APPENDIX

F

Technical Assessments

Appendix F.6

Bushfire assessment report

EMM
creating opportunities

Bushfire Assessment Report

BIRRIWA SOLAR AND BATTERY PROJECT

AMENDMENT REPORT

State Significant Development SSD-29508870

Accommodation Facility (increased residential density)

Birriwa

Mid-Western Regional Local Government Area

Applicant: ACEN Australia Pty Ltd

29 August 2023

Version V1.1

COOL BURN FIRE + ECOLOGY

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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Project Details

Project Name:	J202 – Birriwa Accommodation Facility – Birriwa Solar and Battery Project Amendment Report
Client Details:	ACEN Australia Pty Ltd Suite 2, 15 Castray Esplanade, Battery Point, TAS 7004
Project Address	Accommodation Facility to be located on rural landholding 773 Merotherie Road Merotherie, NSW 2852
Local Government Area	Mid-Western Regional Council – Central Ranges Region (FDI 80)
Zoning (LEP 2014)	RU1 Primary Production REZ – Renewable Energy Zone
Proposed Development	Accommodation Facility for the construction of Birriwa Solar and Battery Project PBP – 'Other Development' – increased residential density
Approval Path	Sate Significant Development (SSD) -29508870
Building Classification	Residential Dwellings – Class 1-4 Structures

Document Control

Version	Primary Author(s)	Description	Date Completed
V1.2-FINAL	D. Pedersen	Final for submission to DPE	29 August 2023

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EXECUTIVE SUMMARY

The Development

In response to matters raised in submissions and outcomes of the ongoing engagement with the local community, government agencies, project landholders, and other stakeholders for the Birriwa Solar and Battery Project, ACEN has made amendments to the project, as follows:

- The addition of a temporary accommodation facility, on adjacent land south-east of the original project study area presented in the EIS (refer to **Figure 1.3**), to provide accommodation for up to 500 construction staff during the construction phase of the project.
- A refinement to the development footprint associated with the solar component of the project, to re-include an area of grassland (approximately 5 ha) that was excluded in the EIS based on conservative mapping of this area as derived native grassland. This area has been surveyed by EMM ecologists since submission of the EIS, which confirmed that this area is not derived native grassland, and therefore does not need to be avoided on the basis of ecological constraints.

The temporary accommodation facility will be suitable to accommodate up to 500 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.

The accommodation facility is in the localities of Birriwa and Merotherie, approximately 15 kilometres (km) southwest of the township of Dunedoo, New South Wales (NSW) (refer to **Figure 1.1**). The project is within the Central-West Orana (CWO) Renewable Energy Zone (REZ) and is within Mid-Western Regional local government areas (LGA). The accommodation infrastructure area is proposed to be connected to the solar and BESS development via a new internal access track. A second access track is also proposed to provide a second means of access/egress, suitable for emergency access only. The project amendments and accommodation facility is shown in **Figure 1.3** and **Figure 3.1**.

An amendment report has been prepared to describe this proposed amendment. A Bushfire Assessment Report was prepared for the Birriwa solar and battery project. This bushfire assessment report provides an assessment of the impacts associated with the revised project amendments.

The proposed Accommodation Facility will involve introducing a large number of people (occupants) to an area that has potential bushfire risk and is assessed as an ‘increase in residential density’ acknowledging Chapter 8.2.1 of Planning for Bushfire Protection 2019 (PBP). Increased resident densities of existing lots that are bush fire prone may heighten the level of risk to the occupants. The presence of additional dwellings can impact on the evacuation and sheltering of residents during a bush fire. This increase in residential density does not require a subdivision approval. However, the same principles and criteria associated with subdivisions in bush fire prone areas will apply. This includes ensuring an Asset Protection Zone (APZ) based on a radiant heat threshold of 29kW/m² for any new

dwellings, along with suitable provision for construction, access, water and landscaping consistent with the requirements of Chapters 5 of PBP.

Bushfire Prone Land

The site is not mapped as bushfire prone land by Mid-Western Regional Council. However, the development could potentially be exposed to a bushfire threat and the Planning Secretary's Environmental Assessment Requirements (SEARs) requires the assessment of bushfire risk in accordance with PBP.

Vegetation Formation Classification

The vegetation posing the highest bushfire risk to the Accommodation Facility is grassland and some forest on the ridges.

Slope Assessment

The Accommodation Facility is on a southern aspect and the effective slopes are between 0-5 downslope (south), cross slope and some upslope influences (north).

Development Performance

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment. The performance for the accommodation facility (assessed against Chapter 5 PBP) is detailed in Table 1.

Table 1 PBP Bushfire planning performance assessment for proposed development

Performance Criteria	Acceptable Solutions	Design Compliance
Asset Protection Zones Intent of measures: to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.		
potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	an APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.	**YES:** APZ is provided in accordance with A1.12.3
APZs are managed and maintained to prevent the spread of a fire to the building.	APZs are managed in accordance with the requirements of Appendix 4 of PBP.	**YES:** APZ design in accordance with the requirements of Appendix 4 of PBP
the APZ is provided in perpetuity. APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are wholly within the boundaries of the development site. APZ are located on lands with a slope less than 18 degrees.	**YES:** APZ are wholly within the boundaries of the accommodation facility **YES:** APZ are located on lands with a slope less than 18 degrees
Landscaping Intent of measures: to provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.		
landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	landscaping is in accordance with Appendix 4; and fencing is constructed in accordance with section 7.6	**YES:** landscaping will be in accordance with PBP Appendix 4 **YES:** fencing is not applicable
Access (general requirements) Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area		
firefighting vehicles are provided with safe, all-weather access to structures.	property access roads are two-wheel drive, all-weather roads;	**YES:** property access roads are two-wheel drive, all-weather roads

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Performance Criteria	Acceptable Solutions	Design Compliance
	perimeter roads are provided for residential subdivisions of three or more allotments;	**YES:** a perimeter road will be provided around the accommodation facility infrastructure area
	subdivisions of three or more allotments have more than one access in and out of the development;	**YES:** there will be more than one access in and out of the development (access track to the north and emergency access track to the south (Figure 3.1))
	traffic management devices are constructed to not prohibit access by emergency services vehicles;	**YES:** traffic management devices will not prohibit access by emergency services vehicles
	maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;	**YES:** access road grades will be suitable
	all roads are through roads;	
	dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	**YES:** there will be through road access **YES:** there will be no dead ends
	where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	**YES:** there will be no kerb and guttering
	where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and	**YES:** there will be secondary access provided to an alternate point on the existing public road system
	one way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	**YES:** n/a for this development

Performance Criteria	Acceptable Solutions	Design Compliance
the capacity of access roads is adequate for firefighting vehicles.	the capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/causeways are to clearly indicate load rating.	**YES:** road surfaces and any bridges/causeways sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes) **YES:** bridges/causeways to clearly indicate load rating
there is appropriate access to water supply.	hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression; hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - Fire hydrant installations System design, installation and commissioning; and there is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	**YES**: hydrant system to be provided in accordance with the relevant clauses of AS 2419.1:2005 **YES**: hydrant system to be provided in accordance with the relevant clauses of AS 2419.1:2005 **YES:** suitable access for a Category 1 fire appliance to within 4m of the static water supply will be provided
Perimeter Road		
perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.	there are two-way sealed roads; minimum 8m carriageway width kerb to kerb; parking is provided outside of the carriageway width; hydrants are to be located clear of parking areas; there are through roads, and these are linked to the internal road system at an interval of no greater than 500m; curves of roads have a minimum inner radius of 6m; the maximum grade road is 15 degrees and average grade of not more than 10 degrees; the road crossfall does not exceed 3 degrees; and	**YES:** two-way sealed or gravel roads; **YES:** minimum 8m carriageway width (no kerb); **YES:** parking provided outside of the carriageway; **YES:** no hydrants located in parking areas; **YES:** there are through roads; **YES:** road curves have a minimum inner radius of 6m; **YES:** the maximum grade road is <15 degrees and average grade of <10 degrees; **YES:** the road crossfall will not exceed 3 degrees; and

