Bush Fire Assessment Report

Battery Energy Storage System

Prepared for Mecone, acting on behalf of M Renewables Australia Development Pty Ltd

Lot 32 DP 1271693 & 24 DP 1263462

346 Old Sydney Road & 8 Millbank Lane, Marinna

Date: 20 January 2024

REF: W24006

WARATAH BUSHFIRE

PLANNING | GIS | ASSESSMENT

Bush Fire Assessment Report

Battery Energy Storage System

Lot 32 DP 1271693 & 24 DP 1263462

346 Old Sydney Road & 8 Millbank Lane Marinna

Report Author:	Nicole van Dorst B. App. Sc., Grad. Dip., BPAD-L3 23610	
Mapping by:	Peter Tolley (B. Biotech., M. SciTech (Env. Sci), Grad. Dip. (Spatial Info.))	
File:	W24006	Version 1 Final
Performance-based assessment	No	

ABN: 52 280 080 023

Phone: 0477 516 455

Email: nicole@waratahbushfire.com.au

WARATAH BUSHFIRE

PLANNING | GIS | ASSESSMENT

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

EXECUTIVE SUMMARY

M Renewables Australia Developments Pty Ltd proposes to develop a Battery Energy Storage System (BESS) (the Project) to operate in conjunction with the recently approved, constructed, and operational 26 megawatt (MW) Junee Solar Farm (DA2018/11) in Marinna, approximately five kilometres (km) north of Junee in New South Wales (NSW).

The BESS is proposed to be constructed on the northern portion of the site. It will have a capacity of 17.6 megawatts and will be used to store excess power, which will be pumped back into the grid for use primarily during peak periods.

The NSW Rural Fire Service (NSW RFS) categorises the proposal as 'other' development and has specific requirements under Section 4.14 of the *Environmental Planning and Assessment Act 1979* (*EPA Act*).

Section 8.3.9 of *Planning for Bush Fire Protection 2019 (*PBP) outlines the requirements for hazardous industries. Whilst PBP does not specifically identify BESS as a hazardous industry, it does require developments of this nature to consider their ability to start bush fires and their susceptibility to bush fire impact.

Whilst the property is not identified as bushfire-prone on the Junee Shire Council bushfire-prone land map, this assessment has identified that bush fire can potentially affect the project from the narrow strip of woodland vegetation within the road corridor to the northwest of the site. The following combination of bush fire mitigation measures will be used to address the risk of bush fire caused by the project and demonstrate compliance with the aims and objectives of PBP 2019.

- Provision of APZs for the BESS in accordance with Appendix 4 of *PBP 2019*.
- Provision of access and water supply in compliance with *PBP 2019*.
- Maintenance and housing of infrastructure so that it will not create a source of ignition to the surrounding vegetation; and
- Update the Emergency Response Plan (inclusive of the Bush Fire Protection Plan) for the Junee Solar Farm to incorporate the BESS.
- Adoption of the recommendations outlined in the Preliminary Hazard Analysis prepared by Riskcon Engineering (2024).

GLOSSARY

APZ	Asset Protection Zone
AS1596	Australian Standard – The storage and handling of LP Gas
AS3745	Australian Standard – Planning for emergencies in facilities
AS3959	Australian Standard – Construction of buildings in bushfire-prone areas 2018
BAL	Bush Fire Attack Level
BPL	Bush fire prone land
BCA	Building Code of Australia
BESS	Battery energy storage system
BFMC	Bush Fire Management Committee
BFMOP	Bush Fire Management and Operations Plan
BMS	Battery Management System
BPM	Bush fire protection measures
BSA	Bush Fire Safety Authority
CFA	Country Fire Authority
DPE	Department of Planning and Environment
DA	Development application
DCP	Development Control Plan
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
FFDI	Forest Fire Danger Index
GFDI	Grassland Fire Danger Index
ha	hectares
IPA	Inner Protection Area
LEP	Local Environmental Plan
LGA	Local government area
Km	Kilometres
kV	Kilovolt
m	Metres
MW	Megawatt
NCC	National Construction Code

NPWS	National Parks and Wildlife Service
NSW	New South Wales
PCT	Plant Community Type
PCS	Power conversion system
PHA	Preliminary Hazard Analysis
PBP	*Planning for Bush Fire Protection 2019*
RF Act	Rural Fires Act 1997
RFS	Rural Fire Service
SEARs	Secretary's environmental assessment requirements
SEE	Statement of environmental effects
SEPP	*State Environmental Planning Policy*
SRPP	Southern Regional Planning Panel
SSD	State significant development
SWS	Static water supply
SVTM	State Vegetation Type Map
UPS	Uninterruptible power supply

TABLE OF CONTENTS

TABLES

FIGURES

1. INTRODUCTION

M Renewables Australia Developments Pty Ltd proposes to develop a Battery Energy Storage System (BESS), a small grid-scale battery, and associated infrastructure (the Project). The Project will have a capacity of approximately 17.6 megawatts (MW)/35.2MWh and approximately two hours of storage. It will be used to store energy generated during periods of high production, which can then be released to the electricity network during times of demand. The project's key feature includes containerised battery units, which have been sited near the existing substation and will be accessible by a semi-sealed road.

The Project is situated in Junee Shire local government area (LGA), approximately five kilometres (km) north of Junee in New South Wales (NSW). It is located at 346 Old Sydney Road and 8 Millbank Lane. The location of the Project is exhibited in Figure 1-1.

A development application for the Project is required to be submitted under Section 4.14 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

1.1 Aims of the assessment

The aims of the bush fire assessment report are to:

- Provide recommendations for the protection of human life and to minimise impacts on property from the threat of bush fire.
- Address the bush fire risk in accordance with *PBP 2019*, through bush fire hazard identification and assessment, including a bush fire hazard site and landscape assessment.
- Reduce the occurrence and consequences of bush fires through risk-based design: and
- Enable safe and effective emergency response through the provision of fire protection systems, including:
    - safe access in and around the facility including firefighting infrastructure such as water supply,
    - management of vegetation,
    - implementation and maintenance of building construction standards,

- prevention of fire ignition on site and prevention of fire spread to the adjoining land.

This report has been prepared following guidance from the NSW RFS document PBP 2019 and bush fire design guidelines developed for renewable energy generating systems and BESS facilities.

1.2 Referenced documents & information collation

Assessment of the bush fire risk and measures required to mitigate this risk was performed through a desktop assessment. Documents reviewed for the preparation of this report include the following:

- Statement of Environmental Effects prepared by Mecone, dated October 2024.
- Preliminary Hazard Analysis Junee BESS prepared by Riskcon Engineering, dated 7/08/2024.
- Bush Fire Risk Management Plan prepared by the Riverina Bush Fire Risk Management Committee, 2018.
- State Vegetation Type Map (STVM) by DPE (SVTM_vC1.1.M1.1).
- Environmental Systems Research Institute (ESRI) aerial photography (2023).
- Planning for Bush Fire Protection 2019 (PBP), NSW RFS.
- Comprehensive Vegetation Fuel Loads, March 2019, NSW RFS.
- The Battery Energy Storage Systems Guidance Report: Australian Energy Council Limited, dated 24th March 2023 by GHD.
- Design Guidelines and Model Requirements Renewable Energy Facilities, Version 4, August 2023 by the Country Fire Authority (CFA).
- Australian Standard 3959 Construction of buildings in bushfire-prone areas (2018).

1.3 Project location

The Project site is zoned RU1 Primary Production under the Junee Local Environmental Plan 2012. It is situated within the recently approved, constructed and operational 26 megawatt (MW) Junee Solar Farm (DA2018/11) in Marinna, approximately five kilometres (km) north of Junee in New South Wales (NSW).

The adjoining land is predominantly managed /operational solar farm with the nearest potential bush fire hazard being woodland vegetation within the road corridor to the northwest.

