, amenities and carparking.

v Supporting infrastructure

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

- a number of new internal roads to facilitate access within the development footprint to allow for construction and ongoing maintenance
- fencing and landscaping.

Chain-link (or mesh) security fencing will be installed within the study area to a height of up to 2.4 m. The specific location of the security fencing will be determined in consultation with the contractors selected for the construction of the project and project landholders. Fencing will restrict public access to the development footprint. Where possible, fencing will be positioned to minimise disruption to ongoing agricultural operations on land adjacent to the development footprint.

A temporary laydown area will be required during the construction stage of the project and will include laydown and storage areas and a compound, located within the development footprint. A temporary laydown area for the road upgrade is also proposed on an area previously disturbed at the entrance of Barneys Reef Road, off the Castlereagh Highway. The final location for the temporary laydown area, indicatively shown on Figure A.1, will be defined in consultation with Warrumbungle Shire Council and Mid-Western Regional Council. The area used for the temporary laydown area within the development footprint will be revegetated or have PV modules and associated infrastructure installed once it is no longer required.

vi Accommodation facility

The proposed accommodation facility infrastructure area will comprise prefabricated demountable units, that will be delivered to site. Plate A.4 provides examples of a typical accommodation facility for a construction workforce. The final design and layout of the accommodation facility will be confirmed during detailed design; however, all components will sit within the development footprint identified for the accommodation facility as shown in Figure A.1. The Amendment Report and associated assessments are based on consideration of reasonable worse case impacts to allow flexibility in design and construction methodology.

Plate A.4 Examples of typical construction workforce temporary accommodation facilities

It is proposed that the construction workforce will be accommodated in industry standard four-bed units that feature four self-contained bedrooms with ensuite bathroom facilities. Up to 163 four-bed units will be installed, to accommodate 650 people. A small number of two-person executive style modules may also be installed. Other facilities, such as kitchen, dining room, licensed social area, gymnasium, recreation area, medical centre, and laundry, will be provided through communal infrastructure. An example of workforce accommodation units (external view) is provided in Figure A.4. An example of the typical layout of a four-bed unit is provided in Figure A.5.

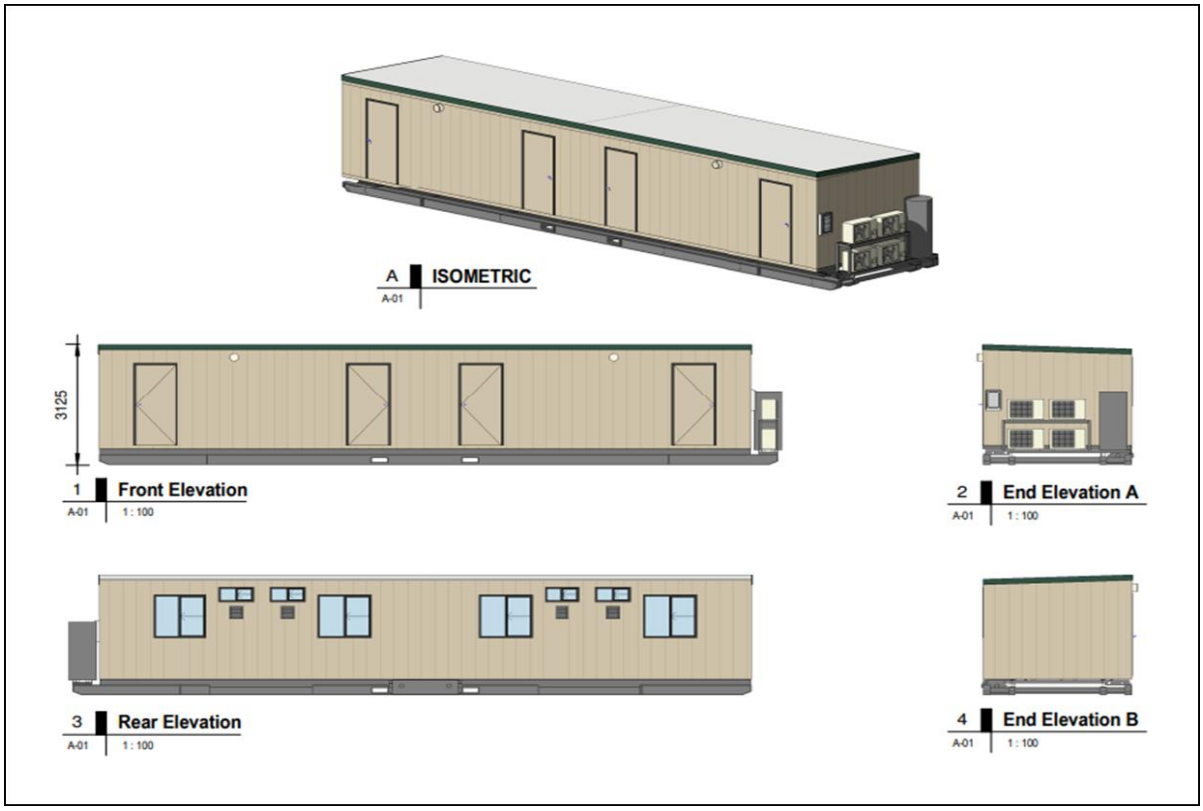


Figure A.4 Example of workforce accommodation units – external view

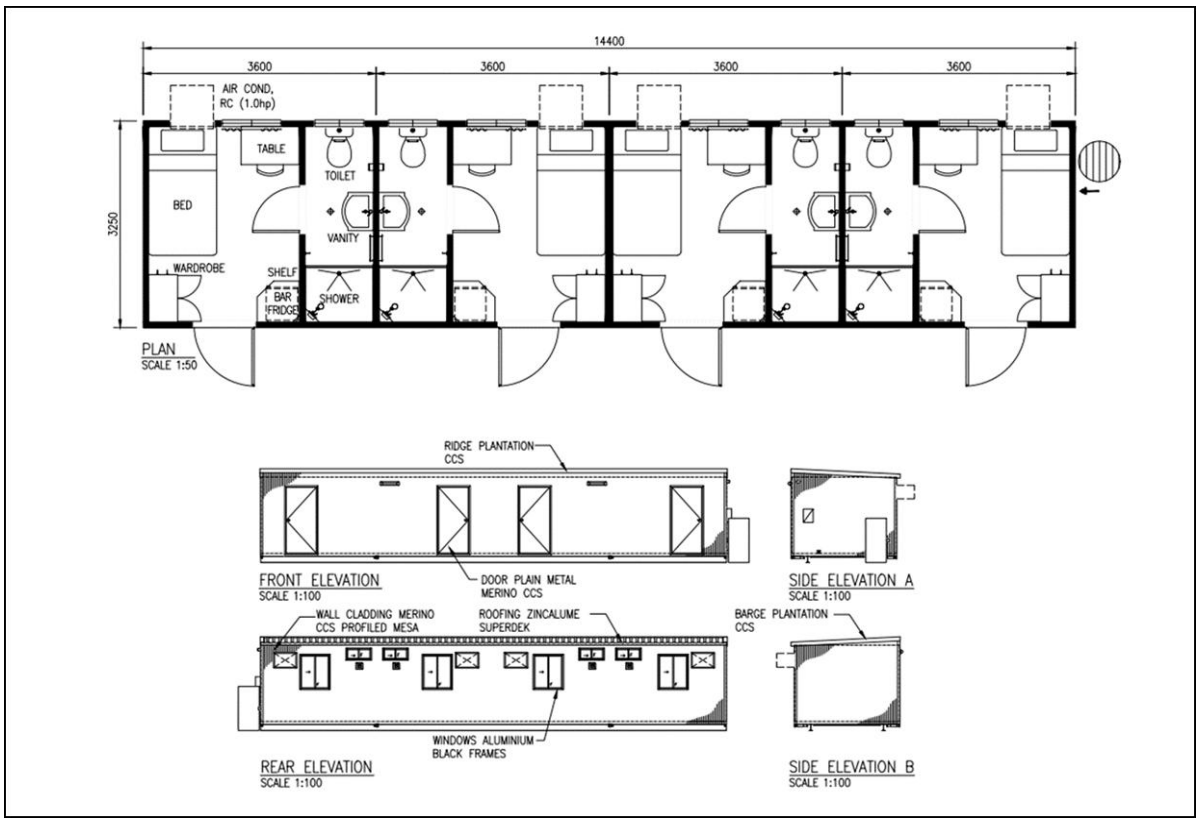


Figure A.5 Example of workforce accommodation units – typical layout

The demountable units may be constructed in stages of up to the 650 person capacity as construction of the project progresses. Communal infrastructure that can accommodate up to 650 people, readily upgradable to 1,000 people if required for future projects and subject to future approvals, will be installed alongside 163 four-bed units.

Communal facilities will include:

- kitchen and dining hall
- recreational facilities such as a gymnasium
- BBQ facilities
- licensed social area
- laundry and linen store facilities
- medical centre.

Figure A.6 and Figure A.7 provide examples of a 500-person capacity accommodation facility layout. The exact layout to be adopted will be confirmed as part of detailed design and will be based on the specific requirements of the site.