Performance Criteria	Acceptable Solutions	Design Compliance
	a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	**YES:** minimum vertical clearance of 4m to any overhanging obstructions will be provided.
Non-Perimeter Road		
non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating	minimum 5.5m carriageway width kerb to kerb; parking is provided outside of the carriageway width; hydrants are located clear of parking areas; roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m; curves of roads have a minimum inner radius of 6m; the road crossfall does not exceed 3 degrees; and a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	**YES**: minimum 5.5m be provided (no kerbs) **YES**: parking provided outside of the carriageway **YES**: no hydrants located in parking areas **YES:** through roads within this development **YES**: curves have a minimum inner radius of 6m **YES**: the road crossfall not exceed 3 degrees **YES**: a minimum vertical clearance of 4m to any overhanging obstructions provided
Property Access		
firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	property access roads are two-wheel drive, all weather roads	**YES**: property access roads are two-wheel drive, all weather roads
the capacity of access roads is adequate for firefighting vehicles.	the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	**YES**: road surfaces and any bridges/causeways capacity could support heavy vehicles, including RFS vehicles to be sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes).
there is appropriate access to water supply.	hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005;	**YES**: hydrant system to be provided in accordance with the relevant clauses of AS 2419.1:2005
firefighting vehicles can access the dwelling and exit the property safely	minimum 4m carriageway width; in forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m	**YES**: property access minimum 4m width **YES**: rural property access road to have passing bays every 200m that are 20m long by 2m wide

Performance Criteria	Acceptable Solutions	Design Compliance
	long by 2m wide, making a minimum trafficable width of 6m at the passing bay; a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches; provide a suitable turning area in accordance with PBP Appendix 3; curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress; the minimum distance between inner and outer curves is 6m; the crossfall is not more than 10 degrees; maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and a development comprising more than three dwellings has access by dedication of a road and not by right of way.	**YES**: a minimum vertical clearance of 4m to any overhanging obstructions provided **YES**: suitable turning area be provided **YES**: curves have minimum inner radius of 6m and minimal in number to allow for rapid access and egress **YES**: distance between inner and outer curves is 6m **YES**: the crossfall not more than 10 degrees **YES**: maximum grades do not exceed 10 degrees **YES**: n/a
Water Supplies Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building		
an adequate water supply is provided for firefighting purposes.	reticulated water is to be provided to the development, where available; a static water supply is provided where no reticulated water is available (n/a).	**YES**: hydrant system to be provided in accordance with the relevant clauses of AS 2419.1:2005 **YES**: static water supply can be provided
water supplies are located at regular intervals; and	Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2005; hydrants are not located within any road carriageway; and	**YES**: hydrant system to be provided in accordance with the relevant clauses of AS 2419.1:2005 **YES**: fire hydrants not located within carriageway.

Performance Criteria	Acceptable Solutions	Design Compliance
the water supply is accessible and reliable for firefighting operations.	reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads	**n/a**: The development is not an urban subdivision nor has perimeter road
flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005.	**YES**: hydrant system to be provided in accordance with the relevant clauses of AS 2419.1:2005
The integrity of the water supply is maintained.	all above-ground water service pipes external to the building are metal, including and up to any taps	**YES**: The proposed development will ensure all above-ground water service pipes external to the building are metal, including and up to any taps
Electricity Services Intent of measures: to locate electricity so as not to contribute to the risk of fire to a building		
location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings	where practicable, electrical transmission lines are underground; and where overhead, electrical transmission lines are proposed as follows: • lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and • no part of a tree is closer to a power line than the distance set out in accordance with the specifications in ISSC3 Guideline for Managing Vegetation Near Power Lines	**YES**: Conditioned, electricity services will be installed to required specifications and will limit the potential of ignition of surrounding bushland or fabric of buildings.
Gas Services Intent of measures: to locate gas so as not to contribute to the risk of fire to a building		
location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used;	**YES**: Conditioned, the proposed development has capacity to achieve the relevant acceptable solutions for gas services

Performance Criteria	Acceptable Solutions	Design Compliance
	• all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; • connections to and from gas cylinders are metal; • polymer-sheathed flexible gas supply lines are not used; and • above-ground gas service pipes are metal, including and up to any outlets	
Construction Standards		
the proposed building can withstand bush fire attack in the form of embers, radiant heat and flame contact.	BAL is determined in accordance with PBP Tables A1.12.5 to A1.12.7; and construction provided in accordance with the NCC and as modified by PBP section 7.5	**YES**: The proposed development has determined the minimum APZ to achieve BAL29, using PBP Table A1.12.6 BAL29 construction applicable to the perimeter structures. BAL19 and BAL12.5 apply to central structures as detailed in site planning. BAL12.5 is the minimum construction standard applicable at this site.

Contents

1. INTRODUCTION

EMM Consulting Pty Ltd (EMM) on behalf of ACEN Australia Pty Ltd (ACEN) has commissioned Cool Burn Pty Ltd (Cool Burn) to prepare a Bushfire Assessment Report to assist in constraints analysis and provide advice for suitable design and planning measures for the proposed temporary accommodation facility at the Birriwa Solar and Battery Project State Significant Development (SSD – 29508870); a large scale solar photovoltaic (PV) generation facility along with a Battery Energy Storage System (BESS) and associated infrastructure (the project) in the locality of Birriwa, approximately 15 kilometres (km) south-west of the township of Dunedoo, in the Central West of New South Wales (NSW) (**Figure 1.1**).

The accommodation facility will comprise prefabricated demountable units (refer *Section 3.4* of the Amendment Report) to accommodate a workforce for the construction of the Birriwa Solar and Battery Project. The proposed development is not on land that is mapped as bushfire prone, however it is recognised as having a potential risk to bushfire, and the Planning Secretary's Environmental Assessment Requirements (SEARs) requires the assessment of bushfire risk in accordance with Planning for Bushfire Protection 2019 (PBP).

This development does not require an approval from the NSW Rural Fire Service (RFS) under *Rural Fires Act 1997* (RF Act) s.100B.

To satisfy bushfire risk and protection requirements, Cool Burn have assessed the development of the accommodation facility following the methodology and standards of PBP, and the specific PBP Chapters:

- *Chapter 8.2.1 Increased residential densities associated with the rural workers dwellings component*; and
- *Chapter 5 Residential Subdivision Development as applicable*.

This assessment has been prepared by a suitably qualified bushfire practitioner, Dan Pedersen (BPAD Level 3 BPAD 16293).

1.1.Location

The accommodation facility study area is in the Merotherie rural district and is located in a rural landscape (agricultural).

It is located approximately 25 kilometres (km) south-west of the township of Dunedoo, in the Central West region of NSW. The project is within the Mid-Western Regional local government area (LGA). The project is within the Central-West Orana (CWO) Renewable Energy Zone (REZ).

The location and regional context of the accommodation facility is illustrated in **Figure 1.1**, **Figure 1.2**, **Figure 1.3**, and **Figure 3.1** (Appendix 1). The accommodation facility infrastructure area will accommodate the prefabricated demountable units; the accommodation facility incorporates the infrastructure area, the access track to the north, and the emergency access track to the south.

2. LEGISLATIVE FRAMEWORK

The project is being assessed as a State Significant Development (SSD) and therefore the EP&A Act s.4.14 (*Consultation and development consent—certain bush fire prone land*) does not apply. However, the SEARs issued for the project require an assessment of potential hazards and risks including bushfire.