LEGEND

- Site boundary

Proposed development

- BESS
- BESS substation
- Access road

Existing environment

- Fire and rescue
- Rural fire service
- Junee railway station
- Rail
- Electricity transmission line
- Minor road
- Local road
- Vehicular track
- Named watercourse
- Local government area

Figure 1.1 – Location

Battery Energy Storage System –
246 Old Sydney Road & 38 Millbank Lane, Marinna
Lot 3 & 4 DP 585471

18/01/2025 (v2) 1:125,000 @A4 GDA2020 MGA Zone 55

0 1.5 3
kilometres

WARATAH BUSHFIRE
PLANNING | GIS | ASSESSMENT

Data source: WBP (2025); Mecone (2024); DCSSS (2025); Google Earth (2024); ESRI (2025); GA (2011)

Path: C:_GIS_Working\WBP\W24006\GIS\B_Maps\BAR005_SiteLocation_20250118_02\BAR005_SiteLocation_20250118_02.aprx

2. PROJECT DESCRIPTION

2.1 Background

A DA (DA2018/11) was lodged on 14 February 2018 for the 'Construction and operation of a 26MW solar farm'. Works proposed included the installation of solar photovoltaic modules, steel racking and piled supports, electrical transformers and inverters, electrical cabling, telecommunications equipment, an operations and maintenance building, site substation and perimeter fencing. The solar panels are installed on trackers which automatically track the position of the sun. In addition to the solar panels, approved development includes electrical transformers and inverters with associated electrical cabling and internal access routes between the solar.

Subsequent to a public meeting held on 6 June 2018, the Southern Regional Planning Panel (SRPP) agreed on the 31 August 2018 to defer the determination of the matter pending the submission of the following further information from the Applicant:

- Details in metres of the actual spacing between panels at the Mt. Majura solar farm (which is used as evidence of appropriate ground cover), and similar details for a comparable (to Marinna) solar farm site.
- Details of the condition of ground cover over an extended period as the Mt. Majoura site and any other comparable site (with single axis solar cells in similar soil and climate to the proposed arrangement at Marinna). Details to demonstrate how ground cover condition has been monitored and managed overtime to maintain cover and manage weeds and fire risks.
- Photomontage with the solar cells to be included in the visual impact assessment. The visual assessment should include locations when viewed form the immediately adjoining site, within proximity to the common boundaries.
- Landscape plan to include provision of canopy trees.

The Panel was also not supportive of a vegetation buffer of less than 10 metres (m).

The required additional information was provided to respond to the deferral decision of the SRPP and a briefing was held with SRPP members to approve the DA pursuant to Section 4.16 of the EP&A Act 1979 on 2 November 2018.

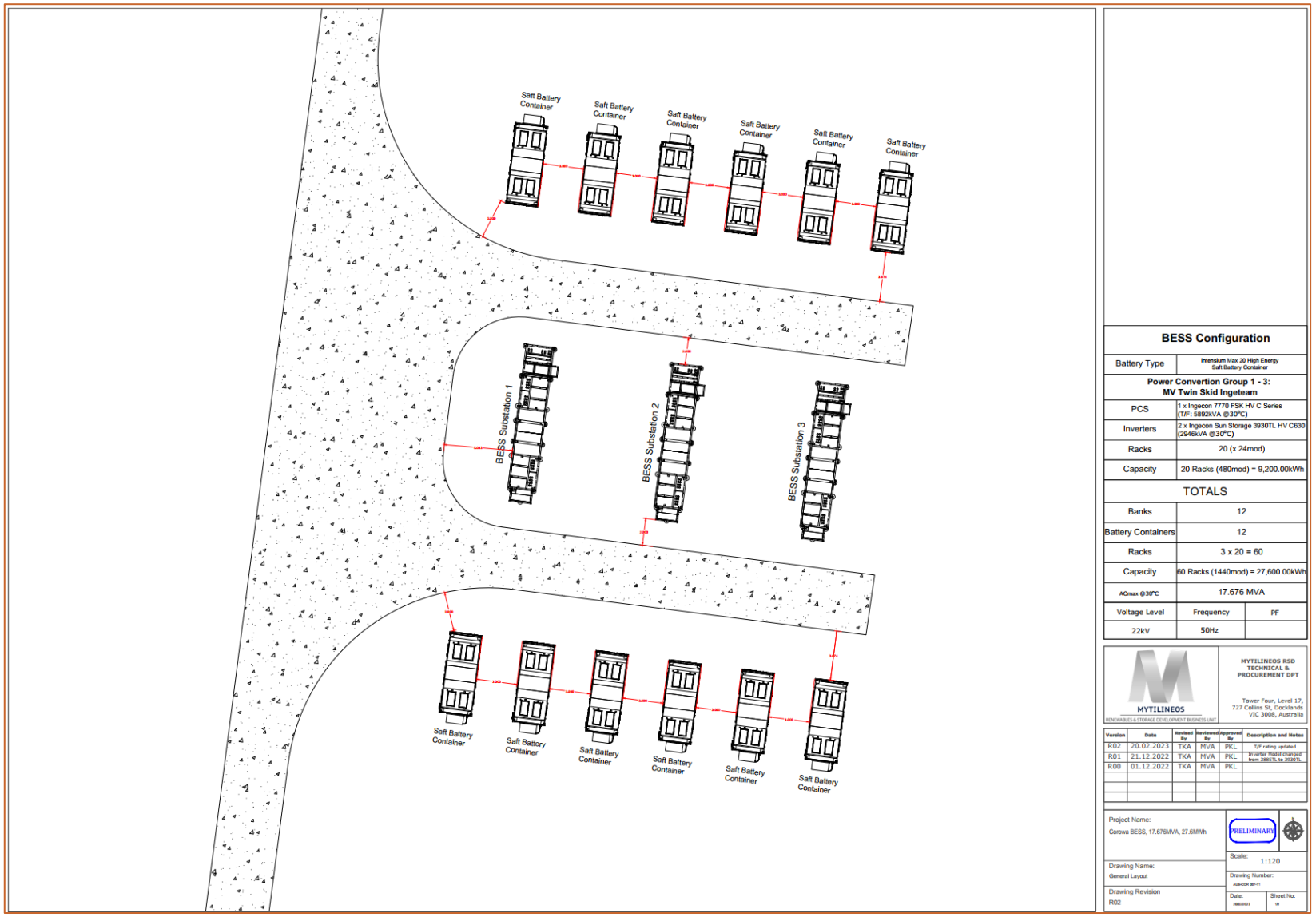
The original consent was modified by council on 6th December 2018 to allow up to 30MW solar farm to be constructed with a future battery storage bay added. This modification made no 'onsite' changes to the original development and was achieved by adding a new condition of consent (No. 41) and making a minor change to an existing condition (No. 42).

The consent was again modified by Council on 5 May 2020, whereby an existing condition (No. 10) limiting construction hours was amended to allow construction to commence an hour earlier than originally specified.

A third modification application sought to modify the landscape screening requirements outlined in condition No. 1(f). This modification application was approved on 8 December 2022, subject to revised wording.

Construction of the approved solar farm has been completed; however, no approval has yet been granted for a BESS on the site. Therefore, this DA has been prepared for the development of the BESS.

The layout of the BESS is depicted in Figure 2-1.