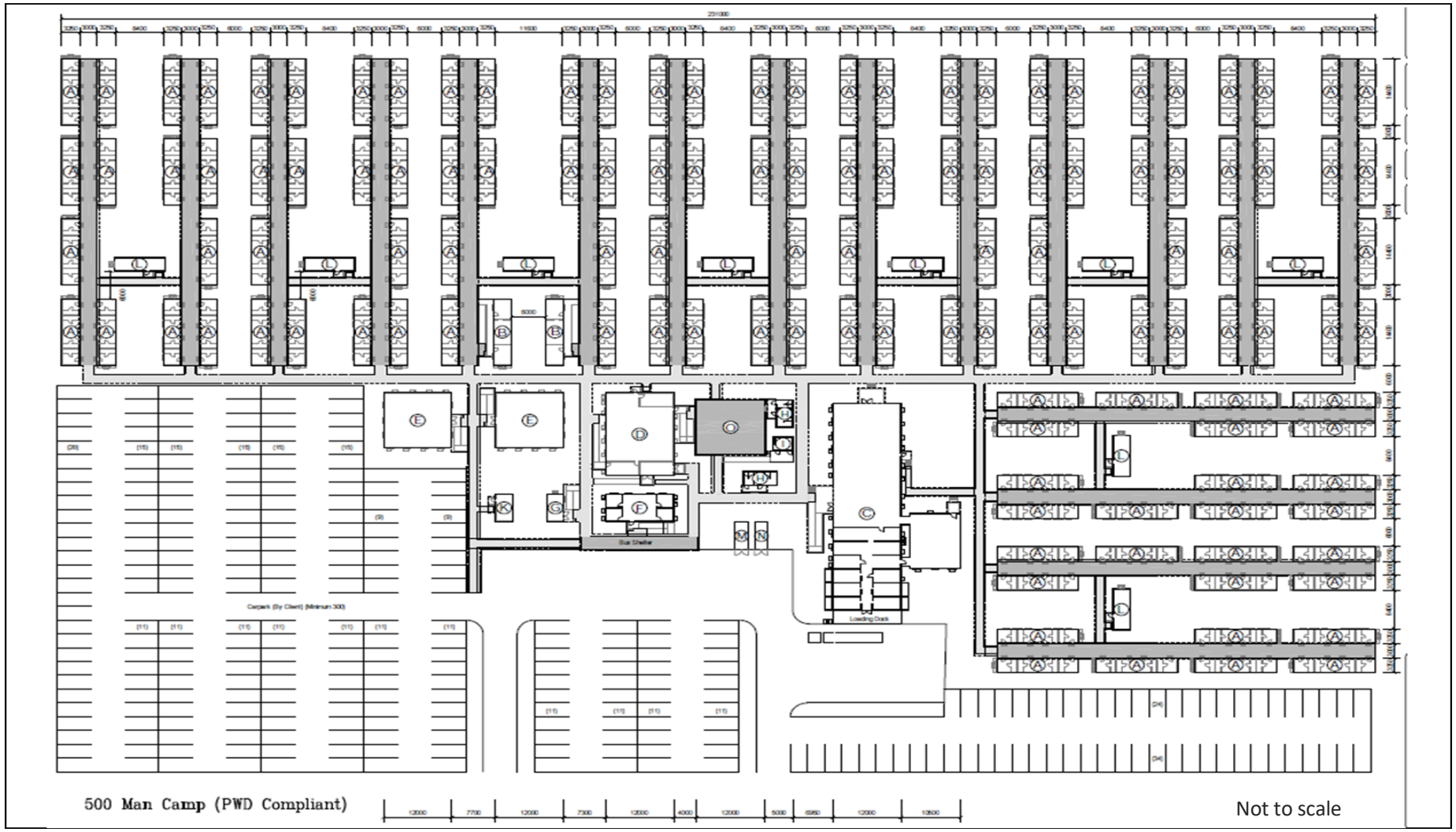


Figure A.6 Example 1 – layout of a 500-person accommodation facility

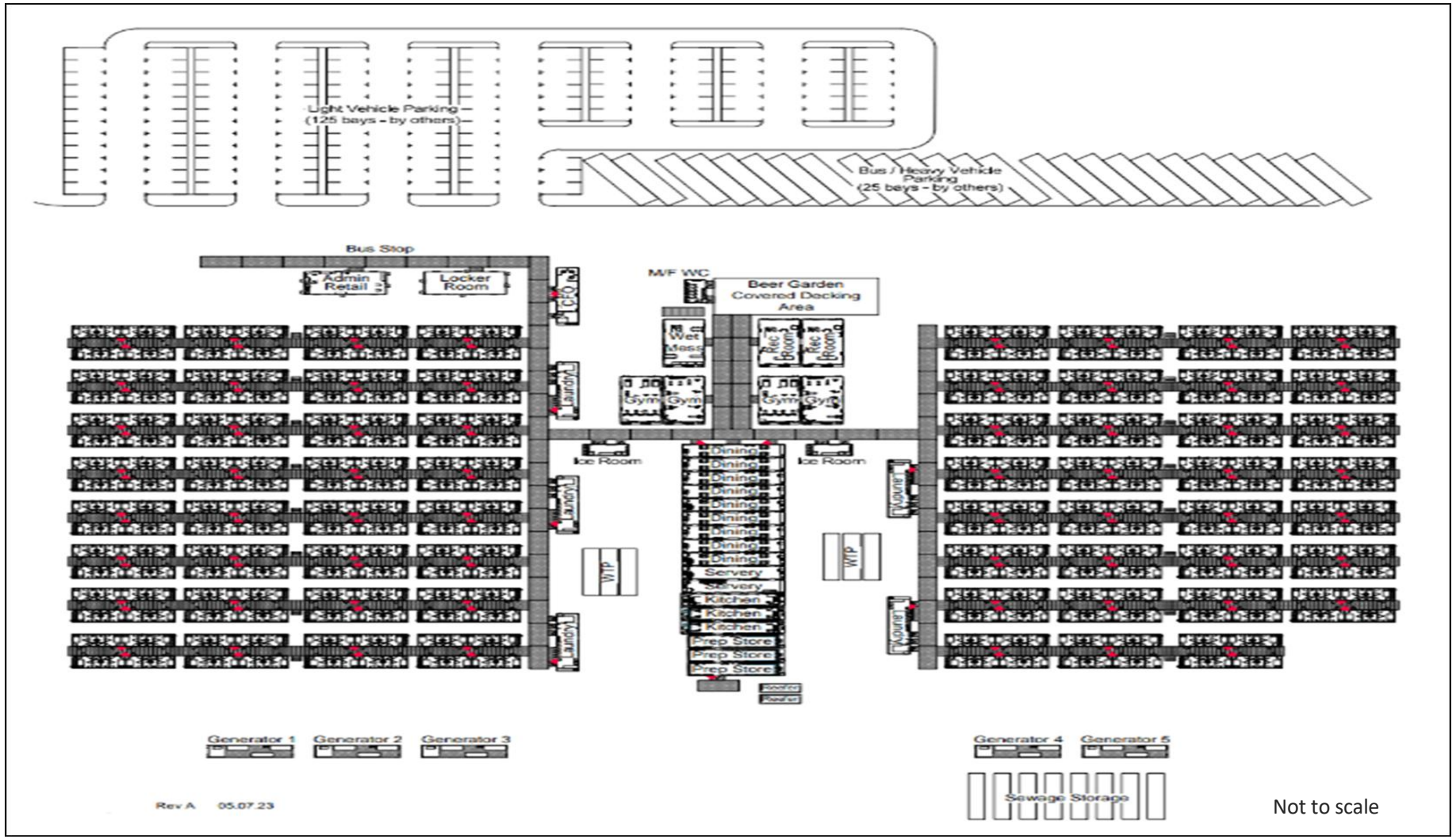


Figure A.7 Example 2 – layout of a 500-person accommodation facility

A.3.2 Project access

i Access

The primary vehicle access route will be via the Castlereagh Highway, Barneys Reef Road and Birriwa Bus Route South. The primary project access point on Birriwa Bus Route South will provide access to the development footprint (refer to Figure A.1).

An alternative access route will be via the Golden Highway, Merotherie Road and Birriwa Bus Route South. The alternative access route will provide access for the construction and operation of the accommodation facility, construction, operation and maintenance of the approved BESS, and access for operation and maintenance by the Network Operator to EnergyCo's CWO REZ infrastructure located adjacent to and within the project area.

Internal access roads will be constructed to facilitate access to the remainder of the development footprint; however, up to three public road crossings will be constructed to allow project-related vehicles to move across public road corridors and between parcels of land that form part of the development footprint (Figure A.1). These crossings will reduce the impact of project-related vehicles on the local road network and maximise the use of the project's internal road network during construction and operations. Design considerations of the public road crossings have been determined in consultation with Mid-Western Regional Council and have been located in areas to avoid vegetation impact or clearance. A typical public road crossing concept design is included in Appendix C of the EIS.

The accommodation facility will be accessed from the alternative access route, and an internal access track between the solar and battery project and the accommodation facility will provide access across the project area.

An internal emergency access track will be constructed south of the accommodation facility infrastructure area, suitable for emergency vehicles (Figure A.1). This will enable an alternative emergency access to the public road network, directed towards the south-eastern corner of the property. This emergency access track is not intended for general access.

In addition, waterway crossings will be required to facilitate vehicle movements and cable crossings within the development footprint. Waterway crossings are proposed within the restricted development area (Figure A.1); however, their exact location will be determined during detailed design. It is assumed that each crossing will require a disturbance corridor of up to 40 m wide (including road and cable corridors). The design and construction of waterway crossings and cable crossings will generally comply with the *Guidelines for controlled activities on waterfront land – riparian corridors* (Natural Resources Access Regulator, 2018); *Guidelines for laying pipes and cables in watercourses on waterfront land* (NSW Office of Water 2012); *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI 2003) and *Guidelines for Watercourse Crossings on Waterfront Land* (DPI 2012).

Proposed transport routes from both Sydney and Newcastle ports are included in Figure A.9.

ii Road upgrades

Proposed upgrades to the primary vehicle access route are summarised in Table A.3.

Table A.3 Road upgrades and project access

Road	Location	Upgrade requirements	Timing
Castlereagh Highway/Barneys Reef Road	Intersection	Basic left turn (BAL) and basic right turn (BAR) treatment to cater for the largest vehicle accessing the project (excluding over-dimensional vehicles).	Prior to construction
Barneys Reef Road	Whole road	7.2 m road carriageway (including 3.1 m travel lanes and 0.5 m shoulders).	
Barneys Reef Road/Birriwa Bus Route South	Intersection	Basic left turn (BAL) and basic right turn (BAR) treatment to cater for the largest vehicle accessing the project (excluding over-dimensional vehicles).	
Birriwa Bus Route South	From intersection with Barneys Reef Road to project access point	7.2 m road carriageway (including 3.1 m travel lanes and 0.5 m shoulders).	
	Project access point	Rural property access type.	
	Public road crossings	The design considerations of the public road crossings have been determined in consultation with Mid-Western Regional Council and have been indicatively located in areas to avoid vegetation impact or clearance. A typical public road crossing concept design has been included in Appendix C of the EIS.	
	From intersection with Merotherie Road to project access point	The road design is to comply with Austroads guideline, which is anticipated to be 3.1 m wide travel lanes with shoulders adjusted to minimise environmental impacts. Where there is a departure from the guideline, the road design needs to be supported by a Road Safety Audit (RSA). Mid-Western Regional Council wishes to review the draft design, RSA and any requested concessions before endorsing the final design package.	Prior to construction
Merotherie Road / Birriwa Bus Route South	Intersection	Basic right turn (BAR). A 56.5 m long shoulder widening is required to the satisfaction of Council	Prior to construction
Merotherie Road	From Golden Highway to Birriwa Bus Route South	9 m seal width, comprising 3.5 m wide travel lanes and 1 m sealed shoulders on both sides. This is currently being upgraded by the Network Operator.	Prior to construction
Golden Highway / Merotherie Road Intersection	Intersection	Channelised right turn treatment (CHR). A short turn lane of 104 m long is required (to turn right onto Merotherie Road). This is currently being upgraded by the Network Operator.	Prior to construction

a Barneys Reef Road

A concept engineering design (Appendix C of the EIS) for the road upgrade corridor of Barneys Reef Road has been developed in consultation with Warrumbungle Shire Council and has been used to inform the extent of the road upgrade corridor in Figure A.8. To facilitate construction, the indicative design works indicate that there will be a requirement for a maximum disturbance of approximately 4 ha. This includes areas of native vegetation, non-vegetated land (i.e. hard surfaces or gravelled tracks and driveways), vegetation within the maintained easement and exotic vegetation. The road upgrade corridor utilises existing roads, tracks and maintained road shoulders to the extent practicable to minimise the amount of vegetation clearing and surface disturbance required. In particular, the conceptual road upgrade design has sought to minimise the clearance of native vegetation as much as possible, with approximately 1.29 ha of native vegetation proposed to be cleared to facilitate the access road upgrade.

The road upgrade corridor of Barneys Reef Road that has been assessed as part of the EIS and supporting technical assessments is conservative and provides flexibility for the final road alignment during detailed design. The extent of the road upgrade corridor may be refined (i.e. reduced) prior to determination, subject to the outcomes of consultation with Warrumbungle Shire Council and Mid-Western Regional Council. Wherever possible, the final road alignment will avoid clearance of native vegetation.

Where the road upgrade corridor extends beyond the road reserve into private property, landowner's consent has been sought to support the lodgement of the development application for the project.