Bushfire risk is to be assessed in accordance with PBP. This includes an assessment of potential bushfire risk associated with the accommodation facility, identification of Bushfire Protection Measures (BPMs), the determination of acceptable solutions for each measure, and a demonstration of compliance.

2.1. Planning for Bushfire Protection 2019

This report is consistent with PBP aims: to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives of PBP are to:

- afford buildings and their occupants protection from exposure to a bush fire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- provide for ongoing management and maintenance of Bushfire Protection Measures (BPMs); and
- ensure that utility services are adequate to meet the needs of firefighters.

This Bushfire Assessment has utilised the site assessment methodology within Appendix 2 of PBP to determine the bushfire threat to the site and the development, and to recommend the appropriate bushfire mitigation measures.

2.2. Increase in Residential Density

The Accommodation Facility will involve introducing a large number of people (occupants) to an area that has potential bushfire risk and is assessed as an ‘increase in residential density’ acknowledging Chapter 8.2.1 of PBP.

Increased resident densities of existing lots that are bush fire prone may heighten the level of risk to the occupants. The presence of additional dwellings can impact on the evacuation and sheltering of residents during a bush fire.

This increase in residential density does not require a subdivision approval. However, the same principles and criteria associated with subdivisions in bush fire prone areas will apply. This includes ensuring an APZ based on a radiant heat threshold of 29kW/m² for any new dwellings, along with suitable provision for construction, access, water and landscaping aligned with the requirements of Chapters 5 of PBP.

The specific objectives for residential and rural residential subdivisions Chapters 5 of PBP are as follows:

- Minimise perimeters of the subdivision exposed to the bush fire hazard (hourglass shapes, which maximise perimeters and create bottlenecks should be avoided);
- Minimise vegetated corridors that permit the passage of bush fire towards buildings;
- Provide for the siting of future dwellings away from ridge-tops and steep slopes, within saddles and narrow ridge crests;
- Ensure that APZs between a bush fire hazard and future dwellings are effectively designed to address the relevant bush fire attack mechanisms;
- Ensure the ongoing maintenance of APZs;
- Provide adequate access from all properties to the wider road network for residents and emergency services;
- Provide access to hazard vegetation to facilitate bush fire mitigation works and fire suppression; and
- Ensure the provision of an adequate supply of water and other services to facilitate effective firefighting.

3. BUSHFIRE RISK ASSESSMENT

3.1. Fire Weather

The fire weather is measured as Fire Danger Index (FDI) and assumes a credible worst-case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds. Fire weather and FDI for NSW LGAs, and for use with PBP is provided in the NSW RFS Community Resilience document (NSW RFS, May 2017) - NSW Local Government Areas FDI.

The accommodation facility study area in Mid-Western Regional LGA is in the Central Ranges district and will use FDI 80 and a Grassland Fire Danger Index (GFDI) of 110.

3.2. Vegetation Assessment

The bushfire assessment methodology assesses the vegetation classification on and surrounding the site (out to 140 metres) in accordance with the system for classification of vegetation contained in PBP. Vegetation is classified by structure or formation using the system adopted by Keith (2004) and by the general description using PBP.

A review of the vegetation mapping conducted for the project identifies that the accommodation facility infrastructure area is primarily situated over derived native grasslands and pastures that are associated to two Plant Community Types (PCTs):

- PCT 479 - *Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion*; and

- 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.*

Elevated areas to the north of the proposed accommodation facility, associated with the ridgeline formation known as Barneys Reef, contain remnant woodland (PCT 479). Derived native grasslands and pastures characterise the lower elevations. Vegetation and contour mapping has been illustrated in **Figure 1.4**.

In accordance with PBP, an on-site assessment and classification of bushfire prone vegetation on and surrounding the accommodation facility study area has been undertaken. The predominant vegetation is:

- Managed, rural grassland vegetation up to 6 tonne per hectare (t/ha); and

- Forest vegetation on Barneys Reef Range.

3.3.Slopes Influencing Bushfire Behaviour

The bushfire assessment methodology assesses the slope of the land supporting bushfire prone vegetation on and surrounding the accommodation facility out to 100 metres from the boundaries of the Facility.

The accommodation facility is located on a lower slope with a southern aspect.

The grasslands are:

- Gentle downslopes between 0-5 degrees to the south;
- Cross slope (flat) to the northeast and west; and
- Upslope to the north.

The forests are:

- Upslope to the north and west.

3.4.Consultation

Consultation has been undertaken with the Orana District RFS[1] from NSW Central West Region. The project lies within the Cudgegong District RFS. The consultation broadly addressed how the RFS perceive risk associated with renewable energy projects within the Renewable Energy Zone (REZ), including Solar Farms, BESS, and transmission infrastructure. The cumulative effect of REZ development has direct and indirect impacts for bush fire management and can be considered to create both positive/beneficial outcomes as well as negative outcomes. A summary of relevant points raised during the consultation is provided below. Minutes of the consultation meeting have been provided in **Appendix 2**.

- The new REZ based developments are dividing the community, particularly rural landholders. Whilst some landholders are accepting offers to lease or sell land, others are declining offers but may still be impacted by neighbouring developments. This can have a flow on affect to volunteer RFS brigades;
- There is the potential for increased pressure on existing infrastructure and resources (roads infrastructure, emergency management capacity);

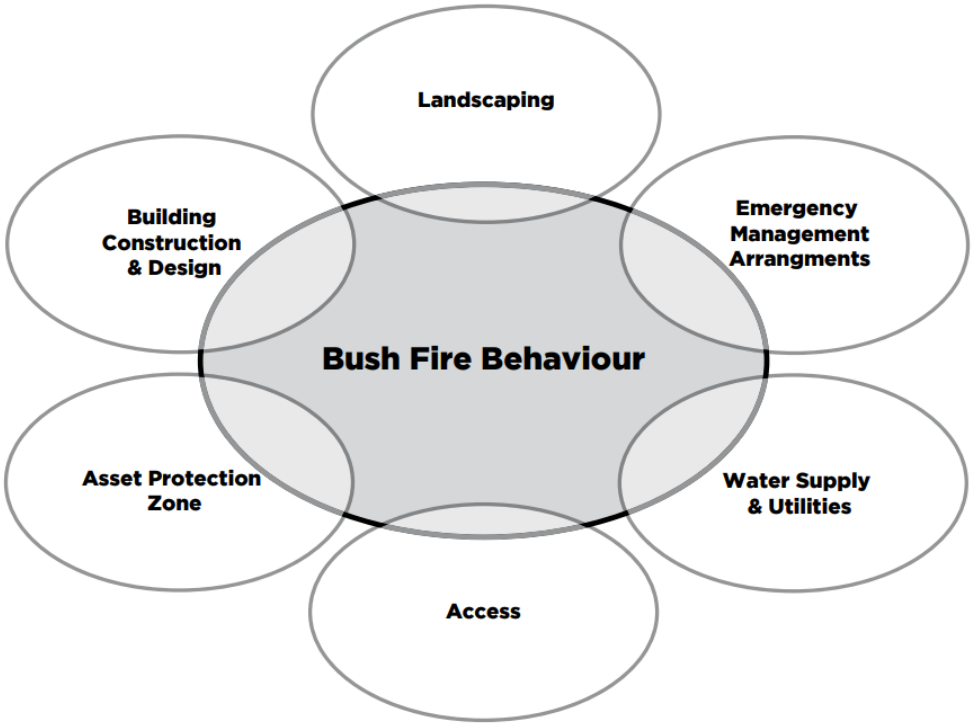
[1] It should be noted that the Birriwa Solar and Battery Project lies within the Cudgegong District RFS area.