BESS Configuration

Battery Type	Intensium Max 20 High Energy Saft Battery Container	
Power Convertion Group 1 - 3: MV Twin Skid Ingeteam		
PCS	1 x Ingecon 7770 FSK HV C Series (T/F: 5892kVA @30°C)	
Inverters	2 x Ingecon Sun Storage 3930TL HV C630 (2946kVA @30°C)	
Racks	20 (x 24mod)	
Capacity	20 Racks (480mod) = 9,200.00kWh	
TOTALS		
Banks	12	
Battery Containers	12	
Racks	3 x 20 = 60	
Capacity	60 Racks (1440mod) = 27,600.00kWh	
ACmax @30°C	17.676 MVA	
Voltage Level	Frequency	PF
22kV	50Hz	

MYTILINEOS
RENEWABLES & STORAGE DEVELOPMENT BUSINESS UNIT

MYTILINEOS RSD TECHNICAL & PROCUREMENT DPT

Tower Four, Level 17, 727 Collins St, Docklands VIC 3008, Australia

Version	Date	Revised By	Reviewed By	Approved By	Description and Notes
R02	20.02.2023	TKA	MVA	PKL	T/F rating updated
R01	21.12.2022	TKA	MVA	PKL	Inverter model changed from 3885TL to 3930TL
R00	01.12.2022	TKA	MVA	PKL	

Project Name:
Corowa BESS, 17.676MVA, 27.6MWh

PRELIMINARY

Scale: 1:120

Drawing Name:
General Layout

Drawing Number:

Drawing Revision
R02

Date:

Sheet No:

Figure 2-1 – Project layout

2.2 Battery Energy Storage System

2.2.1 Batteries

The batteries will consist of 12 Intensium Max 20 High Energy 1500V LFP (IHE) containerised battery units (Lithium Iron Phosphate cells), each approximately 2.4m wide x 6.1m long x 2.9m high and weighing approximately 30 tonnes. The requisite separation distances will be 2-5m from the access roads and 3m from the back of each container.

Each battery pack (Figure 2-2 below) is controlled and monitored by a dedicated Battery Management System (BMS) which constantly monitors voltage, temperature, charge and other parameters to ensure normal operating conditions. A fault will trigger the BMS to disconnect the affected battery pack and engage the emergency management system.

Each container is supported by the following mitigation barriers:

- Mechanical valves are installed on the top of the ESS. The valves allow the gas to escape in order to prevent an internal overpressure IHE event and to avoid flying part if low explosive Limit for hot gas released during fire is reached.
- A minimum distance of 3m (10 feet) between each IHE or between IHE and infrastructures is required to eliminate the risk of fire propagation between IHE.
- Primary Fire Suppression System (FSS) fluid helps to extinguish fires quickly and safely by absorbing heat and interrupting the chain reaction. The FSS is installed by a certified company. This system is more dedicated against electrical fire.
- A secondary, redundant passive FSS is also provided through a physical connection point on the container allowing for water extinguishment by the local fire department.

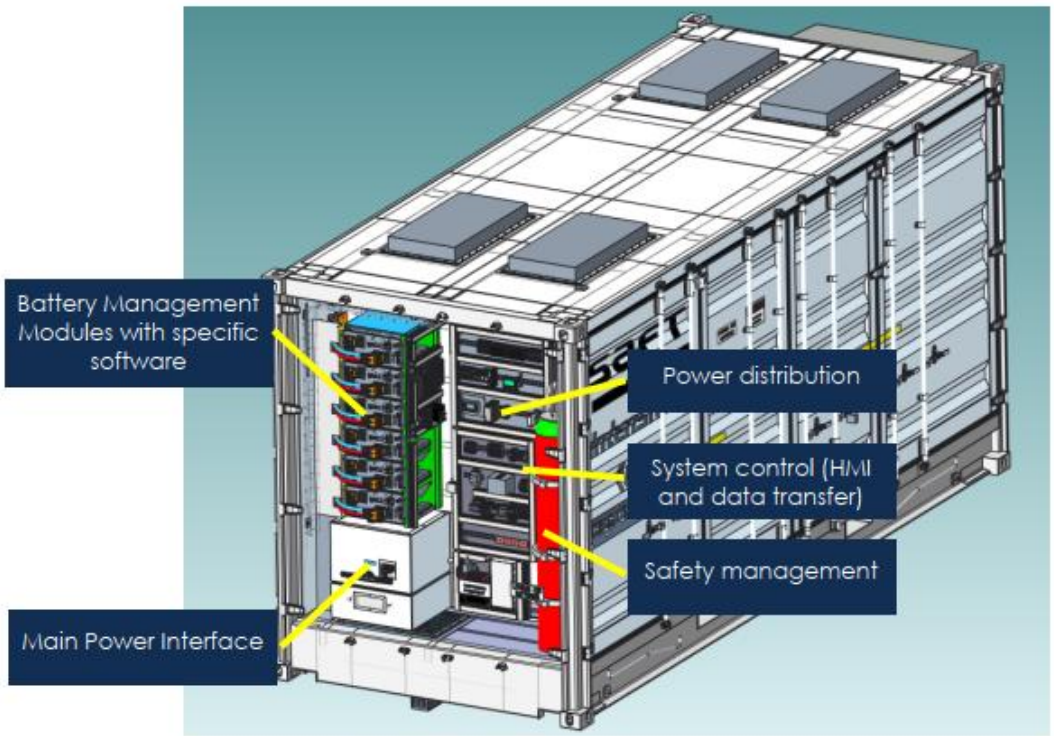


***Figure 6** IHE 1500V Distribution cabinet overview*

Figure 2-2 – IHE 1500V Distribution cabinet overview

2.3 Substation

BESS substations will be established to convert electricity between the high voltage transmission network and medium voltage BESS equipment.

2.4 Construction phases

Construction of the BESS is forecast to take between 3-6 months with a peak workforce of 30 people. The construction activities would be primarily carried out during standard construction hours, as defined by the NSW Environment Protection Authority's (EPA) Draft Construction Noise Guideline (2020), being:

- 7am to 6pm, Monday to Friday
- 8am to 1pm, Saturdays
- No work on Sundays or public holidays.

2.5 Operations

The BESS will be operated remotely with no permanent staff on site. The BESS could undergo two full cycles of charging and discharging per day and could operate at any time of day or night, seven days a week.

Maintenance activities include maintenance of plant and equipment and land management. Maintenance of plant and equipment will include both preventative and corrective maintenance, including the replacement of BESS and substation components from time to time, which will be undertaken by staff or contractors. Land management will include weed, pest and landscaping management which will be undertaken by local contractors on a regular basis.

2.6 Decommissioning

At the end of the 30-year operational life the project will either be upgraded and re-powered or built infrastructure decommissioned, removed and the site rehabilitated.

3. LEGISLATIVE AND POLICY REQUIREMENTS

3.1 Environmental Planning and Assessment Act 1979

The project requires approval under Section 4.14 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