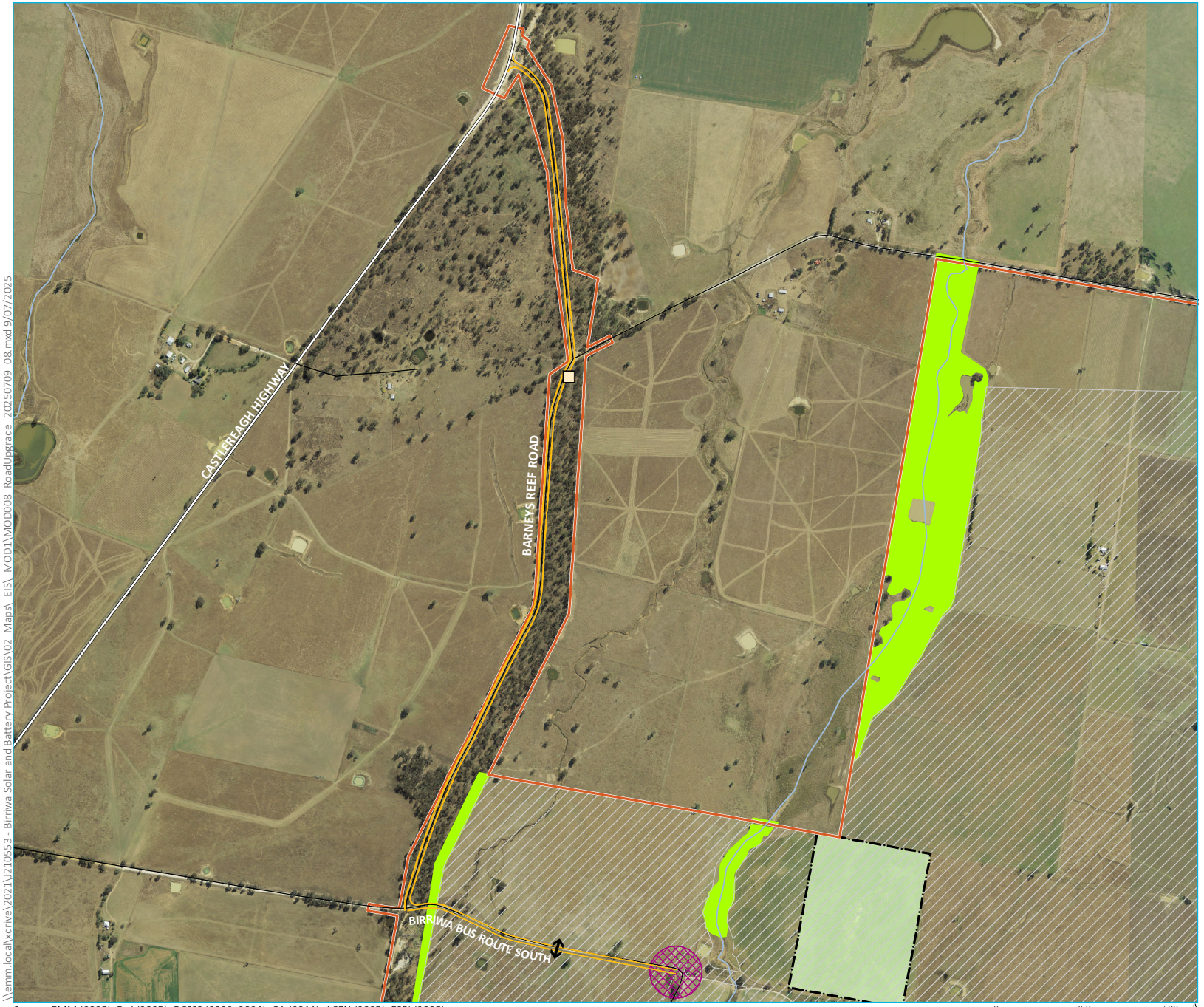
A final design will be prepared in consultation with Warrumbungle Shire Council and Mid-Western Regional Council; however, the final design will not increase the extent of the road upgrade corridor.

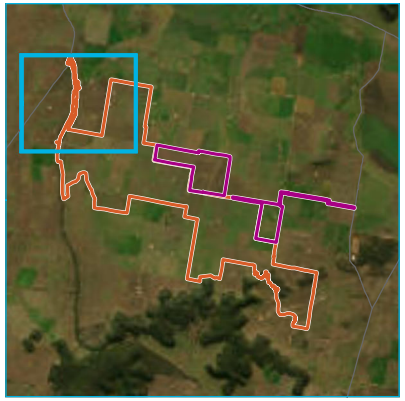
b Birriwa Bus Route South

An upgrade of Birriwa Bus Route South between the intersection of Merotherie Road and the proposed alternative access point will be required to facilitate project related traffic. The proposed upgrades have been carefully designed to avoid significant impacts on both biodiversity and heritage. ACEN has discussed the required upgrades with Mid Western Regional Council who generally support the design solution, which is as follows:

- the road design is to comply with Austroads guideline, which is anticipated to be 3.1 m wide travel lanes with shoulders adjusted to minimise environmental impacts. Where there is a departure from the guideline, the road design needs to be supported by a Road Safety Audit (RSA)
- Mid Western Regional Council wishes to review the draft design, RSA and any requested concessions before endorsing the final design package.

The general design for the intersection upgrades and road corridor upgrade is provided in more detail in Appendix H of the Modification Report. The road upgrade corridor is shown in Figure A.8A.





KEY

- Approved project area
- Modification area (see inset)
- Approved primary access point
- Potential public road crossing location
- Proposed road upgrade

Impact footprint

- Development footprint
- Temporary construction compound

Recorded Aboriginal heritage site

- Aboriginal heritage site (to be avoided)

Existing environment

- Major road
- Minor road
- Named watercourse
- Vegetation to be retained

Road upgrade corridors

Source: EMM (2025); Esri (2025); DCSSS (2023, 2024); GA (2011); ACEN (2025); ESRI (2025)

0 250 500 m

GDA 1994 MGA Zone 55

N

Birriwa Solar and BESS Project - Modification
Figure A.8

EMM creating opportunities

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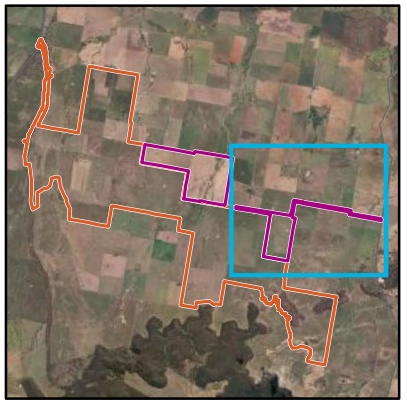

KEY

- Approved project area
- Modification area
- Birriwa Bus Route South (Assessed by ELA)
- Secondary access point

Project layout

- Potential creek crossing point
- Potential public road crossing location

Impact footprint

- Development footprint
- Proposed road upgrade

Existing environment

- Major road
- Minor road
- Cadastral boundary

Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2025); ESRI (2025)

0 250 500 m

GDA 1994 MGA Zone 55

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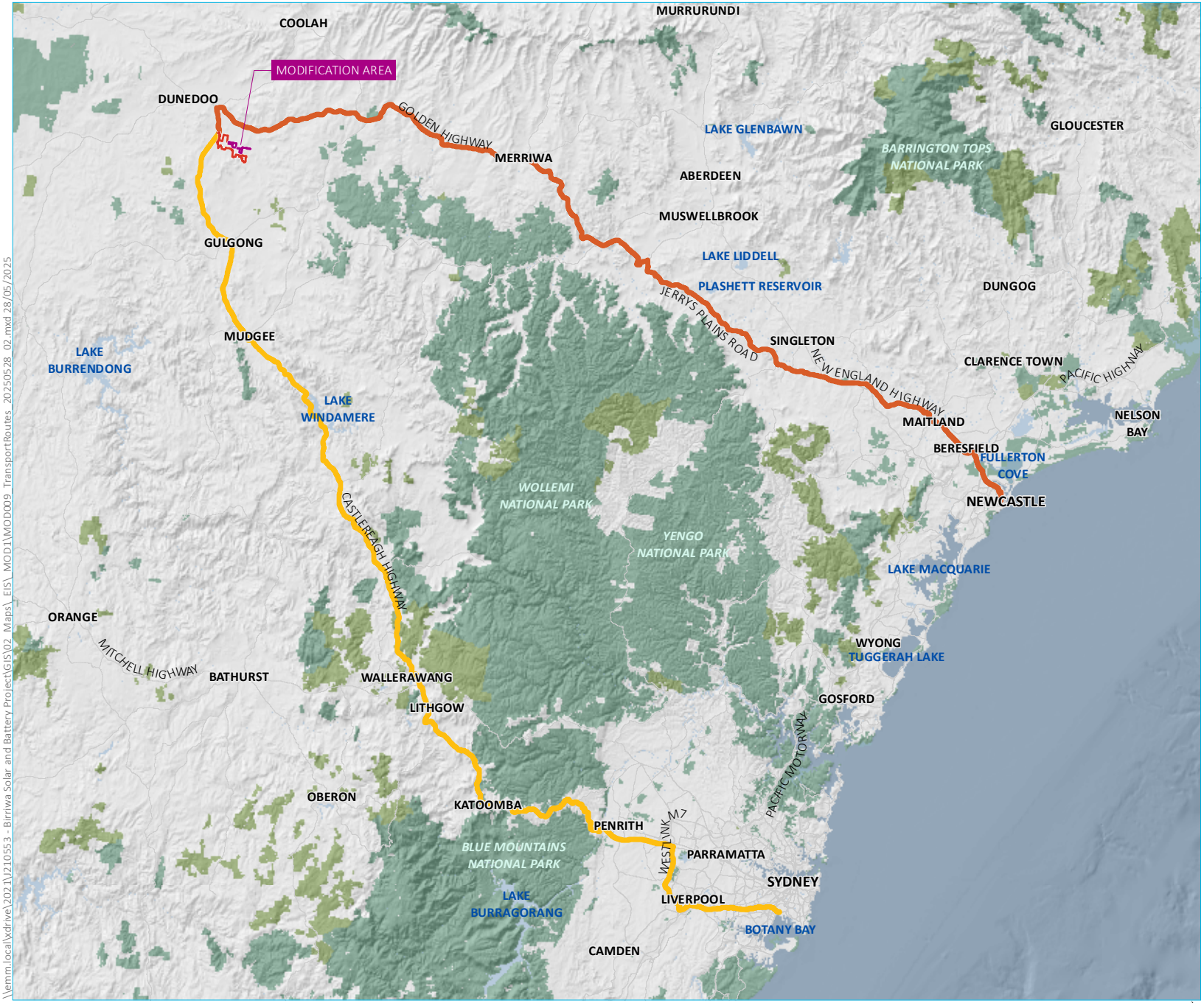
Road upgrade corridors

Birriwa Solar and BESS Project - Modification
Figure A.8a

EMM
creating opportunities



KEY

- Approved project area
- Modification area

Proposed transport route

- Sydney
- Newcastle

Existing environment

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

Source: EMM (2025); DCSSS (2023); GA (2011); ACEN (2025)

0 25 50 km

GDA 1994 NSW Lambert

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Transport routes

Birriwa Solar and BESS Project - Modification
Figure A.9

EMM
creating opportunities

A.3.3 Services

There is no existing water, sewerage or electricity infrastructure at the proposed site. ACEN will continue to consult with Mid-Western Regional Council during detailed design and prior to construction of the accommodation facility commencing, to identify opportunities to avoid or reduce reliance on Council water supply and sewage treatment facilities in the region. Potential options have been detailed below.

i Water

a Solar and battery project

Water demands for the solar and battery project during both construction and operation will be sourced preferentially from:

- commercial suppliers of treated wastewater (water trucks), or
- farm dams within the study area (for non-potable construction purposes to minimise use of imported water and in accordance with the harvestable rights provisions).

Water sources will be determined in consultation with suppliers and landholders and be subject to availability. The project will not impact adjacent licensed water users or basic landholder rights during construction.

It is estimated that approximately 350 kilolitres (kL) of water per day will be required (the volume of approximately 18 water trucks, with a capacity of 20,000 l), equating to approximately 255 megalitres (ML) over the 28-month construction period. Most of this water will be required for dust suppression, with other minor uses including site amenities, fire protection and washing of equipment and plant.

During operations, approximately 7.5 ML of non-potable water will be required annually for ongoing maintenance activities such as cleaning PV modules (indicatively once a year) and vegetation management and for amenities and potable purposes by operational staff.

Additional water will also be required for fire protection. Volumes will be determined during detailed design; however, it is anticipated that up to 80 kL will be required as an emergency water supply for firefighting within the development footprint and up to 650 kL will be required for the fire protection systems associated with the BESS.

In summary, project water requirements are anticipated to be:

- construction (assuming 28-month construction period) = 255 ML
- operations (assuming a 30-year operational life and an allowance of 1 ML for fire protection) = 225 ML.

b Accommodation facility

It is estimated that the accommodation facility will require an addition of approximately 250 litres (L) of potable water per person per day (up to162,500 L per day based on 650 people). Water will be delivered to the site by truck weekly, treated on-site and stored in tanks that are connected to the units and communal infrastructure. A rainwater tank/s will be installed to capture water that can be used for non-potable functions such as toilet flushing, laundry, vehicle washing or landscape irrigation.

c Water sources

The options being investigated that are available to the project for sourcing water to meet the required demand include the following:

1. Purchase water from commercial suppliers of treated wastewater, trucked to the site. It is noted that the truck movements associated with this option were conservatively accounted for in the traffic assessment in the EIS (EMM 2022) and Amendment Report (EMM 2023a).