- There is concern that state significant and national assets may be a higher priority for bushfire protection planning than the existing community and privately owned assets;
- Such developments could lead to an increase in ignition sources;
- A reduction in local personnel, due to land acquisition for renewable projects, could impact local bushfire fighting and protection capacity through diminished volunteer RFS brigades. This could lead to an opportunity to encourage REZ employees to join and support local volunteer brigades;
- Road and track upgrades associated with renewable energy projects could provide access assurances and compartmentalise larger fires, which can be perceived as a beneficial outcome;
- Level of landscaping management to ensure REZ assets are protected from bush fire (as conditioned in the approvals process) will provide inherent fuel 'breaks' across the landscape;
- Larger water supplies strategically located at the REZ projects (i.e., 50,000L+ tanks) can be adapted for broader community and emergency service use. This water supply for community accessibility could be at perimeter locations so that the fire services do not need to enter into and travel through renewable energy project sites; and
- The strategic bush fire emergency planning for the cumulative REZ could enhance bush fire protection for the region and districts.

4. RECOMMENDED BUSHFIRE PROTECTION MEASURES

The BPMs for the accommodation facility include provisions relating to APZs and landscaping, access, water supply, electricity and gas services, construction standards, and emergency management (**Plate 1**).

Plate 1 Bushfire Protection Measures



4.1.BPM - Asset Protection Zones

The APZ is a fuel-reduced, physical separation between structures and bushfire hazards, which would provide sufficient space and maintain reduced fuel loads to ensure radiant heat levels at the buildings are below critical limits and prevent direct flame contact.

The required APZ setbacks for the proposed temporary prefabricated demountable units have been calculated using PBP Table A1.12.3 Minimum distances for APZs – residential development, FFDI 80 areas, (to achieve <29kW/m^2, at 1090K flame temp.) based on the assessed grassland vegetation on >0^0 - 5^0 effective slopes.

The accommodation facility will provide a minimum:

- 11m APZ setback from grasslands (east, south and west)

- 20m APZ setback from forest (north)
- The APZ will incorporate a perimeter road.

Mapping of the proposed APZs has been provided in **Figure 1.4**.

4.2. BPM - Landscaping

The assessment assumes that vegetation within the APZ and the accommodation facility would be managed to the prescribed standards for Inner Protection Area (IPA) as detailed in PBP Appendix 4:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- 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% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

4.3.BPM - Construction

Bushfire Attack Level (BAL) is a means of measuring the ability of a building to withstand attack from bushfire. The BAL is defined in *Australian Standard AS 3959-2018 Construction of buildings in bushfire-prone areas* (AS 3959-2018). The temporary prefabricated demountable units will be constructed to comply with Sections 3 and 5-7 Australian Standard AS 3959-2018 Construction of buildings in bushfire

prone areas or NASH Standard (1.7.14 updated) National Standard Steel Framed Construction in Bushfire Areas – 2014 as appropriate and Section 7.5 of PBP.

The maximum construction level allowable is BAL29 (i.e., perimeter structures within 20m of forest or 11m from grasslands).

The minimum construction standards for the demountable units in the accommodation facility will be BAL12.5.

The temporary prefabricated demountable units will be constructed to:

- BAL19 construction standards when within 30m from the hazard (or the outer APZ extent), and
- BAL12.5 construction standards when greater than 30m from the hazard (or the outer APZ extent).

4.4.BPM – Access

The intent of access measures is to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

The development design provides a road network where firefighting vehicles are provided with safe, all-weather access to structures, these include:

- Property access tracks (minimum 4 m carriageway width and capacity for heavy vehicles up to 23 tonnes) to the public road system:
    - A new access track north facilitating access from the accommodation facility to the solar and BESS project area
    - Emergency access track to the south of the accommodation facility
- 8 m wide perimeter road being clear of parking provided around the accommodation facility where the temporary prefabricated demountable units will be located;
- 5.5 m wide non-perimeter roads being clear of parking provided within the accommodation facility allowing for property access; and
- Suitable access to water supplies and connection points (hydrants, static water supply).

These roads should be designed and constructed in accordance with *Table 5.3b PBP 2019*.

4.5.BPM - Water and Services

The development will provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

Specific to the accommodation facility, a static water and hydrant supply will be provided, and comply the following requirements of PBP:

- A minimum 50,000L static water supply (above ground storage steel or concrete tank);
- Connections suitable for firefighting purposes located within the accommodation facility, being 65 mm Storz outlets;
- Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005;
- Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005;
- A fire hose reel system be constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005;
- Unobstructed access to water supply points at all times;
- All above-ground water service pipes are metal, including and up to any taps.

It is recommended that electricity and gas provisions to the property are installed to relevant standards and will limit the possibility of ignition of surrounding bushland or the fabric of buildings, and these elements can be engineered into any future design scenarios.

As per *Section 3.4.3* of the Amendment Report, it is estimated that the accommodation facility will require 2.6 - 2.8 kWh of electricity per person per day. 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. It is expected that electricity would be installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of the relevant authority.

The proposed water and services design for this development have capacity to meet the PBP performance criteria requirements.

4.6.BPM – Emergency Management Planning

Emergency management planning for the accommodation facility will provide suitable emergency and evacuation arrangements for occupants of the Facility.

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*.

5. RECOMMENDATIONS AND CONCLUSION

The proposed accommodation facility design applies acceptable bushfire protection measures and can demonstrate performance criteria consistent with PBP. The following recommendations have been made for this site:

- A minimum APZ to be provided:
    - 20 m north to forest
    - 11 m east, south and west to grassland.
- APZ and landscaping across the accommodation facility infrastructure area will be managed to ensure ongoing protection from the impact of bush fires, the entirety of the proposed temporary worker accommodation facility must be managed as an inner protection area (IPA) in accordance with the requirements of Appendix 4 of PBP.
- Construction Standards
    - BAL 29 level of construction as per Section 3 & 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 & 5-6 of AS 3959-2018 to internal structures
- Access roads and tracks to and within the accommodation facility infrastructure area comply with Table 5.3b PBP.
- The provision of water, electricity and gas comply with Table 5.3c of PBP.
    - A 50,000 L static water and hydrant supply will be constructed for the accommodation facility, with provisions of fire hydrants and fire hose reels.
    - Electricity and gas services limit the possibility of ignition of surrounding bushland or fabric of buildings.
- The provision of suitable and appropriate bushfire emergency management planning for the occupants of the development:
    - 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*.

It has been assessed that the proposed development adequately considers bushfire risk and can conform to the specifications and performance requirements of PBP, providing a suitable outcome commensurate with the bushfire risk.

Dan Pedersen | Principal Bushfire Ecology
Cool Burn Pty Ltd
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Fire Protection Association of Australia BPAD Level 3 BPD-PA 16293

6. ASSESSMENT AGAINST THE AIMS AND OBJECTIVES OF PBP

The bushfire assessment identifies the extent to which the proposed mixed use and increased residential density development conforms with or deviates from the aims and specific objectives set out in PBP 2019. Table 3 details the compliance with PBP aims and objectives.