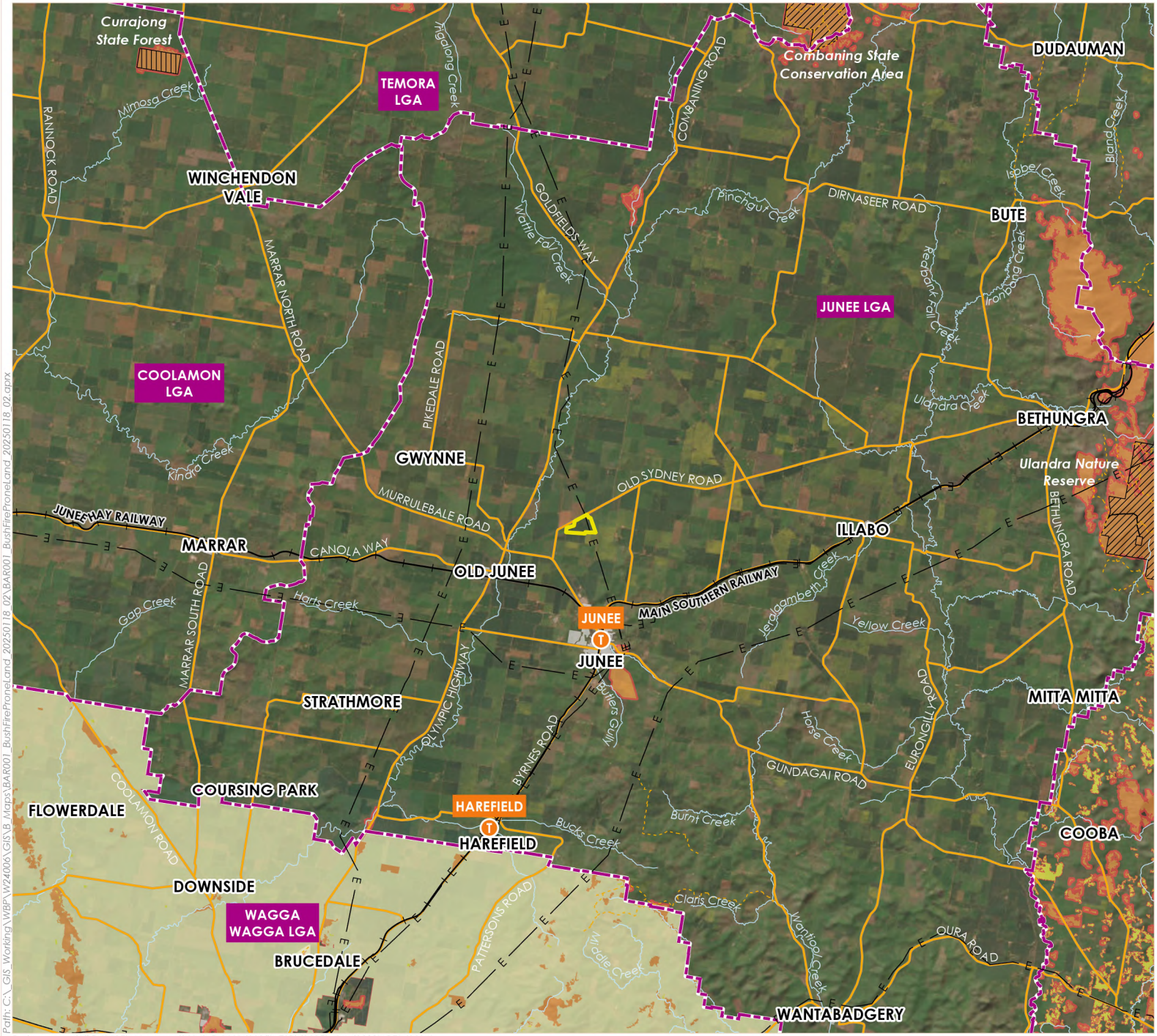
3.1.1 Bush Fire Prone Land Mapping

The *EP&A Act 1979* requires that any development on bush fire prone land (BPL) for any purpose complies with PBP 2019. Councils maintain and update BPL maps according to the NSW RFS *Guide for Bush Fire Prone Land Mapping* and then they are certified by the NSW RFS. BPL maps are based on the vegetation types present which are classified into one of four categories, as follows:

- Category 1: which includes areas of forest, woodland, heath, forested wetland and timber plantation. Highest risk category.
- Category 2: rainforests and "lower risk vegetation parcels". These parcels contain remnant vegetation that is limited in its connectivity to larger areas and land parcels with land management practices that actively reduce bush fire risk (and are subject to a bush fire plan or similar).
- Category 3: which includes grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands. Moderate risk category; and
- Exclusion: Areas of vegetation less than 1 ha and greater than 100 m separation from category 1, 2 or 3 vegetation; small patches or strips of remnant vegetation; managed grasslands; agricultural cropland; gardens; and mangroves are not mapped as bush fire prone.

BPL is defined as land with category 1, 2 or 3 vegetation and land within 100 m of category 1 or within 30 m of category 2 or 3 vegetation.

As depicted in Figure 3-1 the project area is not identified as bush fire prone land. However, the site is located within 100m of woodland vegetation located within a road reserve with farming land (grassland further to the north) and therefore there is a risk that a fire could occur nearby the site.



LEGEND

- Site boundary
- Railway station
- Electricity transmission line
- Rail
- Minor road
- Classified fire trail
- Named watercourse
- Built up area
- State forest
- National park/reserve
- Local government area

Bush fire prone land (RFS, 2024)

- Vegetation Buffer
- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3

Figure 3.1 – Bush fire prone land map

Battery Energy Storage System –
246 Old Sydney Road & 38 Millbank Lane, Marinna
Lot 3 & 4 DP 585471

18/01/2025 (v2) 1:300,000 @A4 GDA2020 MGA Zone 55

0 5 10
kilometres

WARATAH BUSHFIRE
PLANNING | GIS | ASSESSMENT

Data source: WBP (2025); Mecone (2024); DCSSS (2025); ESRI (2025); GA (2011); RFS (2024)

Path: C:_GIS_Working\WBP\W24006\GIS\B_Maps\BAR001_BushFireProneLand_20250118_02\BAR001_BushFireProneLand_20250118_02.aprx

3.2 Rural Fires Act 1997

The objectives of the *Rural Fires Act 1997* are to provide:

- the prevention, mitigation and suppression of fires
- coordination of bush fire fighting and prevention
- protection of people and property from fires; and protection of the environment.

In relation to the management of bush fire fuels on public and private lands within NSW, sections 63(1) and 63(2) of the *Rural Fires Act 1997* require public authorities and owners/occupiers of land to take all practicable steps to prevent the occurrence of bush fires on their land, and to minimize the danger of the spread of bush fires.

3.3 Planning for Bush Fire Protection 2019

The NSW RFS document PBP 2019 provides and explains the legal requirements, framework and protection measures needed for all types of development on bush fire prone land in NSW.

Section 8.3.9 of PBP 2019 provides guidelines for hazardous industry. Whilst this section does not specifically include BESS infrastructure, this type of development should be considered for its ability to start a bush fire as well as its susceptibility to bush fire impacts.

3.4 Other guidelines relevant to renewable energy projects

Victoria's Country Fire Authority (CFA), in conjunction with industry and regulatory authorities, has developed the *Design Guidelines and Model Requirements for Renewable Energy Facilities* (March 2022) to support designers and operators of facilities to consider and mitigate fire risk. This includes fires which originate within the facility itself as well as bush fire impact on the site from external factors.

While these were developed in a Victorian context, CFA expertise and guidelines have been sought for supporting fire safety at renewable energy facilities across Australia and internationally. The CFA guidance represents the current leading practice and has been utilised within this document as it builds upon the principles

and knowledge from fires at large-scale renewable energy facilities within Australia, including the Victoria Big Battery site in 2021.

Network Standard NS187 Passive Fire Mitigation Design of Major Substations is an Ausgrid document that details the minimum levels for passive fire protection systems at Ausgrid's major substations (sub-transmission and zone substations). The recommended mitigation measures provided in this document have been applied to guide the design of the substations (and associated switchgear). Substation design should aim for a high level of bush fire protection for critical assets and a rapid return to service following a bush fire event.

In addition*, The Battery Energy Storage Systems Guidance Report: Australian Energy Council Limited,* dated 24th March 2023 by GHD, has also been referenced within the report as it provides a guide and resource highlighting key areas for consideration for grid-scale BESS facilities, with a focus on lithium-ion and vanadium chemistries.

4. BUSH FIRE RISK FACTORS

The following assessment uses the methodology identified in PBP 2019 to provide a focussed assessment used to qualify the risk by assessing the hazardous vegetation and the effective slope within 140m of the project, as well as providing a review of the current bush fire management controls, fire history and potential fire behaviour.