2. Source the water from the Regulated Cudgegong River (downstream Windemere Dam) – A water access licence (WAL) would need to be established and permanent water entitlement or temporary allocation purchased from the market. In addition, a water supply works and use approval would need to be granted to install the necessary pump/pipe and infrastructure.

3. Source water from the existing farm dams within the study area for non-potable construction purposes, to minimise the use of imported water and in accordance with the harvestable rights provisions. There is likely to be limited water supply and security of supply associated with this option.

4. Use recycled water where practicable from other industrial facilities, such as concrete batching plants in the region.

5. Source water from existing groundwater bores via purchasing WAL entitlement or allocation available on the market or entering into an agreement with relevant landholders.

6. Install new groundwater bores within or near to the project site and purchase a WAL entitlement or allocation from the market to use this water for the project.

7. A combination of the above options.

ii Telecommunications

Telecommunication utilities are not available at the site. As such, the cellular network will be used during construction. During operations, connection to telecommunications will be via optical fibre expected to be installed along transmission lines, with cellular backup.

iii Sewer

a Solar and battery project

There is no sewer access at the site. Amenity facilities for the solar and battery project construction will be pumped out via tanker and delivered to the closest available sewage treatment facility or as agreed with Mid-Western Regional Council during construction. ACEN or its contractors will consult with Mid-Western Regional Council prior to commencement of construction to reach an agreement.

b Accommodation facility

It is estimated that the accommodation facility will produce approximately 250 litres (L) of sewage per person per day. The accommodation facility will be serviced by a pump-out sewerage system. A septic holding tank will be connected to the units and communal infrastructure and sewage will be removed by truck to a treatment facility which has the required capacity, at least weekly.

There may also be an opportunity to install an on-site sewage treatment plant that will produce treated wastewater that can be used during construction of the project. It may also be appropriate to use treated water to supplement rainwater captured for non-potable functions such as toilet flushing. If an on-site system were to be used, the capacity is expected to be approximately 250 L per person per day, or a total of up 163 kL per day, when the facility is up to the maximum capacity of 650 people. This processing capacity is below the threshold specified in section 36 of Schedule 1 of the POEO Act, and therefore an environment protection licence (EPL) would not be required if an on-site sewage treatment facility was to be installed.

ACEN will continue to consult with Mid-Western Regional Council to determine an appropriate mechanism for treating and disposing of sewage prior to the finalisation of detailed design and construction of the accommodation facility commencing.

iv Electricity

a Solar and battery project

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

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

b Accommodation facility

It is estimated that the accommodation facility will require 2.6 to 2.8 kWh of electricity per person per day. This assumes typical energy usage for lighting, heating or cooling systems, electronic devices, and common amenities. Electricity will be generated on-site using solar panels and batteries. Electricity may also be sourced via the local distribution network, where available and via diesel generation where access to the grid is unavailable.

Diesel will be delivered to the site weekly and stored within fuel storage tanks that comply with the relevant standards. The fuel storage tanks will be located within a restricted access area. Diesel will be sourced from local suppliers.

v Waste (putrescible, recyclable and general)

a Accommodation facility

It is estimated that the accommodation facility will produce 0.00857 m^3 of waste per person per day (weighing approximately 8.75 kg depending on waste density). This includes putrescible waste, recyclable waste and general waste. Waste will be collected and stored in waste tanks that are emptied and removed by truck to local landfill and recycling centres, which have the required capacity, at least weekly.

Recyclable materials and food waste will be stored and disposed of separately to reduce the waste entering landfill. There may be opportunities to employ a food waste management process that produces organic fertiliser and water that can be re-used on-site, in construction or shared with the community.

ACEN will continue to consult with Mid-Western Regional Council to identify opportunities to limit the solid waste entering local landfill facilities, prior to finalisation of detailed design and construction of the accommodation facility commencing.

vi Waste (grease)

a Accommodation facility

The kitchen will be equipped with a grease trap that will be pumped out regularly, depending on capacity and grease waste generated. Grease generated is estimated at 0.4 L per person per day. Local contractors will be engaged to perform this service.

A.4 Uses and activities

A.4.1 Construction

i Staging

The anticipated period of construction for the project is 28 months. The accommodation facility will be operational for the duration of the project construction phase, unless approved for use by future ACEN developments in the CWO REZ.

The construction of the project will generally include the following overlapping stages, some of which may be undertaken in parallel (note: bold text is associated with the modification):

Early works:

1. Public road upgrade of Birriwa Bus Route South for the project.
2. Establishment of internal access tracks for the project.
3. Site establishment including security fencing, and bushfire asset protection zones for the project.
4. Minor earthworks including levelling for the prefabricated demountable units for the accommodation facility.

Construction of the accommodation facility:

5. Construction of the accommodation facility including delivery and construction of prefabricated demountable units, and utility infrastructure for a capacity of approximately 650 people. The demountable units may be constructed in stages of up to the 650-person capacity as construction of the project progresses.

Construction of the project:

6. Construction of solar and BESS including public road upgrade of Barneys Reef Road.

Project commissioning:

7. Final commissioning and testing of the project.

ii Site preparation and pre-construction activities

ACEN may commence site preparation and pre-construction activities of the project prior to installation of the accommodation facility, assuming the majority of the initial construction workforce are sourced locally.

Site establishment works and preparation for construction may include:

- the establishment of a temporary construction compound in a fenced-off area within the development footprint including:
  - a project office
  - containers for storage
  - workshops
  - parking areas
  - workforce amenities
  - temporary laydown areas, including those associated with public road upgrades
- construction of internal access tracks and installation of boundary/security fencing within the solar and battery project and accommodation facility (including the new access track for the accommodation facility as well as the accommodation facility emergency access track)
- site survey to confirm infrastructure positioning and placement within the project
- ongoing geotechnical investigations to confirm the ground conditions within the project
- preliminary earthworks and installation of environmental controls including erosion and sediment management structures and asset protection zones within the project
- identification and demarcation of no-go zones around trees and vegetation to be retained within the project.

As part of site establishment works, management measures will be implemented to mitigate potential impacts on the environment and receptors within close proximity of the development footprint. Where required, additional or improved drainage channels, sediment control ponds and dust control measures will be implemented. Further, laydown areas and waste handling, fuel and chemical storage areas will be strategically placed to minimise potential environmental impacts during the construction stage of the project.

Earthworks will be limited to the locations requiring resurfacing activities for temporary construction facilities (including laydown areas, construction compounds and carparking areas) and permanent operational infrastructure such as the substation, BESS and ancillary infrastructure. A small level pad area may need to be prepared for the PCUs depending on which specific solution is chosen in detailed design.

Minor earthworks will also be required to prepare the development footprint for the installation of prefabricated demountable units, car parking, and the rows of PV modules including some grading or levelling including “cutting and filling” where required. The need for heavy earthworks and compaction is expected to be low due to the flat topography of the development footprint and will be minimised as much as practicable. Farm dams may be filled in if this does not have adverse hydrology impacts as assessed in this EIS.

The extent of excavations and volume of fill required for the project will depend on geotechnical conditions and the final locations for infrastructure and will be determined during detailed design of the project.

iii Activities

Upon completion of the site establishment and pre-construction activities described above, construction activities will typically be rolled out as follows:

- Accommodation facility:
  - Installation of communal infrastructure and bedroom units. The size of the accommodation facility will vary to meet demand. This staged approach will mean that the number of four-bed units installed will gradually increase towards the project peak and then decline afterwards. It is anticipated that 12 four-bed units (48 beds) will be installed initially, peaking at 163 (650 beds). Some two-person executive style units may be installed; however, the overall capacity will not exceed 650.
  - The temporary accommodation facility will be suitable to accommodate up to 650 people (construction workforce). The accommodation facility will have the potential to expand, enabling capacity for up to 1,000 people subject to future approvals, to accommodate a workforce from future ACEN developments within the CWO REZ, if deemed required and subject to future accommodation needs.
- Solar and battery project:
  - Installation of steel piles and mounting system for the tracking system and PV modules.
  - Secure PV modules to mounting system.
  - Trenching and installation of DC cabling and medium voltage cables.
  - Installation of PCUS either on steel skids, concrete pads or in modified shipping containers.
  - Construction of workshop and associated infrastructure, temperature-controlled spare parts storage facility, permanent staff office, operations and control room, meeting facilities, amenities and carparking.
  - Construction of the substation (including grid connection-related infrastructure).
  - Establishment of the BESS compound.
  - Installation of battery racks either in cabinets, modified shipping containers or sheds.
  - Installation of inverters associated with the BESS.
  - Test and commission project infrastructure.
  - Removal of temporary construction facilities.

iv Plant and equipment

The plant and equipment required for the construction of the project will include:

- earthmoving machinery and equipment for site preparation (e.g. rollers, dump truck, concrete truck, excavators, grader and compactor)
- cable trenching and laying equipment

- pile-driving equipment
- assisted material handling equipment (forklifts and cranes)
- machinery and equipment for installation of the substation and BESS
- generators
- water trucks for dust suppression.

v Delivery of construction material and infrastructure

Construction materials and infrastructure will be transported to the development footprint via road. Heavy vehicles up to 19 m in length will require access to the accommodation facility development footprint, and heavy vehicles up to 26 m in length and over-dimensional vehicles will require access to the solar and BESS development footprint. Construction materials and infrastructure delivered to the project development footprint will include:

- pre-fabricated demountable units (staged delivery)
- PV modules
- piles
- tracking tubes and associated tracker equipment (e.g. motors, bearings, drivetrains, etc.)
- electrical infrastructure including cabling and PCUs
- construction and permanent operations and maintenance buildings and associated infrastructure
- earthworks and lifting machinery and equipment.

vi Transport routes and vehicle movements

Construction materials and infrastructure are anticipated to be transported to the study area via road from either:

- Port of Newcastle (via the Golden Highway and the Castlereagh Highway), or
- Port of Sydney (via the Golden Highway and the Castlereagh Highway).

Deliveries may also come from elsewhere in Australia, subject to supplier selection, port capabilities and fees.

The origins of project-related light vehicle movements and preferred transport routes will be dependent on the geographic area from which people travel to the project; however, it is anticipated to include people travelling from Gulgong, Mudgee, Dunedoo, Dubbo and surrounds.

All project-related vehicles will use the primary vehicle access route described in Section A.3.2i.

A 500-person accommodation facility will require approximately 180 semi-trailer deliveries to establish the facility, including delivery of equipment and prefabricated units. A similar number of semi-trailer deliveries will be required to de-mobilise the accommodation facility during decommissioning. Daily light vehicle movements are dependent on the workforce on site, and is expected to build up during peak accommodation facility installation activities.

Approximately 40 oversize and/or overmass (OSOM) vehicles will be required during the construction phase of the solar and battery project for deliveries (e.g. transformers and prefabricated buildings). It is anticipated that there will be no more than one OSOM vehicle travelling to the study area per day. The maximum estimated length of the OSOM vehicles is estimated to be up to 120 m. It is anticipated that decommissioning will require the same number of OSOM vehicles (i.e. to remove the infrastructure). The OSOM vehicles considered in the EIS relate to high-risk over-dimensional vehicles. Special purpose vehicles, restricted access vehicles and exempt OSOM vehicles are included in the number of heavy vehicles assessed in the EIS.

No OSOM vehicle movements are anticipated during operations.

Estimated maximum vehicle movements per day during construction are provided in Table A.4.

Table A.4 Estimated *peak daily* vehicle movements during construction

Vehicle type	Peak movements per day
Light vehicles	130
Heavy vehicles	312
Shuttle buses (internal movements only)	34
OSOM	1
Total	477

The potential impacts of project-related vehicle movements on the local and regional road network have been assessed as part of the Traffic Impact Assessment (EMM 2022, 2025c).

vii Hours

Construction activities will be undertaken during standard daytime construction hours consistent with the *Interim Construction Noise Guideline* (ICNG) (DECC 2009), as follows:

- 7:00 am to 6:00 pm Monday to Friday
- 8:00 am to 1:00 pm on Saturdays
- no works on Sundays or public holidays.