Table 2 Compliance with Aim & Objectives of PBP

Aim	**Meets Aim**	**Comment**
to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.	Yes	The location of the proposed development has considered bushfire risk and applied relevant bushfire protection measures to mitigate bushfire impact, commensurate with the risk
General Objectives	**Meets Objective**	**Comment**
afford buildings and their occupants protection from exposure to a bush fire;	Yes	The proposed development is afforded acceptable APZ protection and defendable space, commensurate to the risk
provide for a defendable space to be located around buildings;	Yes	Design will provide for a defendable space
provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;	Yes	Setbacks to achieve <BAL29 and construction commensurate with assessed risk
ensure that appropriate operational access and egress for emergency service personnel and occupants is available;	Yes	Access will be provided to acceptable PBP2019 standards
provide for ongoing management and maintenance of BPMs; and	Yes	Bushfire protection management and maintenance responsibility contained within the site
ensure that utility services are adequate to meet the needs of firefighters.	Yes	Water and services will be provided to acceptable PBP2019 standards
Specific Residential Subdivision Objectives	**Meets Objective**	**Comment**
minimise perimeters of the subdivision exposed to the bush fire hazard (hourglass shapes, which maximise perimeters and create bottlenecks should be avoided);	Yes	Design to incorporate minimal perimeter exposure
minimise vegetated corridors that permit the passage of bush fire towards buildings;	Yes	Design to incorporate minimal vegetation corridors

provide for the siting of future dwellings away from ridge-tops and steep slopes, within saddles and narrow ridge crests;	Yes	Design avoids ridge tops and steep slopes, saddles and narrow ridge crests
ensure that APZs between a bush fire hazard and future dwellings are effectively designed to address the relevant bush fire attack mechanisms;	Yes	Access will be provided to acceptable PBP2019 standards
ensure the ongoing maintenance of APZs	Yes	Bushfire protection management and maintenance responsibility contained within the site
provide adequate access from all properties to the wider road network for residents and emergency services;	Yes	The proposal will increase the level of bushfire protection to the existing site
provide access to hazard vegetation to facilitate bush fire mitigation works and fire suppression; and	Yes	Access will be provided to acceptable PBP2019 standards
ensure the provision of an adequate supply of water and other services to facilitate effective firefighting.	Yes	Water supply will be provided to acceptable PBP2019 standards

References

Keith, David (2004) – Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT. The Department of Environment and Climate Change

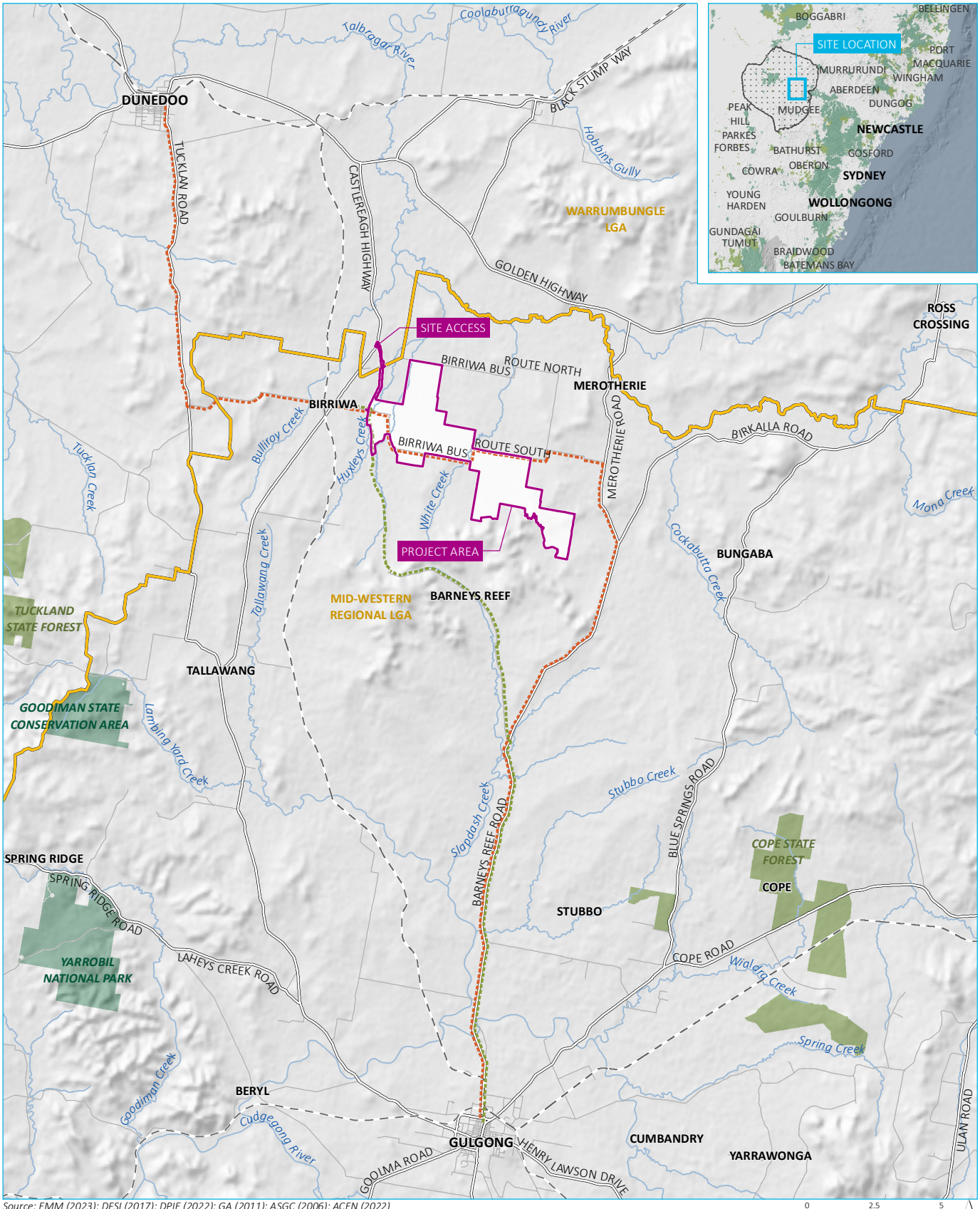
NSW Rural Fire Service (2015) Guide for Bushfire Prone Land Mapping

NSW Rural Fire Service (2019). NSW LOCAL GOVERNMENT AREAS FDI. COMMUNITY RESILIENCE May 2017. Fire Weather Districts and FDI for NSW Local Government Areas- for use with Planning for Bush Fire Protection.
https://www.rfs.nsw.gov.au/__data/assets/pdf_file/0007/55285/Local-government-areas-and-FDI.pdf

NSW Rural Fire Service (2019). Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Homeowners. Australian Government Publishing Service, Canberra

NSW Government (1979) Environmental Planning and Assessment Act 1979. NSW Government Printer

Appendix 1 Proposed Development Site Mapping



Source: EMM (2023); DFSI (2017); DPIE (2022); GA (2011); ASGC (2006); ACEN (2022)