4.1 Current bush fire management controls

The site comprises the recently approved and constructed Junee Solar Farm. A bushfire protection plan has been prepared for the Solar Farm. It includes mitigation measures to prevent fires from occurring within the site as well as reducing fuel loads within the site to prevent intensification of a bushfire that may originate outside of the solar farm. These mitigation measures include:

- Contact shall be made with the Local Brigade of the NSW Rural Fire Service and details about contact numbers and site access arrangements shall be shared
- Site induction training includes the Bushfire Management Plan including Bushfire risk and that smoking in only designated areas, and no burning of vegetation or any waste onsite
- 10 m wide asset protection zone (APZ) will be maintained outside the perimeter security fence to provide for bush fire control and tanker access
- The site shall be monitored and maintained to a satisfactory condition by maintenance staff, for the management of grass and weeds growth including maintenance of ground cover, and any indications of erosion
- The fuel load over the site before and during construction will be monitored and reduction measures implemented as required. These measures will be restricted to mechanical slashing or stock crash grazing
- Total Fire Ban rules will be adhered to. That is, MYT (and any of its contractors) will not:
    - (in any grass, crop or stubble land) drive or use any motorised machine unless the machine is constructed so that any heated areas will not come into contact with combustible matter;
    - carry out Hot Works (e.g., welding operations or use an angle grinder or any other implement that is likely to generate sparks), unless the

necessary exemption from the RFS Commissioner has been obtained and work complies with all requirements specified in the exemption.

- Fire extinguishers will be available in all vehicles; and
- Prompt action will be taken to extinguish fires in accordance with the Bush Fire Management Plan.

The Riverina Bush Fire Risk Management Plan also outlines the current local government-wide controls to reduce the overall bush fire risk in the area:

- Ensuring developments in bush fire prone land comply with PBP.
- Using LEPs to exclude development in extreme bush fire risk areas or where bush fire protection measures cannot be incorporated.
- Varying the standard bush fire danger period where required; and
- The declaration and management of burning restrictions, such as Total Fire Bans, Restricted Burning Times, Prohibited Burning Times and Harvest and Vehicle Movement Bans to reduce ignition risk.

The area is also relatively well-served by fire response services. The nearest volunteer fire brigades are Old Junee Rural Fire Brigade located approximately 7km to the southwest and Junee Rural Fire Brigade also 7kms to the south of the project area, followed by Junee Fire Sation (Fire and Rescue NSW) located 10km to the south.

4.2 Fire history & ignition

The Riverina Bush Fire Management Committee (BFMC) area has on average 200 bush fires per year, of which on average 2 can be considered major fires (BFMC, 2018).

Bush fires within the region are typically started by natural causes (i.e. lightning), machinery (particularly agricultural machinery), escapes from legal burning off and accidental ignition.

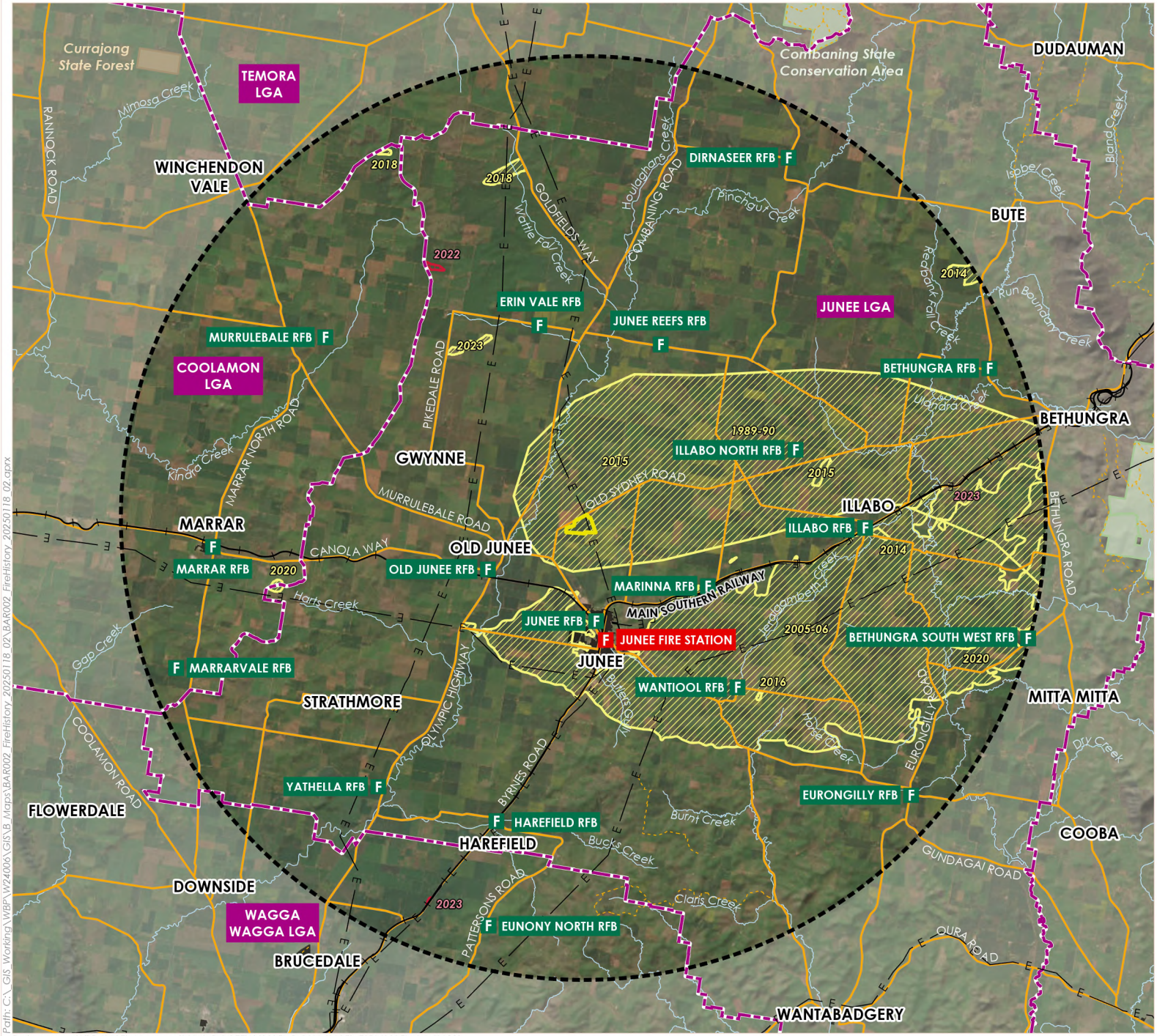
Earth moving equipment, power tools (e.g., welders, grinders), mowers and slashers are known for starting bush fires under conditions of high temperature, low humidity and high wind. Therefore, hot works or use of machinery that could cause a spark within the project area will be a potential source of ignition during the bush fire danger season (typically November to the end of March).

A review of NPWS Fire History – Wildfire and Prescribed Burns (downloaded on 25/08/2024 and depicted in Figure 5-1) suggests that the site was impacted by a

wildfire in 1989/90. The intensity of the fire and the cause were registered as unknown, however the fire did burn approximately 34974ha of land.

Other larger recorded fires include:

- A wildfire in 2005-06 located approximately 3km to the south. The fire impacted 24.303 hectares (ha) of land.



LEGEND

- Site boundary
- BESS – 25 km buffer
- Fire and rescue
- Rural fire service
- Electricity transmission line
- Rail
- Minor road
- Classified fire trail
- Named watercourse
- Built up area
- State forest
- National park/reserve
- Local government area

Fire history (DCSSS (2025) & DCCEEW (2025))

- Wildfire
- Unknown

Figure 4.1 – Fire History and location of emergency services

Battery Energy Storage System –
246 Old Sydney Road & 38 Millbank Lane, Marinna
Lot 3 & 4 DP 585471

18/01/2025 (v2) 1:300,000 @A4 GDA2020 MGA Zone 55

0 5 10
kilometres

WARATAH BUSHFIRE
PLANNING | GIS | ASSESSMENT

Data source: WBP (2025); Mecone (2024); DCCEEW (2025); DCSSS (2025); ESRI (2025); GA (2011)

Path: C:_GIS_Working\WBP\W24006\GIS\B_Maps\BAR002_FireHistory_20250118_02\BAR002_FireHistory_20250118_02.aprx

4.3 Fire behaviour potential

Grassland (subject to grazing) and a narrow strip of woodland vegetation located to the northwest of Old Sydney Road make up the predominant fuel for bush fire. Potential fire runs have been reviewed up to 15km from the project site and predominantly relate to the connectivity of grassland communities (Figure 5-2). This vegetation is fragmented by land use (cropping / grazing), access tracks, and the solar farm to the south, which mitigates the bush fire risk from this aspect. Junee and Old Junee town centre provides a significant fire break in the south and southwest with patches of woodland fuel scattered throughout.