Once operational, the accommodation facility will be used for 24 hours a day, 7 day a week.

ACEN proposes the following construction activities may be undertaken outside these hours without the approval of the Secretary:

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

Out of hours work and extended construction hours may be required on limited occasions such as for special deliveries to minimise road traffic disruption, or in the case of emergencies. The Secretary, Mid-Western Regional Council, Warrumbungle Shire Council and surrounding landholders will be notified of any foreseeable exceptions.

viii Workforce

The project will require a peak construction workforce of up to 800 people (assuming concurrent construction of the solar and BESS infrastructure). The construction of the accommodation facility will require approximately 25 to 30 staff, accommodated in the local area. It is anticipated that the average construction workforce throughout the 28-month construction period will be approximately 360 people (solar component only). Construction of the BESS is anticipated to take approximately 16 months with an average construction workforce of approximately 170 people.

Consultation will continue with Mid-Western Regional Council, Warrumbungle Shire Council, business owners and key stakeholders throughout the assessment and development phases of the project regarding managing potential impacts and opportunities associated with the construction workforce and accommodation capacity.

The construction workforce will be sourced from the local area as far as practicable with ACEN considering options to provide training for local hires. Where possible, ACEN will also consider the construction schedules of other renewable and transmission projects in the CWO REZ in the scheduling of the project's construction to minimise the impact on the local community.

Non-local hires will be accommodated in the Birriwa solar accommodation facility.

ix Timing

The anticipated construction phase of the solar and battery project is approximately 28 months.

The anticipated period of construction for the accommodation facility will be over a period of approximately 3 to 7 months (10 to 28 weeks) within the 28-month construction window for the project. Note, this construction period, however, will be determined once a supplier has been selected and contracts executed. It is also noted that construction of the accommodation facility may be staggered to adapt to the project construction needs.

The accommodation facility will be operational for the duration of the solar and battery project construction phase, which is anticipated to be approximately 28 months, unless approved for use by future ACEN developments in the CWO REZ.

A.4.2 Operations

i Accommodation facility management

The accommodation facility will be managed by an experienced operator engaged by ACEN. The operator will work closely with ACEN to manage relationships with accommodation providers (responsible for delivering, installing and removing demountable units) and service providers (responsible for servicing the accommodation facility during its operation).

ii Accommodation facility services

The accommodation facility will be fully serviced to ensure staff living needs can be met on-site. This will reduce the need for staff to travel to town for basic commodities, recreation, or health and human services.

Services provided onsite are anticipated to include:

- catering
- housekeeping
- provision of alcohol (in a dedicated and licensed social area)
- security (via security officer/s that control access and conduct patrols)

- medical (through an on-site nurse based in the first aid room)
- ground maintenance
- janitorial services
- delivery and removal of water, waste and fuel
- skilled tradesperson services.

Catering will include the provision of meals for breakfast, lunch and dinner every day. These meals will meet the relevant nutrition standards and can be amended to adhere to individual dietary requirements. Alcohol may be sold onsite in a dedicated licensed social area. This would provide local suppliers with the opportunity to sell alcohol without construction staff putting additional pressure on local hospitality venues. The licensed social area will include the requirement for training of service staff in the Responsible Service of Alcohol. All construction staff will be required to register zero drug and alcohol readings when scheduled to work and will be subject to testing.

Security personnel will be situated onsite 24 hours every day to ensure the safety of workers and the surrounding community. Security officers will be responsible for monitoring access to and from the site and managing people within the site. This includes mobile security checks of the accommodation facility and the site perimeter, crowd control for social areas, incident control and emergency response. Officers will have a relevant security licence and will be first aid certified.

First aid facilities will be provided onsite. A registered nurse will be available to address more complex health concerns to reduce the reliance on local health services. They will be responsible for the care and supervision of all medical services including formulating care plans, ordering and/or administering medication and referring to external health providers (preferably telehealth services).

ACEN recognises that local health and human services are strained. There may be opportunities for accommodation facility services to be available to the local community during its operation, for example, having an afternoon each week where the nurse is available for the local community. It may also be possible to donate resources once the accommodation facility has been decommissioned, such as security vehicles, to the community.

ACEN will continue to engage with the Mid-Western Regional Council to explore these options so they can benefit local businesses without adversely impacting the local communities.

iii Accommodation facility safety and bushfire risk

The operator will implement an ISO 45001 Certified Management system that is compliant with relevant legislative requirements, standards, and codes of practices and include processes and procedures to respond to and manage emergencies. As outlined in Section A.3.2i., the accommodation facility will be accessed from the primary vehicle access route of the project through to a new internal access track between the project and the accommodation facility (Figure A.1). An emergency access track will be constructed south of the accommodation facility infrastructure area, suitable for emergency vehicles to provide a safe access to and from the site via existing public roads and tracks (Figure A.1).

The accommodation facility will be designed and operated to comply with *Planning for Bushfire Protection and AS3959-2018 Construction in Fire Prone Areas*. The accommodation facility development footprint will provide an asset protection zone between bushfire hazards and buildings (including roads) that is compliant with the Asset Protection Zone standards. Other bushfire protection measures such as building, construction and design, water supply, landscaping and site access will be planned in response to the outcomes of the bushfire assessment (Cool Burn 2023).

iv Solar and BESS activities

It is anticipated that the facility will require regular maintenance throughout its operational life. This will include the following ongoing tasks:

- site maintenance including:
  - vegetation maintenance
  - weed and pest management
  - fence and access road management
  - landscaping
- infrastructure maintenance including:
  - PV module cleaning
  - PV module, PCU and tracker system repair (if required)
  - inverter and PCU replacement (within every 7 to 10 years)
  - equipment, cabling, substation and communications system inspection and maintenance.

ACEN is currently in discussions with a number of the landholders to enable sheep grazing to resume on portions of the development footprint following the completion of construction of the project, if practicable. A detailed protocol will be developed to ensure biosecurity is maintained and that grazing does not impact on the safe and efficient operation of the project or result in injury to farm workers, stock or operations staff.

To ensure the optimal electricity production output for the project is maintained, the PV modules may need to be washed periodically to remove dirt, dust and other matter. Water for panel cleaning will be transported to the project via water trucks. Washing will not require any detergent or cleaning agents.

The operational workforce will also be responsible for ongoing security monitoring of project infrastructure. Perimeter security cameras may be utilised to assist with monitoring.

v Transport route and vehicle movements

All project-related vehicles will use the primary and alternative vehicle access route**s** described in Section A.3.2i.

a Accommodation facility operations

After the accommodation facility is established, ongoing access for semi-trailer deliveries will not be required, until decommissioning of the accommodating facility. Ongoing heavy vehicle access will be required for provisioning the accommodation facility, including deliveries of consumable goods, water, gas for the kitchen, fuel for generators, and access for waste management.

During operation of the accommodation facility, construction staff will travel to and from the accommodation facility for their shifts via shuttle buses. It has been assumed that there will be approximately 17 shuttle bus trips per day (34 movements). It is anticipated that travel between the solar and battery project and the accommodation facility will occur between 5:00 am to 6:00 am and 6:00 pm to 7:00 pm Monday to Sunday to reflect a 6:00 am to 6:00 pm shift schedule.

Other strategies to minimise the use of private vehicles will be detailed in the Traffic Management Plan and the Accommodation and Employment Strategy, which will be prepared prior to construction.

b Solar and battery project operations

Regular light vehicle access will be required throughout operations; however, is not anticipated to exceed approximately 20 light vehicles per day. Heavy vehicles may be required occasionally for replacing larger components of project infrastructure including inverters, transformers or components of the BESS.

vi Hours

The project, which includes both a solar PV component and a BESS, will have the ability to operate 24 hours per day, 7 days per week, 365 days per year.

vii Workforce

Throughout operations of the solar and battery project, it is anticipated that a workforce of up to 20 people will be required.

Highly technical operations and maintenance activities will typically be undertaken by specialist subcontractors and/or equipment manufacturers whereas routine activities such as fencing maintenance and vegetation management are likely to be offered to local contractors wherever available.

A.4.3 Local employment and procurement

ACEN's preference and priority is to employ locally first through targeted recruitment and upskilling of local workers. This includes engaging businesses based in the local area (Gulgong, Dunedoo, Leadville) to construct and service the accommodation facility.

The operator will have procurement mechanisms to engage local and Indigenous businesses to install and decommission the accommodation facility, and provide maintenance, laundry, cleaning, catering, security, shuttle bus and waste management services during its operation.

ACENs approach to maximising opportunities for regional participation through the projects is centred on the following priorities:

1. Prioritise the procurement of goods and services from regional and Indigenous businesses, and social enterprises.

2. Prioritise workforce participation opportunities for regional, Indigenous and other minority groups through employment.

3. Prioritise opportunities for 'learning workers' with a focus on regional, Indigenous and other minority groups to participate in the project.

This commitment is embedded into procurement frameworks including engineering procurement and construction (EPC), management and assurance systems.

A.4.4 Decommissioning

i Accommodation facility

Following the construction of the project, the accommodation facility may be maintained for use by the construction workforce associated with other ACEN developments in the region, if this is approved as part of future development applications. There may also be an opportunity to accommodate the construction workforce of other energy proponents.

If these options are not pursued, the accommodation facility will gradually be decommissioned when no longer required after the construction peak. The prefabricated demountable units will be removed from the site as the construction workforce decreases. Once construction is complete, communal infrastructure, such as the dining hall, water storage and fencing will be removed to enable the site to be generally restored to its former condition.

ii Solar and battery project

Once the solar and battery project reaches the end of its investment and operational life, the project infrastructure will be decommissioned and the development footprint returned to its pre-existing land use, namely suitable for grazing or cropping, or another land use as agreed by the project owner and the landholders at that time.

Solar and battery project decommissioning will require disturbance of the development footprint during the removal of equipment. A significant number of people, including both staff and contractors, and vehicle movements will be required during the decommissioning stage of the project.

Any underground cabling below 600 mm will remain in-situ following project decommissioning unless otherwise agreed with the landholders.

ACEN will attempt to recycle all dismantled and decommissioned infrastructure and equipment, where possible. Structures and equipment that cannot be recycled will be disposed of at an approved waste management facility.

A.4.5 Environmental management

An environmental management strategy will be implemented to provide the strategic framework for environmental management of the project. The strategy will:

- incorporate a project environmental management plan (EMP), all other required plans, protocols, management and mitigation measures proposed in the EIS
- identify all relevant statutory approvals
- establish roles, responsibility, authority and accountability of all key personnel involved in the environmental management of the project
- establish procedures for consulting with the local community and relevant agencies about the operation and environmental performance of the development
- establish procedures for handling of complaints, disputes, non-compliances and emergency response.

A consolidated summary of the management measures that will be implemented during the construction and operation of the project to manage, mitigate and/or monitor potential impacts is provided in Appendix C.

A.5 Timing

The operational lifespan of the solar and battery project will be in the order of 30 years, unless the solar farm is re-powered at the end of the PV modules' technical life. The decision to re-power the solar farm will depend on the economics of solar PV technology and energy market conditions at that time. Should the PV modules be replaced during operations, the lifespan of the project may extend to up to 50 years.

The BESS's operating life is likely to be 20 years, with the potential for replacing components to extend its life if the market conditions and the cost of the batteries warrant this.

Appendix B

Detailed statutory compliance table

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Table B.1 Statutory compliance

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
Considerations under Commonwealth Acts			
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	-	The EPBC Act provides the legal basis to protect and manage internationally and nationally important flora, fauna, ecological communities, heritage places and water resources which are deemed to be matters of national environmental significance (MNES). MNES, as defined under the EPBC Act, are: 1. world heritage properties 2. places listed on the National Heritage Register 3. wetlands of international significance listed under the Ramsar Convention 4. threatened flora and fauna species and ecological communities 5. migratory species 6. Commonwealth marine areas 7. Great Barrier Reef Marine Park 8. nuclear actions (including uranium mining) 9. water resources, in relation to coal seam gas or large coal mining development. Under the EPBC Act, a proponent proposing to undertake an action that may or will have a significant impact on MNES, or the environment generally for 'Commonwealth agencies', is to be referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for determination as to whether or not it is a controlled action. A search of the Commonwealth Protected Matters Search Tool shows that there are no World Heritage Properties, National Heritage Places or wetlands of international importance within the vicinity of the study area. A biodiversity development assessment report (BDAR) was prepared for the project and updated to include assessment of the amended project. The updated BDAR concludes that the project is not likely to significantly impact on threatened species, ecological communities or migratory species listed under the EPBC Act.	Modification Report Section 6.1 Biodiversity. Appendix E Updated Biodiversity Development Assessment Report.