0 2.5 5 km

GDA 1994 MGA Zone 55

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KEY

- Project area

Existing environment

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

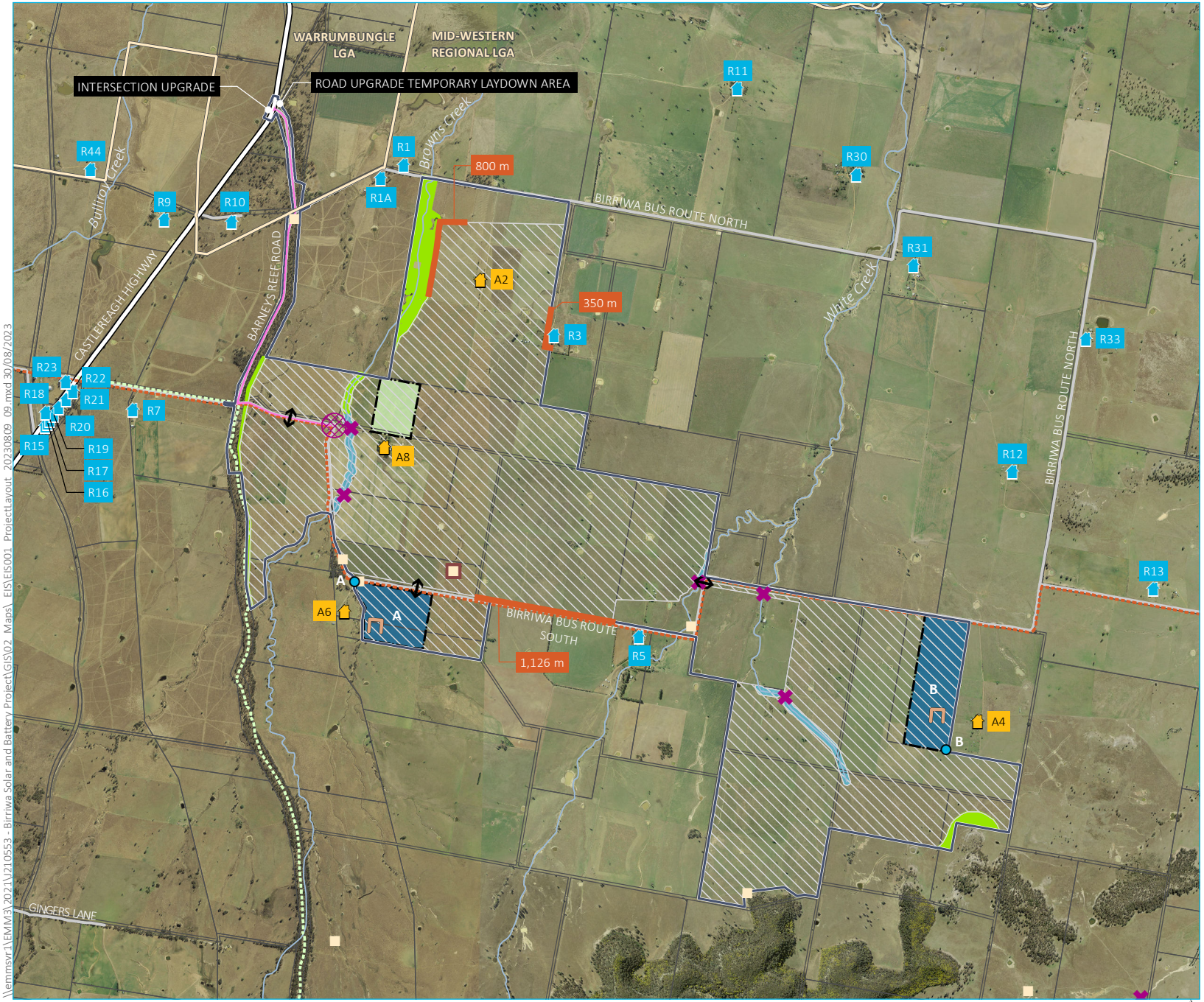
Central West Cycle (CWC) Trail

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

Regional location

Birriwa Solar and BESS Project
Amendment Report
Bushfire Assessment Report
Figure 1.1

EMM
creating opportunities



KEY

- Solar and BESS study area
- Develoment footprint
- Barney's Reef Road upgrade corridor
- Restricted development area
- Potential public road crossing location

Project layout

- Potential creek crossing point (refer to inset below for indicative design)
- Connection point (option A or B)
- Indicative noise wall location
- Landscape screen planting
- Proposed access point to the project
- Proposed operational infrastructure area including substation, operational facility and BESS (option A or B)
- Temporary construction compound

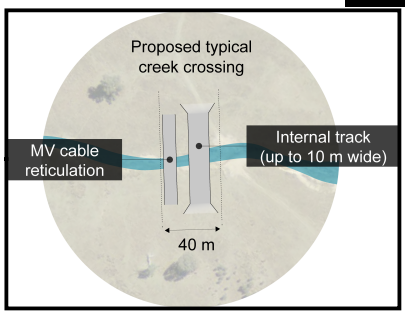
Existing environment

- Dwelling not associated with the project
- Dwelling associated with the project
- Aboriginal heritage site (to be salvaged)
- Aboriginal heritage site (to be avoided)
- Vegetation to be retained
- Major road
- Minor road
- 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

INSET



Project layout

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

0 1 2 km

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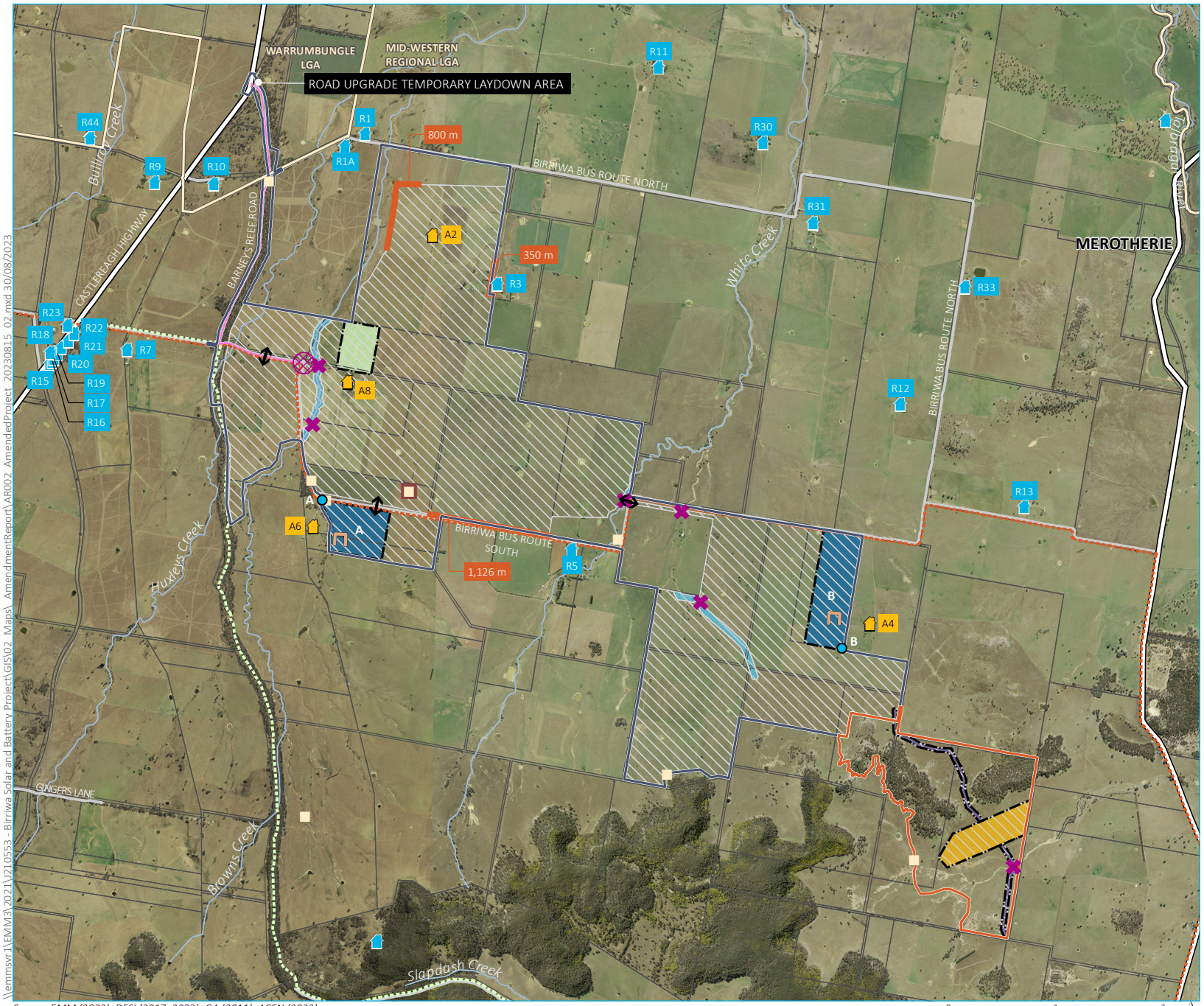
Birriwa Solar and BESS Project
Amendment Report
Bushfire Assessment Report
Figure 1.2