There will be periods when the adjoining grazing and cropping lands are non-flammable due to climatic and agricultural practices. There will also be periods when these grassland areas are cured and highly flammable.

An ignition point takes some time to build to a quasi-steady state rate of spread, however, under extreme weather conditions a grass fire can be expected to reach maximum rate of spread within 30 minutes or even less (Cheney and Sullivan, 2008), by which time the fire is likely to be uncontrollable.

It should also be assumed that, under the most extreme weather, a fire can spread even in heavily grazed grass and embers may breach any APZ. The residence time for flames in heavily grazed pasture is likely to be very short (less than five seconds) (Cheney and Sullivan, 2008), so the project area will have a similarly short time of exposure to high radiant heat under such a scenario.

4.4 Climate and bush fire season

Bush fire behaviour is significantly influenced by climate, so understanding the climatic and seasonal factors that affect bush fire risk will help determine the appropriate treatment strategies.

As outlined in the Bush Fire Risk Management Plan, the Riverina area is temperate with warm to hot dry summers and cool winters.

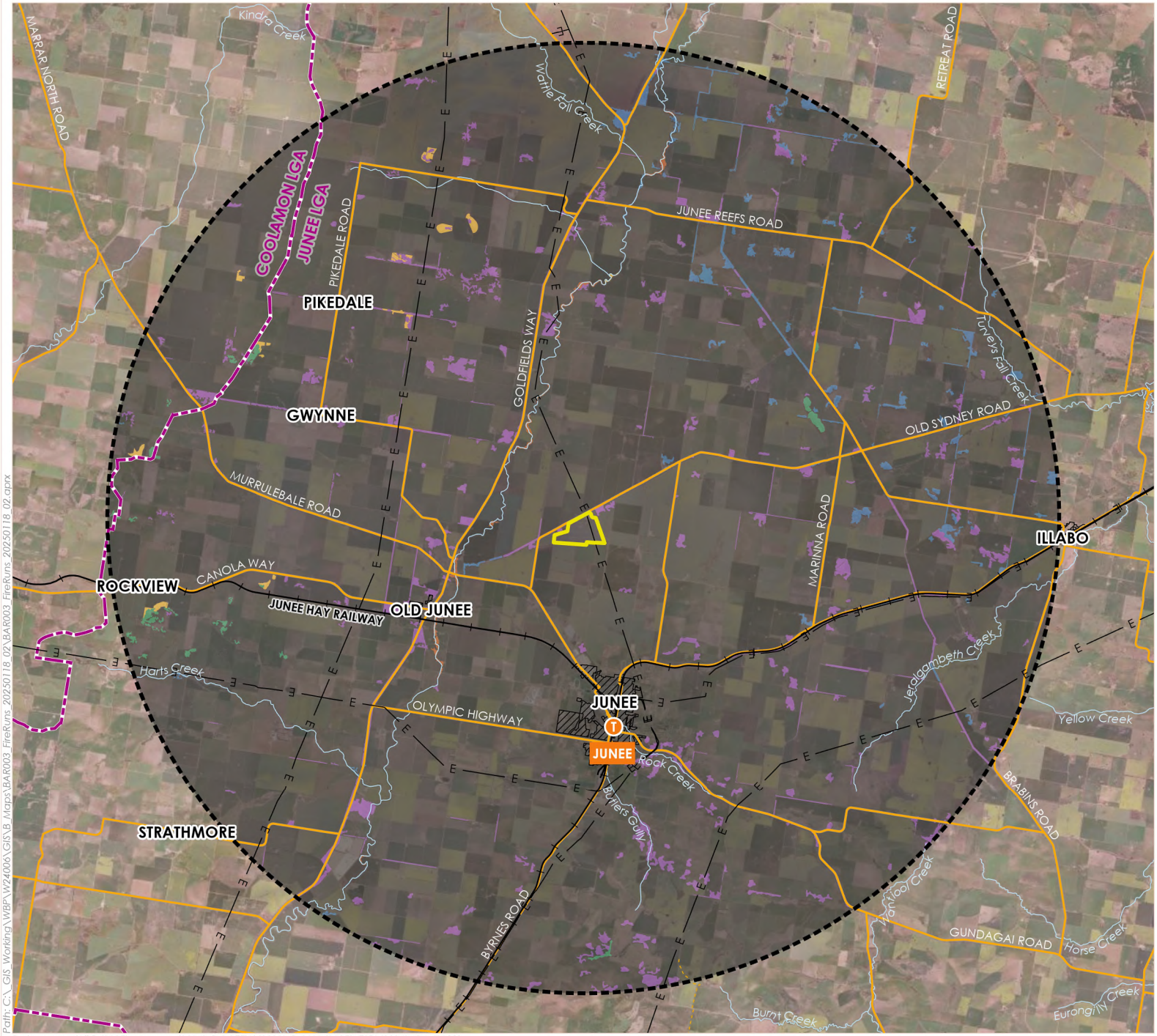
Rainfall is predominately autumn and winter and the bush fire season generally runs from October to March.

Fire weather conditions are usually associated with winds from the northwest accompanied by high daytime temperatures and low relative humidity. Dry lightning

storms occur frequently during the bush fire season and often starting forest and grass fires.

As outlined by the Climate Council, climate change will lead to a longer fire season, drier vegetation and fuel, hotter temperatures and more lighting events which will lead to an increase in fire risk and more dangerous bush fires.

The project is expected to have a minimum operational life of 25 years and therefore should be expected to withstand bush fire events into the late 2040s.



LEGEND

- Site boundary
- BESS – 15 km buffer
- Railway station
- Electricity transmission line
- Rail
- Minor road
- Classified fire trail
- Named watercourse
- Built up area
- Local government area

Vegetation class (NSW SVTM vC2.0.M2.1)

- Not classified
- Riverine Plain Grasslands
- Western Slopes Grassy Woodlands
- Floodplain Transition Woodlands
- Inland Riverine Forests
- Western Slopes Dry Sclerophyll Forests

Figure 4.2 – Potential fire runs (landscape scale)

Battery Energy Storage System –
246 Old Sydney Road & 38 Millbank Lane, Marinna
Lot 3 & 4 DP 585471

18/01/2025 (v2) 1:175,000 @A4 GDA2020 MGA Zone 55

0 2.5 5
kilometres

WARATAH BUSHFIRE
PLANNING | GIS | ASSESSMENT

Data source: WBP (2025); Mecone (2024); DCCEEW (2020); DCSSS (2025); ESRI (2024); GA (2011)

Path: C:_GIS_Working\WBP\W24006\GIS\B_Maps\BAR003_FireRuns_20250118_02\BAR003_FireRuns_20250118_02.aprx

4.5 Predominant vegetation

PBP 2019 guidelines require the identification of the predominant vegetation formation in accordance with the publication *Ocean Shores to Desert Dunes* (David Keith, 2004) if using the simplified acceptable solutions. The hazardous vegetation is calculated for a distance of at least 140m from a proposed development envelope. The vegetation posing a bush fire threat to the project area includes:

Table 4-1 – Vegetation

Aspect	*Plant Community Type (PCT) mapping*	*Vegetation formation*	*Acceptable solution fuel loads (t/ha) (PBP 2019)*
South, east and west	N/A – grassland associated with solar farm	Grassland	6/6
Northwest	Western Slopes Grassy Woodland	Woodland	10.5/20.2

4.6 Effective slope

Topography has a significant effect on bush fire behaviour and therefore can increase the risk to assets. For example, fire travels faster when moving uphill when compared to downhill. For every 10 degrees slope, the fire will double its speed and increase in intensity.