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
The Commonwealth Native Title Act 1993	-	The Commonwealth *Native Title Act 1993* recognises and protects native title rights in Australia. It allows a native title determination application (native title claim) to be made for land or waters where native title has not been validly extinguished, for example, extinguished by the grant of freehold title to land. There are currently no native title determinations over the study area. A native title claim covering an area from Dunedoo to Lithgow, that includes the study area, was registered on 31 August 2018 on behalf of the Warrabinga-Wiradjuri people (NC2018/002). There is another native title claim, registered on 20 December 2011 on behalf of the Gomeroi People (NC2011/006), approximately 2.4 km north of the study area.	Appendix F
Considerations under the EP&A Act and EP&A Regulation			
NSW *Environmental Planning and Assessment Act 1979*	Section 1.3	Relevant objects of the Act	The relevant objects of the EP&A Act have been considered in the technical assessments undertaken for the Modification (refer Section 6), and are considered in the justification of the Modification (refer Section 7).
	Section 4.15(1)	Matters for consideration – general In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:	
		(a) the provisions of— (i) any relevant environmental planning instruments, and … (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), That apply to the land to which the development application relates.	The provisions of relevant environmental planning instruments have been considered in the technical studies undertaken for the Modification.
		(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.	Section 6 of this Modification report clearly describes and assesses the potential impacts of the Modification on the natural environment. The Modification does not impact the built environment. The social and economic impacts on the locality were comprehensively canvassed in the EIS and Amendment Report for the original Project, and the Modification would not change the outcomes (see Section 6 and Appendix E through to Appendix N).

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
		(c) the suitability of the site for the development.	The Modification includes land adjacent to the existing site. This land is cleared agricultural land, connected to the approved development footprint, and accessible using the approved vehicle access route.
		(e) the public interest.	Public interest was determined by the consent authority in the approval of the original Project. This has not changed materially. Section 5 outlines the engagement carried out for the Modification.
Environmental Planning and Assessment Regulation 2021	Section 98	(1) A modification application may be made by— (a) the owner of the land to which the modification application relates, or (b) another person, with the consent of the owner of the land. (2) The consent of the owner is not required if the original development application was made, or could have been made, without the consent of the owner. (3) The consent of the owner of the land is not required for a modification application made by a public authority, or a modification application for public notification development, if the applicant complies with subsections (4) and (5). (4) The applicant must give notice of the modification application— (a) to the owner of the land before the modification application is made, or (b) by publishing, no later than 14 days after the modification application is made. a notice in a newspaper circulating in the area in which the development will be carried out. (5) If the applicant gives notice under subsection (4)(b), the applicant must also, no later than 14 days after the application is made— (a) if the applicant is a public authority—publish the notice on the public authority's website, or (b) for public notification development—arrange for the consent authority to publish the notice on the NSW planning portal.	The modification application has been made with the consent of the owner of the land which has been provided separately to DPHI.

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
	Section 99	Making a modification application	
		(1) A modification application must— (a) be in the approved form, and (b) contain all the information and documents required by— (i) the approved form, and (ii) the Act or this Regulation, and (c) be submitted on the NSW planning portal.	The Modification report will be submitted via the NSW planning portal and has been prepared in the approved form.
		(2) If the modification application is for State significant development— (a) the application must also include particulars of the nature of the modification, and (b) the applicant must have regard to the State Significant Development Guidelines in preparing the application.	The Modification has been prepared in accordance with the *State significant development guidelines – preparing a modification report* (DPE 2022c).
	Section 100	Content of modification application (1) A modification application must contain the following information—	
		(a) the name and address of the applicant,	Section 1.3
		(b) a description of the development that will be carried out under the development consent,	Section 1.2, Section 3 and Appendix A.
		(c) the address and folio identifier of the land on which the development will be carried out,	Section 3.2
		(d) a description of the modification to the development consent, including the name, number and date of plans that have changed, to enable the consent authority to compare the development with the development originally approved,	Sections 3.1 and 3.5
		(e) whether the modification is intended to— (i) merely correct a minor error, misdescription or miscalculation, or (ii) have another effect specified in the modification application,	Section 3.1
		(f) a description of the expected impacts of the modification,	Section 6
		(g) an undertaking that the modified development will remain substantially the same as the development originally approved,	Section 4.1

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
		(h) for a modification application that is accompanied by a biodiversity development assessment report—the biodiversity credits information,	Section 6.1 and Appendix E.
		(i) if the applicant is not the owner of the land—a statement that the owner consents to the making of the modification application,	The modification application has been made with the consent of the owner of the land which has been provided separately to DPHI.
		(j) whether the modification application is being made to— (i) the Court under the Act, section 4.55, or (ii) the consent authority under the Act, section 4.56.	ACEN proposes to modify the consent under section 4.55(2) of the Act.
Mandatory relevant considerations under EPIs			
State Environmental Planning Policy (Resilience and Hazards) 2021	Section 3.7 Consideration of Departmental guidelines	In determining whether a development is— (a) a hazardous storage establishment, hazardous industry or other potentially hazardous industry, or (b) an offensive storage establishment, offensive industry or other potentially offensive industry, consideration must be given to current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development.	A preliminary hazard analysis (PHA) was prepared as part of the EIS. The Modification does not alter the outcomes of this assessment.
	Section 3.12 Matters for consideration by consent authorities	In determining an application to carry out development to which this Part applies, the consent authority must consider (in addition to any other matters specified in the Act or in an environmental planning instrument applying to the development)— (a) current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development, and (b) whether any public authority should be consulted concerning any environmental and land use safety requirements with which the development should comply, and (c) in the case of development for the purpose of a potentially hazardous industry—a preliminary hazard analysis prepared by or on behalf of the applicant, and (d) any feasible alternatives to the carrying out of the development and the reasons for choosing the development the subject of the application (including any feasible alternatives for the location of the development and the reasons for choosing the location the subject of the application), and (e) any likely future use of the land surrounding the development.	A preliminary hazard analysis (PHA) was prepared as part of the EIS. The Modification does not alter the outcomes of this assessment. Consultation was undertaken at the time of the EIS and Amendment Report. Consultation was also undertaken as part of this Modification and is summarised in Section 5. Feasible project alternatives were considered and documented in the EIS. Surrounding land uses and future uses of the land were identified in the EIS.

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
	Section 4.6	A consent authority must not consent to the carrying out of any development on land unless— (a) it has considered whether the land is contaminated, and (b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and (c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.	Modification Report Section 6.6.
State Environmental Planning Policy (Transport and Infrastructure) 2021	Section 2.48	Before determining a development application for development immediately adjacent to an electricity substation, the consent authority must— (a) give written notice to the electricity supply authority for the area in which the development is to be carried out, inviting comments about potential safety risks, and (b) take into consideration any response to the notice that is received within 21 days after the notice is given.	There is electricity infrastructure within the vicinity of the development boundary and the project will require connection to the electricity transmission network. TransGrid is the relevant electricity supply authority. This was considered in the EIS and Amendment Report.
	Part 2.3 Division 7 Section 2.121	(4) Before determining a development application for development to which this section applies, the consent authority must: … (b) take into consideration: (ii) the accessibility of the site concerned, including— (A) the efficiency of movement of people and freight to and from the site and the extent of multi-purpose trips, and (B) the potential to minimise the need for travel by car and to maximise movement of freight in containers or bulk freight by rail, and (iii) any potential traffic safety, road congestion or parking implications of the development.	Section 6.3 and Appendix G.
	Chapter 3 and 4	Chapter 3 and Chapter 4 of this SEPP aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.	Modification Report Section 6.1 and Appendix E

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
Mid-Western Regional LEP	Clause 2.3(2)	The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.	Section 2.1
	Clause 6.3 Earthworks	(3) Before granting development consent for earthworks, the consent authority must consider the following matters— (a) the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality, (b) the effect of the proposed development on the likely future use or redevelopment of the land, (c) the quality of the fill or of the soil to be excavated, or both, (d) the effect of the proposed development on the existing and likely amenity of adjoining properties, (e) the source of any fill material or the destination of any excavated material, (f) the likelihood of disturbing Aboriginal objects or other relics, (g) proximity to and potential for adverse impacts on any watercourse, drinking water catchment or environmentally sensitive area.	Section 6
	Clause 6.4 (Groundwater vulnerability)	(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that— (a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or (b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or (c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	Modification Report Section 6.5.
	Clause 6.9 (Essential services)	Development consent must not be granted to development unless the consent authority is satisfied that any of the following services that are essential for the proposed development are available or that adequate arrangements have been made to make them available when required— (a) the supply of water, (b) the supply of electricity, (c) the disposal and management of sewage, (d) stormwater drainage or on-site conservation, (e) suitable road access.	Provision of services has been considered in the ES and Amendment Report. The Modification does not propose any increase in the capacity of the solar farm or BESS. The proposed modification will not change the approved life of project operations. No changes to the accommodation facility are proposed. Appendix A Updated project description.

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
Considerations under other legislation			
NSW *Biodiversity Conservation Act 2016*	Section 7.14	(2) The Minister for Planning, when determining in accordance with the NSW *Environmental Planning and Assessment Act 1979* any such application, is to take into consideration under that Act 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.	The Modification will result in any changes to the approved disturbance area. Modification Report Section 6.1and Appendix E.
Crown Lands Act 1989	-	The NSW *Crown Lands Act 1989* provides for the administration and management of Crown land in the eastern and central divisions of NSW. Crown land may not be occupied, used, sold, leased, dedicated, reserved, or otherwise dealt with unless authorised by this Act or the NSW Crown Land (Continued Tenured) Act 1989.	No crown roads are within the modification development footprint.
NSW Waste Avoidance and Resource Recovery Act 2001 (WARR Act)	-	The WARR Act promotes waste avoidance and resource recovery with the objective of minimising waste generation and disposal, and sets out objectives to ensure that resource management considers the following hierarchy: 1. Avoid unnecessary resource consumption. 2. Resource recovery (reuse, reprocessing, recycling, energy recovery). 3. Disposal.	The project aligns with the objectives of the WARR Act.
Roads Act 1993	Section 138	Approval will be required under section 138 of the NSW *Roads Act 1993*, for any works in, on or over a public road. This will include the access road upgrade and public road crossings.	Approval will be required from Mid-Western Regional Council for upgrades to Birriwa Bus Route South required as part of this Modification.

Statutory document	Section reference	Mandatory consideration	Consideration in Modification
Water Act 1912 and Water Management Act 2000		*The NSW Water Act 1912* (Water Act) and WM Act regulate the management of water by granting licences, approvals for taking and using water, and trading groundwater and surface water. The WM Act applies to those areas where a water sharing plan has commenced. Alternatively, if a water sharing plan has not yet commenced, the Water Act applies. The WM Act is progressively replacing the Water Act as relevant water sharing plans are introduced across the State. Water sharing plans have commenced for most of NSW. Licensing of monitoring bores continues under the Water Act until a regulation for aquifer interference gives a mechanism to approve these activities. Clause 4.41 (1g) of the EP&A Act exempts an SSD authorised by a development consent from requiring 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 WM Act. These exemptions apply to the project as it has been declared an SSD and therefore there is no requirement to obtain approvals under the WM Act, including water use, water management work or controlled activity approvals.	Water take and licensing have been considered in the EIS and Amendment Report. The modification does not result in any changes to the water requirements for the project.

Appendix C

Updated mitigation measures table

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C.1 Updated summary of mitigation measures

Note: New or updated mitigation measures as a result of the modifications been bolded.