EMM
creating opportunities



KEY

- Solar and BESS study area
- Accommodation facility study area
- Develoment footprint
- Road upgrade corridor
- Restricted development area
- Potential public road crossing location

Project layout

- Potential creek crossing point (refer to inset below for indicative design)
- Connection point (option A or B)
- Indicative noise wall location
- Landscape screen planting
- Proposed access point to the project
- Proposed operational infrastructure area including substation, operational facility and BESS (option A or B)
- Birriwa accommodation facility
- Access track
- Temporary construction compound

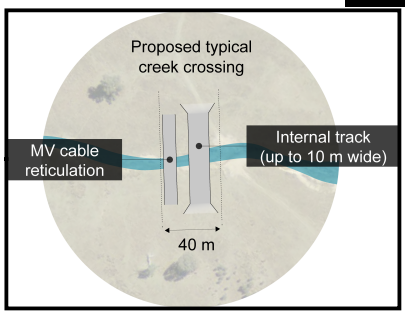
Existing environment

- Dwelling not associated with the project
- Dwelling associated with the project
- 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

INSET



Amended project

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

0 1 2 km

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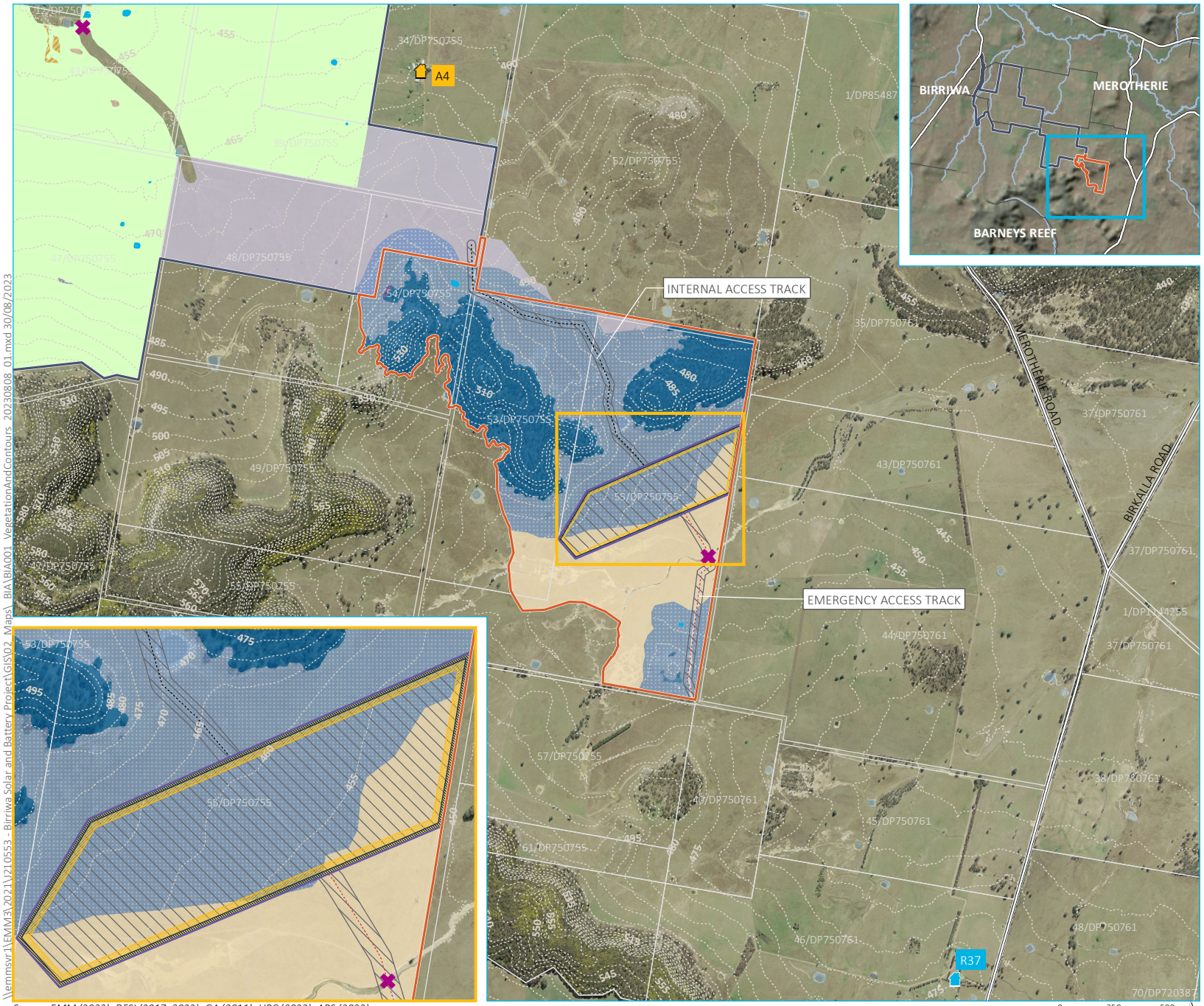
Birriwa Solar and BESS Project
Amendment Report
Bushfire Assessment Report
Figure 1.3

EMM
creating opportunities



KEY

- Solar and BESS study area
- Accommodation facility study area
- Accommodation infrastructure area
- Accommodation facility development footprint
- Asset protection zone
- Bushfire perimeter road
- Access track
- Emergency access track
- Associated residence
- Non-associated residence
- Potential creek crossing point

Plant community type

- Exotic (trees, grassland)
- Cleared
- Dam

PCT 80 | Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion

- High
- Poor
- Pasture

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

- Poor
- Pasture
- Planted

PCT 479 | Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion

- High
- Moderate
- Derived native grassland (DNG)

Existing environment

- Major road
- Minor road (refer to inset)
- 5 m contour
- Watercourse (refer to inset)
- Cadastre
- Waterbody

Source: EMM (2023); DFSI (2017, 2023); GA (2011); UPC (2023); ABS (2023)