The effective slope has been assessed within the vegetation up to 100m from the development footprint to determine the minimum APZs required and the expected radiant heat output in a bush fire event. This is described in detail within Table 4-2 and Figure 4-3 below.

4.7 Bush fire attack assessment

The following assessment has determined the available APZ and radiant heat levels (expressed in BAL thresholds BAL 12.5) using Table A1.12.6 of PBP 2019 (deemed to satisfy).

For example, as depicted in Figure 4.3 the expected radiant heat impact on the project area from a bushfire originating from the woodland vegetation to the northwest is <12.5kW/m^2 for infrastructure located within 100m.

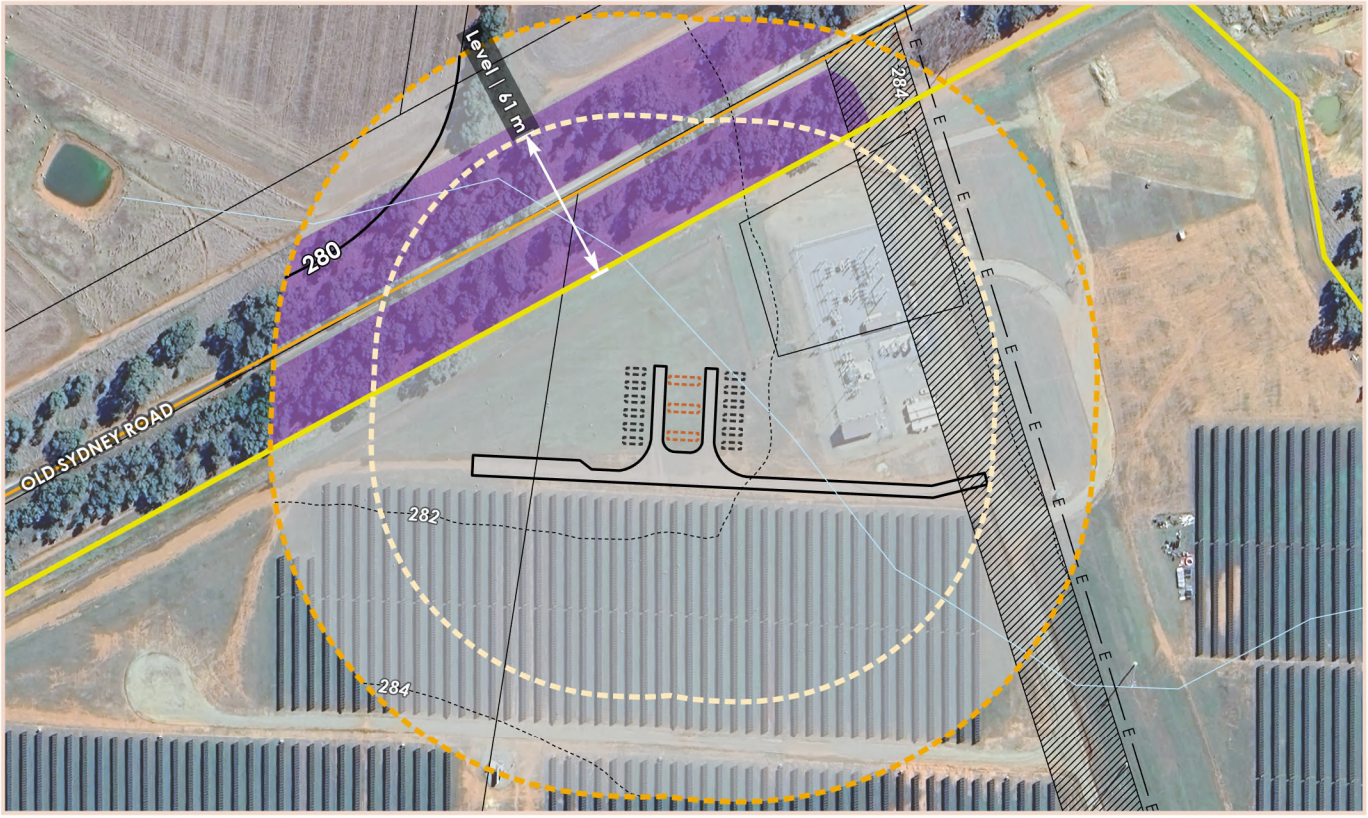
A fire danger index (FDI) of 80 has been used to calculate bush fire behaviour on the project area based on its location within the Eastern Riverina region.

Table 4-2 – Bush fire attack assessment

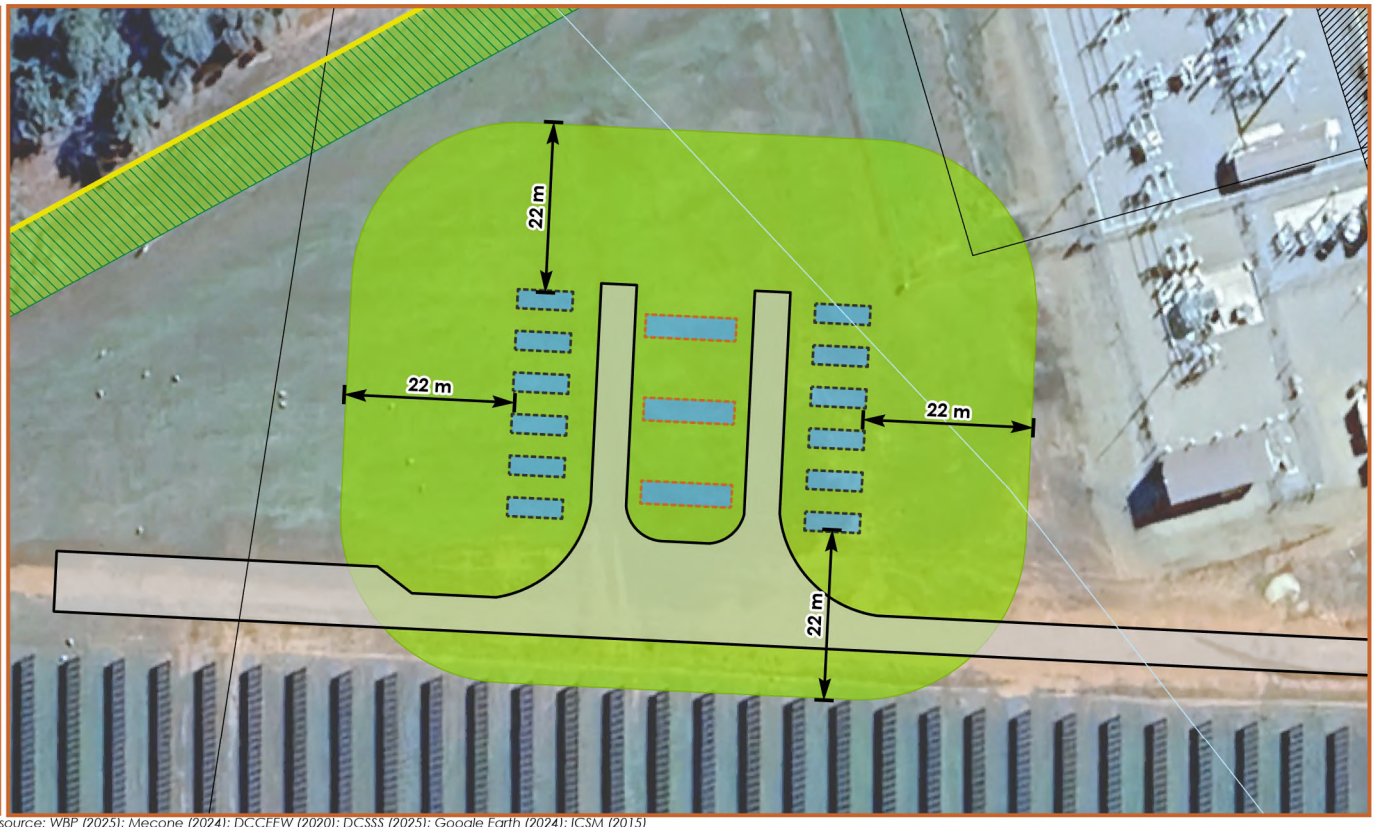
Aspect	Vegetation Formation within 140m	Effective Slope	APZ provided	*BAL thresholds*
Northwest	Woodland	Level	>22m	BAL 12.5 (22-<100 m)
South, east and west	Managed land / solar farm	N/A	>22m	