Table C.1 Summary of mitigation measures

ID	Mitigation measures
Biodiversity	
BIO1	A biodiversity management plan (BMP) will be prepared for the project. The BMP will document the measures to avoid and minimise direct and indirect impacts to ecological values and natural assets.
BIO2	Following construction, species consistent with PCT 80 and PCT 281 will be included in landscaping to increase the floristic and structural diversity of the land.
BIO3	Pre-clearance surveys will be conducted prior to removal of hollow bearing trees to mitigate injury to potential fauna species inhabiting hollows.
BIO4	Hollow logs and debris will be retained to be used post construction. This will improve potential fauna habitat within the indirect impact area and study area.
BIO5	Exclusion fencing ('no go' zones) will be used to avoid indirect impact to retained trees. This includes temporary fencing, bunting tape or similar and signage to protect or avoid habitats to be retained. This will be maintained and checked daily through construction.
BIO6	All workers will be made aware of ecologically sensitive areas and the need to avoid impacts including adjacent native vegetation. This will avoid unintentional impacts to Box Gum woodland, Grey Box woodland and native vegetation.
BIO7	Chemicals and fuel will be managed in accordance with Safe Work Australia guidelines (e.g. employ use of barriers, inspecting tanks and containers, etc).
BIO8	Appropriate spill containment materials (or spill kits) will be used to clean-up spills if they occur. This will avoid unintentional impacts to Box Gum woodland, Grey Box woodland and native vegetation due to chemical or fuel runoff.
BIO9	Sediment controls, including fencing and sediments traps, will be installed in any areas where works will occur in proximity to waterways to avoid increased sedimentation and erosion of watercourses.
BIO10	Weeds will be removed prior to clearing. Weeds will be stockpiled appropriately prior to removal from the study area to avoid the spread/introduction of seed and other propagules.
BIO11	Weed hygiene protocols will be put in in place prior to entering the site including wash-down procedures to all plant and machinery. This will avoid weed introduction from outside of the site.
BIO12	Coolatai Grass (*Hyparrhenia hirta*), and St. Johns Wort (*Hypericum perforatum*) are to be managed as per the *Biosecurity Act 2015* and their regional recommended measures (Section 7.3 of BDAR). If any other priority weeds of NSW are identified in the study area during construction, they will be removed from the site.
BIO13	Dust levels will be monitored and dust suppression strategies implemented where required, i.e. wetting down dirt roads or reducing vehicle speeds.
BO14	**Regular inspection of waterway crossings for accumulation of debris which block fish passage, and removal of such debris if present.**
BO15	• **Implement structural features to dissipate high energy flow. These could include rock baffles or riprap in areas prone to erosion.** • **Monitor banks and bed for signs of erosion.**
Visual	
VIS1	Mitigation measures will be undertaken in accordance with Table 5.2 and Table 5.3 of the VIA.
VIS2	Landscape planting will be undertaken in accordance with the Landscape Plan (Figure 6.1 of VIA).

ID	Mitigation measures
VIS3	Laydown areas will be located in areas with limited visibility from residences and public roads.
VIS4	Clearing and trimming of vegetation will be kept to a minimum.
VIS5	Finishes and products that minimise or eliminate surface glare will be selected as part of design. Neutral colours that blend in with the surrounding landscape i.e. khaki, green, beige, or similar, will also be selected, where possible.
VIS6	The principles of the *Dark Sky Planning Guideline* will be implemented.
Traffic and transport	
TT1	A channelised right turn treatment (CHR) will be installed at the Castlereagh Highway/Barneys Reef Road intersection northbound approach.
TT2	Resurfacing and widening will be completed on Barneys Reef Road and Birriwa Bus Route South in compliance with Austroads rural roads design standards, and in further consultation with relevant authorities during subsequent phases of project design and assessment.
TT3	A detailed traffic management plan (TMP) will be developed in consultation with **CWCT**, Mid-Western Regional Council and Warrumbungle Shire Council prior to the commencement of road upgrades and construction of the project. **The TMP will take into consideration the Network Operator's traffic management plan where relevant**. These will include a Driver Code of Conduct addressing: • informing drivers about the school bus routes along Castlereagh Highway, **Golden Highway, Merotherie Road and Birriwa Bus Route South** • direction to avoid compression braking near residential receptors • direction to avoid trips during school zone times (8:00 am–9:30 am and 2:30 pm–4:00 pm) • in consultation with relevant councils and road authorities, install school bus signs at suitable locations along construction routes if necessary to warn heavy vehicle drivers of student drop-off and pick-up areas • responding to local climate conditions that may affect road safety such as fog, dust and wet weather. The TMP will be prepared by suitably qualified persons in accordance with the TfNSW (2022) *Traffic Control at Work Sites Manual*.
TT4	**ACEN are committed to implementing traffic mitigation measures to minimise impacts on any part of the cycle trail that may be affected by project traffic. This could include:** • in consultation with the CWC Trail Inc, a signage plan will be prepared, highlighting the CWCT within and in the vicinity of the project • within the site induction and driver's code of conduct, the CWCT will be highlighted to increase awareness of cyclists' presence in the area • in site-specific circumstances, e.g. peak construction activities, a traffic controller may be required to manage the vehicular traffic and cyclists which is subject to site supervisor's safety assessment and discretion • **a dedicated phone number will be provided for CWCT users to call confirm safe passage before using the trail during peak construction periods. This phone number would be listed on a sign approximately 1 km from the start of construction and on the CWCT website** • **safe pull over bays for bicycles will be identified along the construction route, which would move depending on the construction schedule** • **provision of speed management strategies.**
TT5	A permit will be obtained (from NHVR) to allow oversize or overmass vehicles to use the road network as part of construction.
TT6	ACEN will design up to three public road crossings to Mid-Western Regional Council's satisfaction, generally in accordance with the design considerations approved at the traffic committee meeting on 17 June 2022.
TT7	A road maintenance program will be developed in consultation with the relevant road authorities to be undertaken during construction and will include route inspections of all the affected local roads. Any new road pavement damage which occurs to these roads during the project construction period from construction activities, which represent a potential traffic safety risk to the travelling public, will be restored to their pre-construction condition at the completion of construction.

ID	Mitigation measures
TT8	**Project traffic will not use Golden Highway / Merotherie Road intersection or Merotherie Road until these have been upgraded as part of EnergyCo CWO Renewable Energy Zone Transmission project (Merotherie Energy Hub).**
TT9	**ACEN proposes to undertakethe Merotherie Road/Birriwa Bus Route South Road intersection upgrade, and upgrade to Birriwa Bus Route South Road to the satisfaction of the Mid-Western Regional Council and in consultation with the Network Operator.**
TT10	**ACEN will upgrade the portion of Birriwa Bus Route South between Merotherie Road and the proposed alternative access point as per Mid-Western Regional Council's requirements.**
Aboriginal heritage	
AH1	Prior to commencement of construction, an Aboriginal cultural heritage management plan (ACHMP) will be developed in consultation with DPE, the RAPs and Heritage NSW.
AH2	During construction, temporary fencing will be installed around sites identified in the study area in the vicinity of the development footprint (Mangarlowe OS-1, Mangarlowe IF-1, **White Creek IF-1, White Creek IF-2, and White Creek IF-3**) and the location of all known sites will be shown on appropriate plans to ensure that they are not inadvertently harmed. **If 36-3-3918 (Birriwa Bus Route South ST-1) can be avoided, the site will be temporarily fenced while works are undertaken near the site.**
AH3	**Two** Aboriginal sites, Mangarlowe IF-2 **and 36-3-4102 (SNI-AS85)**, will be salvaged prior to the commencement of construction. **Should ground disturbing works within the dripline of 36-3-3918 (Birriwa Bus Route South ST-1) be unavoidable, management of the tree may be required in consultation with RAPs. These management measures may include salvage (i.e. removal of the scarred portion of the tree) or alternate management of the tree should it be preferred to remain *in situ*, or alternative measures developed in consultation with RAPs should be followed.** The methodology for collection of this site will be finalised as part of the ACHMP.
AH4	In the event of discovery of new Aboriginal sites within the study area, the procedure detailed in Section 9.3.1 of the ACHA (Appendix I of the EIS) will be followed. In the event that newly identified sites will be impacted by the construction of the project and cannot be avoided, they will be managed in a manner commensurate with their assessed significance.
AH5	If the final design of the access track cannot avoid Winora IF-2, it will be salvaged prior to the commencement of construction. The methodology for the salvage of this site will be finalised as part of an ACHMP to be prepared for the project.
Hazards and risks	
HR1	Onsite security protocols will be implemented and staff will be present during operational hours.
HR2	BESS units will be certified to UL 9540A and installed in accordance with the manufacturer's instructions for best practice to mitigate fire propagation.
HR3	ACEN will keep a copy of deflagration hazard studies undertaken by manufacturer in accordance with UL 9540 or include explosion control measures such as passive safe ventilation of flammable gases under pressure.
HR4	If the containerised BESS is installed, a minimum one-hour fire rating (REI60) will be applied.
HR5	If the BESS is installed within a dedicated use building, the detailed design will consider: • compartmentalisation • occupancy and means of egress • fire barriers • exhaust and ventilation system • sprinkler system and required water volume • containment system for the expected fire protection system discharge.
HR6	The requirements of the National Construction Code and regulated Australian standards and codes will be met for an indoor BESS within dedicated use buildings (e.g. fire rating of materials, fire detection systems).

ID	Mitigation measures
HR7	ACEN will consult with Fire and Rescue NSW (FRNSW) during detailed design of the facility to ensure that the relevant aspects of fire protection measures have been included. These may include: • type of firefighting or control medium • demand, storage and containment measures for the medium.
HR8	ACEN will review the investigation reports on the Victorian Big Battery Fire (occurred on 31 July 2021) and implement relevant findings for the BESS component of the project.
HR9	Security fencing, cameras, and warning signs will be installed, and onsite security protocols implemented to deter trespassers and minimise unauthorised person access resulting in vandalism/asset damage to the infrastructure with the potential for self-injury during the act.
HR10	ACEN will engage with Mid-Western Local Emergency Management Committee (LEMC) to discuss how the site will be considered under the Mid-Western Local Disaster Plan (DISPLAN).
HR11	**To minimise the potential for off-site impacts, based on the consequence analysis for a battery unit on fire, a minimum setback of 24 m between the development footprint boundary and the closest battery unit.**
HR12	**Upon any significant modifications made to the project's design, the PHA should be reviewed and updated as required to ensure that the aspects considered (e.g. control measures, clearances between battery units, separation distance to off-site receptors) and assessments made in this report are still valid. Similarly, once the project's design is finalised and the battery OEM is selected, the PHA should be revisited and updated as required.**
Noise and vibration	
NV1	If the actual fleet of plant and equipment required during construction varies significantly from that assumed within the NVIA, a risk assessment of the proposed works will be undertaken to determine the likelihood of noise impacts on surrounding residential assessment locations. Appropriate management and mitigation measures will be used, where required. A CEMP will be developed as part of the project and will include the risk assessment protocol and detail the management and mitigation measures to be implemented during construction consistent with best practice requirements.
~~NV2~~	~~To achieve compliance during construction with the ICNG noise goals, the following will be implemented:~~ ~~• during site establishment works, a construction exclusion zone of 650 m from non-associated residences will be established on Saturdays from 1:00 pm to 6:00 pm~~ ~~• during infrastructure delivery and installation, a construction exclusion zone of 300 m from non-associated residences will be established on Saturdays from 1:00 pm to 6:00 pm.~~
NV3	The safe working distances for cosmetic damage will be monitored throughout the construction process. If construction is within 25 m of sensitive structures, then work practices will be reviewed so that safe working distances are followed. If safe working distances need to be encroached, real time vibration monitoring with audible and visual alarms will be installed at vibration sensitive structures so actual vibration levels can be monitored and managed appropriately in real-time.
NV4	To achieve compliance with operational noise criteria, the following mitigation measures will be incorporated into the project design: • no electrical infrastructure (i.e. transformers or inverters) will be installed within 250 m of the property boundary of R3 • the 1,200 MVA grid transformer, which will form part of the BESS, will be installed with a 6.5 m high barrier, positioned to reduce noise impacts on nearby sensitive receivers (i.e. non-associated residences). Mitigation measures as outlined above may not be required to achieve compliance when more information is available (e.g. during detailed design). These mitigation measures may be refined if additional noise modelling during detailed design identifies alternative measures to achieve compliance with the NPfI (EPA 2017).