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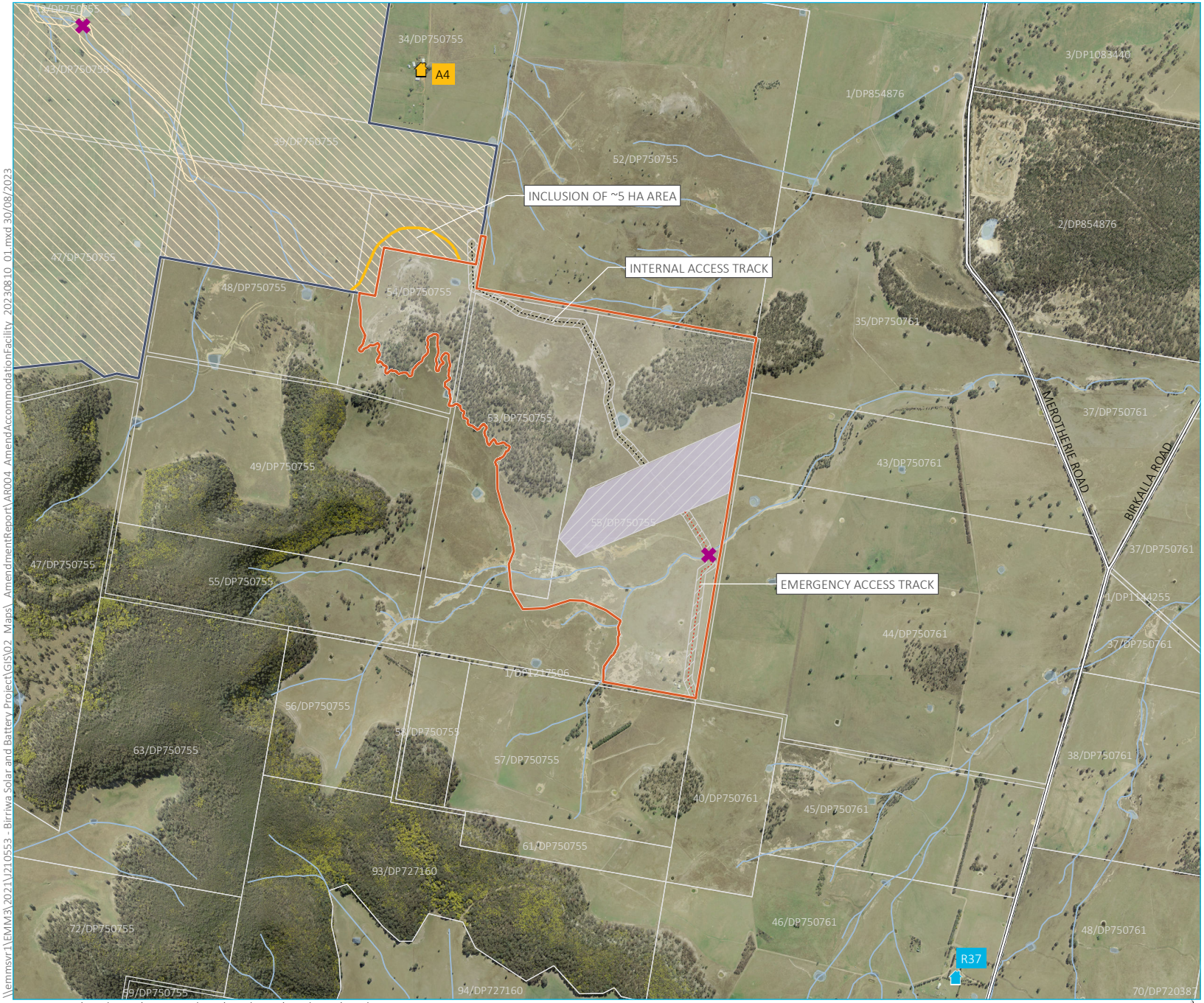
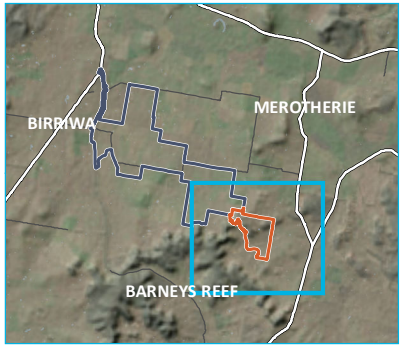
Vegetation, contours and asset protection zone

Birriwa Solar and BESS Project
Amendment Report
Bushfire Assessment Report
Figure 1.4

EMM
creating opportunities





KEY

- Solar and BESS study area
- Accommodation facility study area
- Solar and BESS develoment footprint
- Accommodation facility infrastructure area
- Accommodation facility development footprint
- Inclusion of ~5 ha area
- Potential creek crossing point
- Associated residence
- Non associated residence
- Access track
- Emergency access track

Existing environment

- Major road
- Minor road (refer to inset)
- Watercourse/drainage line
- Cadastre
- Waterbody

Source: EMM (2023); DFSI (2017, 2023); GA (2011); UPC (2023); ABS (2023)

0 0.5 1 km

GDA 1994 MGA Zone 55

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Accommoadation facility study area and development footprint

Birriwa Solar and BESS Project
Amendment Report
Bushfire Assessment Report
Figure 3.1

EMM
creating opportunities

Appendix 2 Consultation

RFS meeting notes 19 July 2023

Meeting held at Orana Fire Control Centre - 8 Judy Jakins Drive, Dubbo 2830

- Inspector. Mark Pickford (RFS)
- Corinne Ilievski (RFS)
- Dan Pedersen (Cool Burn)
- Dallas Milburn (Cool Burn)

Agenda:

Open forum to get a better understanding of how the RFS perceive risk associated with the REZ infrastructure development and cumulative impacts, and to identify what RFS would like to see considered in new developments for increased bush fire protection.

REZ development is detailed as Solar Farms (panels arrays and buildings); Wind Farms (turbines); BESS; transmission lines; workers accommodation camps.

The cumulative effect of REZ development has direct and indirect impacts for bush fire management, and can be considered as creating both positive/beneficial outcomes for bush fire management (e.g. better access, water, bush fire awareness) and negative outcomes for bush fire (increased density population, more ignition source potential).

Community consultation and REZ perception:

The new REZ based developments are dividing the community, particularly rural landholders:

- Some landholders are either accepting offers to lease land to install RE infrastructure.
- Sometimes adjoining landholders are not willing to take up offers, but they will be indirectly (and possibly directly) affected by neighbouring land use for RE development.
- Land prices have soared due to demand for RE land use, and pricing has become 'out of reach' for developing rural enterprises.
- Could be an increased pressure on existing infrastructure and resources (roads infrastructure, emergency management capacity).
- Will these state significant and national assets have higher priority for bush fire protection planning than the existing community and privately owned assets (e.g. rural homes, hay sheds etc.) – again requires fire fighting resource capacity (appliances and trained/dedicated personnel).

Community bush fire threat concept:

- Increased ignition sources:
    - The introduction of energy production, storage and transmission infrastructure could provide for multiple sources of ignition (example given of a solar farm that had multiple fires (7 fires) associated with short circuiting and ignition of grasslands within arrays – likely due to sub-standard wiring connections and checking);
    - Could the increased population associated with the REZ development result in more potential ignition through human error, unaware, etc?
    - The BESS infrastructure is an unknown risk to bush fire ignition?
    - The increased transmission lines an increased ignition source?

Bush fire fighting and protection capacity:

- These rural areas rely on volunteer RFS brigades.
- Brigades (sheds) are often located at regional localities OR appliances can even be stored (parked) at rural landholders properties.
- There are fewer and fewer community members (particularly with the younger aged community) available to support the volunteer RFS brigades. This is exacerbated by increased RE land ownership and land owners leaving local communities.
- Aggrieved landholders/RFS volunteers may not engage fires associated with RE developments.

- **Opportunities**: The introduction of the increased density workforce required to construct and maintain the REZ infrastructure could increase firefighting capacity – but this should be planned in a strategic and coordinated way to increase RFS response capacity:
    - More volunteers could potentially be acquired through increased workers population during construction and ongoing maintenance;
    - Better quality access roads and ongoing road monitoring and maintenance associated with REZ projects can provide access assurance and compartmentalise larger fires, which can be perceived as a better outcome;
    - Level of landscaping management to ensure REZ assets are protected from bush fire (as conditioned in the approvals process) provides inherent fuel 'breaks' across the landscape
    - More capacity in fire fighting vehicle appliances associated with any project managed 'first response' appliances associated with REZ projects;
    - Larger water supplies strategically located at the REZ projects can be adapted for broader community and emergency service use. This water supply for community accessibility could be at perimeter locations so as the fire services do not need to enter into and through RE project sites;
    - The strategic bush fire emergency planning for the cumulative REZ could enhance bush fire protection for the region and districts (e.g. advantage for campaign fires?).
- Aerial firefighting operation and Wind Farm REZ development is a highlighted concern, and needs to be planned in detail with all fire management agencies.

Appendix 2 Consultation