ID	Mitigation measures
Land resources	
LR1	Prior to the commencement of construction, a Soil and Water Management Plan (SWMP) will be prepared and will include management measures to cover: • erosion and sediment control • soil preservation • dispersive subsoils • any cut and fill activities • drainage and landform design. The SWMP will be implemented during construction and operation of the project.
LR2	As part of the CEMP, land disturbance processes will be developed to ensure unnecessary land disturbance does not occur, including provision for site inspection by the site Environmental Manager or delegate prior to disturbance to identify any necessary drainage and erosion and sediment controls are planned and implemented as required.
LR3	• **Agriculture land use will be re-established over all agricultural land removed from agriculture at the time of decommissioning (unless otherwise agreed with the landowner and/or regulatory authorities).** • **The modification area will be returned to an approximately equivalent potential agricultural productivity following the Project via soil management and LSC class reinstatement.** • **Stock fences, dams and irrigation infrastructure to be reinstated during decommissioning to suit post-Project land use as required.**
LR4	• **All soil that is proposed to be disturbed as a result of the proposed modification will be handled in accordance with the SWMP which will include soil management measures relating to soil stripping, stockpiling, respread/reuse, and land rehabilitation. This will inform the CEMP, OEMP and a Decommissioning and Rehabilitation Plan.** • **All disturbed land within the modification area will be returned to an equivalent LSC class following the end of life for the Project, through site rehabilitation and good soil management practices in accordance with the SWMP prepared for the Project.** • **All soil resources within the modification area are to be managed throughout construction, operation and decommissioning phases of the Project in accordance with a SWMP which should include erosion and sediment control recommendations.**
LR5	**Pest species will be managed in accordance with a detailed protocol relating to weed and pest control.**
LR6	**Biosecurity will be managed in accordance with a detailed protocol relating to biosecurity.**
Water resources	
Water quality	
WQ1	Prior to the commencement of construction, a Soil and Water Management Plan (SWMP) will be prepared, which will outline mitigation measures to be implemented during construction and operation of the project. Mitigation measures may consist of staged construction, construction outside the wet season and erosion and sediment control (ESC) measures such as sediment fences and sediment basins.
WQ2	The SWMP will also outline ESC measures to minimise the risk of erosion from unsealed roads in the study area. Mitigation options may include rumble pads, sediment fencing and sediment basins.
WQ3	The CEMP will include measures to minimise the risk of contamination from chemical spills.
Flooding	
FLO1	The natural state of the draining flow paths will be maintained whenever possible. Internal access roads, where crossing watercourses, will be designed for the 10% AEP design flow and may include compacted rock causeways to provide low maintenance access with limited impact on the drainage line or culvert structures.
FLO2	Foundations for the PV arrays and transmission lines will be located where possible outside of the areas identified as higher flood hazard. Solar panels will be designed to provide a minimum of 300 mm freeboard for the lowest edge above the maximum 1% AEP flood level. The panel posts and footings will also be designed to withstand the predicted flood velocities (adding scour protection if required).

ID	Mitigation measures
FLO3	Infrastructure with the potential to cause pollution to waterways in the event of flooding (i.e. inverters and BESS components) will be located with a minimum 300 mm freeboard above the maximum 1% AEP flood level.
FLO4	BESS components will be located on pad areas and aligned with local overland flow paths to prevent flows being redirected. **Where flood prone areas cannot be avoided in the operational infrastructure area and BESS locations, it is recommended that BESS pads would be flattened and constructed with a freeboard of 0.3 m from the 1% AEP flood event height.**
FLO5	The design and construction of waterway tracks and cable crossings and all internal tracks crossing watercourses within the development footprint will be generally in accordance with the *Guidelines for controlled activities on waterfront land – riparian corridors* (Natural Resources Access Regulator 2018), *Guidelines for watercourse crossings on waterfront land* (Department of Primary Industries, Office of Water 2012) and *Guidelines for laying pipes and cables in watercourses on waterfront land* (NSW Office of Water 2012).
FLO6	The best practice principles for stormwater and sediment control will be incorporated into the design, construction and operation phases of the project as part of the SWMP.
FLO7	Fencing will be designed to consider flood levels across the site through construction of floodways or relocating the fencing to reduce the likelihood of fence blockage due to loss of vegetation in storm events.
Social	
SOC1	ACEN will adopt a shared value approach in their identification of future community funding opportunities, employment, apprenticeship and training opportunities, and community involvement opportunities.
SOC2	ACEN is exploring the development and implementation of an ACEN Central West Orana solar projects Community Benefit Sharing Program (CBSP) that would see investment in a range of opportunities (including shared value opportunities) aligned with the needs of the community. The CBSP will be informed through a tailored community and stakeholder engagement strategy. In the interim, ACEN will continue to provide community support through the recently established Stubbo Solar and Battery project Social Investment Program.
SOC3	Construction workforce behaviour will be managed through the implementation of a construction workforce management plan (CWMP). The CWMP will seek encourage positive workforce behaviour and participation in community activities.
SOC4	ACEN will appoint a locally based resource to coordinate community and workforce engagement across all ACEN projects in the local area.
SOC5	ACEN will develop a Local Participation Plan and Aboriginal Participation Plan for the project construction phase that commits to procurement, employment and investment in job readiness targets for ACEN and its contracting partners.
SOC6	ACEN will comply with the mandatory contribution obligations for the Birriwa Solar and Battery project, under Section 7.11 and/or Section 7.12 of the EP&A Act in consultation with Mid-Western Regional Council, and/or with any requirements introduced specifically for the CWO REZ in place of such Contributions/Levies. The contributions paid under these requirements will be included in the global amount that constitutes the CBSP.
SOC7	ACEN will work with local employment, apprenticeship, and training agencies to enhance the potential of hiring of local and regional workers thereby minimising the need to hire workers from outside of the local and regional areas. Partnership with local employment and training agencies could specifically benefit youth and Aboriginal and Torres Strait Islander People by providing direct employment opportunities.
SOC8	ACEN will implement a Complaints and Grievances Procedure. The procedure will provide an opportunity for stakeholders to raise complaints, grievances, and provide feedback. The procedure will facilitate the timely response to stakeholder complaints and grievances, and enable the monitoring and reporting of grievances and ACEN response.

ID	Mitigation measures
SOC9	ACEN will prepare an Accommodation and Employment Strategy (AES) for the project. The AES documents actions that seek to support the following key objectives: • Identify how the facility construction workforce will be accommodated, and where they will be accommodated, and measures to minimise pressure on the existing capacity of short-term accommodation in the local area. • Facilitate an increase in the extent of the geographic area for local hires and workforce accommodation. • Facilitate enhanced local workforce participation.
SOC10	ACEN will develop a decommissioning and rehabilitation plan for the project that will describe how the development footprint would be returned, as far as practicable, to its condition prior to the commencement of construction. The decommissioning and rehabilitation plan will also describe the approach to disposal/recycling of infrastructure.
SOC11	ACEN will continue to explore opportunities with landholders to support co-location of livestock grazing within the development footprint.
SOC12	Gate and property access procedures, specific to individual landholder needs and requests, will be developed and implemented.
SOC13	ACEN will develop and implement a construction phase stakeholder engagement plan to guide engagement with the community and ensure timely release of project information.
SOC14	ACEN will develop and implement safety measures within the facility, including security patrols and adequate fencing and worker training, as well as complaints reporting processes for nearby landholders.
SOC15	The accommodation facility will consider the provision of a medical centre and first aid station with an onsite nurse to reduce pressure on local health service providers; however the onsite nurse should not be sourced from the regional workforce due to existing issues with recruitment for rural positions.
Bushfire	
BUS1	A minimum 10-m-wide APZ will be provided around the perimeter of project assets, including solar array and any operational buildings and storage/laydown areas. A minimum 11 m wide APZ setback from grassland will be provided to the east, south and west, and a minimum 20 m wide APZ setback from forest will be provided to the north of the accommodation facility infrastructure area.
BUS2	The APZ will be installed and maintained for the life of the project to the standard of an Inner Protection Area as outlined within Appendix 4 of PBP and the NSW RFS document *Standards for Asset Protection Zones* • APZ will be maintained free from fuel (i.e. comprised of sand, gravel, etc). • Grass will be kept short and to a height <10 cm. • Where possible any tree canopy will be excluded from the APZ. Where tree canopy cannot be excluded then the following will be implemented: – Ensure canopy cover within the APZ is less than 15% of the total canopy area. – Ensure branches do not touch or overhang any infrastructure buildings. – Ensure lower limbs are removed up to a height of 2 m above ground. – Ensure canopies are separated by at least 2 m. – Preference should be given to smooth barked and evergreen trees. • Shrubs are to be maintained as follows: – Large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided. – Shrubs should not be located under trees. – Shrubs should not form more than 10% groundcover. – Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
BUS3	A Bushfire Management Plan will be developed to guide landscape management, monitor and reduce potential fuel loads surrounding the project and APZ areas via ongoing rural activities (e.g. slashing, grazing). The Bushfire Management Plan will also be developed in consultation with the local NSW RFS District Office.

ID	Mitigation measures
BUS4	All buildings (BESS, substation buildings, management and operational buildings) will provide for minimum ember protection consistent with BAL12.5 construction standards (AS3959-2018). For the accommodation facility, the following BAL apply: • BAL 29 level of construction as per Section 3 and 7 of AS 3959-2018 and Chapter 7.5 PBP to perimeter structures. • BAL 19 and BAL 12.5 level of construction as per Section 3 and 5-6 of AS 3959-2018 to internal structures.
BUS5	50–80 kL steel tank dedicated water storage will be strategically located in consultation with NSW RFS, to allow for permanent emergency water supply and ease of access.
BUS6	The project site access point and private internal roads will provide for safe, reliable, and unobstructed passage by a Cat 1 firefighting vehicle and maintained for the life of the development.
BUS7	The access relevant to property access, perimeter road and non-perimeter road within the accommodation facility comply with Table 5.3b PBP.
BUS8	The provision of water, electricity and gas comply with Table 5.3c of PBP.
BUS9	Emergency management: A Bush Fire Emergency Management and Evacuation Plan is prepared by the operator consistent with the NSW RFS publication: *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan, and the AS 3745:2010*.
Historic heritage	
HH1	A historic heritage management plan (HHMP) will be prepared for the project in consultation with DPE, prior to the commencement of construction. The HHMP will include an unanticipated finds protocol that will be implemented if previously unrecorded or unanticipated historic objects are encountered during construction.
Air quality	
AQ1	Water truck(s) will be used during construction for dust suppression along internal, unsealed access roads and disturbed areas.
AQ2	Vehicle movements will be minimised, where possible.
AQ3	All vehicles, plant and equipment will be cleaned and washed regularly.
AQ4	All vehicles, plant and equipment will be regularly inspected and maintained to ensure that they are operating efficiently.
AQ5	Regular maintenance of unsealed access roads will be undertaken to minimise wheel-generated dust.
AQ6	Dust suppression requirements during construction will take into consideration weather and the likelihood of extended dry periods which could exacerbate impacts.
Waste	
WAS1	All waste will be managed in accordance with the NSW *Protection of the Environment Operations Act 1997* and NSW *Waste Avoidance and Resource Recovery Act 2001*.
WAS2	All waste produced by the project will be classified, stored and handled in accordance with *the Waste Classification Guidelines – Part 1: Classifying Waste* (EPA 2014).
WAS3	Waste will be managed in accordance with the waste hierarchy, which is listed in order of preference: • reduce waste production • recover resources • dispose of waste appropriately.
WAS4	A detailed waste management plan will be prepared prior to construction.
WAS5	As part of decommissioning, ACEN will attempt to recycle all dismantled and decommissioned infrastructure and equipment, where possible.
WAS6	General waste bins will be provided for disposal of materials that cannot be cost-effectively recycled .

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