Note 1 – The Preliminary Hazard Analysis (PHA) prepared by Riscon Engineering identifies hazards, potential causes, consequences, and controls for events such as BESS fire, substation fire, bush fire, thermal runaway and generation of explosive gas (refer Section 5.2.5).

Vegetation and slope assessment



Asset Protection Zone (APZ) & Bush fire Attack Level (BAL)



Path: C:_GIS_Working\WBP\W24006\GIS\B_Maps\BAR004_AssessMitigate_20250118_05\BAR004_AssessMitigate_20250118_05.aprx

Data source: WBP (2025); Mecone (2024); DCCEEW (2020); DCSSS (2025); Google Earth (2024); ICSM (2015)

LEGEND

- Site boundary
- BESS
- BESS substation
- Access road
- Electricity transmission line
- Minor road
- Watercourse/drainage line
- Topographic contour (2 m)
- Topographic contour (10 m)
- Lot boundary
- Easement
- Slope buffer (100 m)
- Vegetation buffer (140 m)

Bush fire land category/vegetation class

- Managed land
- Woodland
- Approved 10 m APZ for solar farm (DA2018/11)
- Asset protection zone

Bush fire Attack Level (BAL)

- BAL 12.5

WARATAH BUSHFIRE
PLANNING | GIS | ASSESSMENT

Figure 4.3 – Bush fire assessment and mitigation measures

Battery Energy Storage System – 246 Old Sydney Road & 38 Millbank Lane, Marinna – Lot 3 & 4 DP 585471

18/01/2025 (v5) | 1:3,000 @A4 (upper frame) | 1:1,000 @A4 (lower frame) | GDA2020 MGA Zone 55

0 50 100
metres (upper frame)

0 15 30
metres (lower frame)

4.8 Bush fire risk created by the project

Fire risks have been identified and must be effectively managed during the construction and commissioning of the project.

4.8.1 Assessment of bush fire risk during construction and decommissioning

The potential sources of ignition of bush fires resulting from the construction of the project and decommissioning include:

- Construction equipment including bulldozers, excavators and vegetation removal machinery using slashers and mulching machines. These activities can produce sparks when steel blades encounter rock, with the potential to ignite surrounding vegetation.
- Motor vehicle exhaust systems and diesel-powered trucks with pollution control devices have the potential to emit burning diesel particles and ignite grassland and woodland ground fuels.
- Hot works such as welding and grinding can produce sparks resulting in an extreme level of risk of ignition for cured vegetation.
- Electrical equipment faults create a high level of risk of ignition of vegetation.
- Inappropriate storage of chemicals has the potential to cause a chemical fire or explosion. Failure to clean up a spill can also lead to fire.

Mitigation measures required to manage and minimise these risks are outlined in Section 5.

4.8.2 Assessment of bush fire risk during operation

The potential sources of ignition of bush fires resulting from the operation of the project, including those identified within the PHA are:

- Landscape hazards, such as ignition of site infrastructure from embers, radiant heat and flame contact from a bush fire external to the project area
- Potential fire spread due to proximity of batteries to each other and on-site infrastructure.
- Production and accumulation of flammable gases in battery enclosures with ignition resulting in fire or explosion and thermal runaway.
- Faulty equipment.

- Mechanical damage or failure of battery case (e.g short circuit, overheating, overcharge.
- Chemical hazards, such as the inherent hazards of the stored dangerous goods; spills and leaks of transformer oil/diesel spills/leaks, refrigerant gas/coolant; chemical reactions from ignition.
- Mechanical damage to battery containers/enclosures due to vehicular impact.

The potential consequence of fire within and external site includes:

- Damage to BESS and associated infrastructure.
- Disruption to power supply.
- Injury and/or fatality to onsite personnel or firefighters.
- Bush fire and damage to the surrounding environment, including the surrounding rural areas.
- Heat radiation to transformer. The transformer overheats and fails.
- Ember attack ignites exposed cables.
- Contaminated fire water (potential runoff of contaminated fire water into the environment)
- Emergency responders are unable to reach BESS as space between battery banks is insufficient for to allow for safe vehicle movement.

Section 5 outlines the mitigation measures required to manage and minimise these risks, and Section 5.2.5 provides a summary of the controls outlined in the PHA.

5. BUSH FIRE MITIGATION MEASURES

Bush fire mitigation measures have been developed for the construction, operational and decommissioning phases of the project based on guidance from NSW RFS guidelines, *PBP 2019,* electrical network industry sources and best practice design guidelines prepared by the CFA (2022). Adopting these measures is expected to reduce, to an acceptable level, both the risk of bush fire ignition by construction and/or operation of the assets and the risk that bush fires in the landscape pose to the assets.

5.1 During construction and decommissioning

Construction and decommissioning activities may pose a potential for on-site ignitions, resulting in a fire escaping to the surrounding private land. These mainly arise from hot work, fire risk work, vegetation clearing and management and the use of vehicles on site. It is recommended that contractors incorporate the following bush fire mitigation measures to ensure the risk is appropriately managed.

- The use of construction equipment, slashers and mulching machines in areas where rock is known to occur shall be accompanied by a fire-fighting appliance such as a 4-wheel drive (4WD) Striker with 'slip-on' fire-fighting unit or tanker trailers, equipped with diesel pump and hose. This work should not occur during periods of Total Fire Ban and Catastrophic Fire Weather Days.
- Precautions should be used during all external hot works with shielding and a water supply (i.e., nine kilogram water fire extinguisher) provided. No external hot works should be undertaken during periods of Total Fire Ban and Catastrophic Fire Weather Days. Contractors must be aware of prohibited activities or exemptions that are notified by the Commissioner of the NSW RFS under the RF Act s99.
- Emergency external hot works undertaken during periods of Total Fire Ban and Catastrophic Fire Weather Days are to have a NSW Rural Fire Service fire-fighting appliance on stand-by at the works.
- Motor vehicles should not be driven across long cured (dry) vegetation (grass & crops) and should be equipped with a nine kilogram water fire extinguisher.

- Operators of diesel-powered trucks should be made aware of the risk of ignition of vegetation posed by the exhaust emission system. These trucks should be equipped with a nine-kilogram water fire extinguisher.
- Electrical equipment should be checked weekly for potential faults.
- All chemicals should be managed and stored in accordance with safety data sheet requirements.
- Fire detection and suppression systems should be installed at the earliest stage of construction for BESS infrastructure.
- Provide first-aid equipment, such as fire extinguishers.
- Prepare an updated Emergency Response Plan (inclusive of the Bush Fire Protection Plan) to include the BESS component (refer Section 5.2.7)

5.2 During operation (permanent mitigation measures)

5.2.1 Asset protection zones & vegetation screening

A 22m APZ setback has been defined around the batteries and substations as shown in Figure 4-3 to minimise radiant heat impact to 12.5kW/m^2 or less. This is more than the minimum requirements outlined in PBP.

The APZ must be effectively managed for the duration of the project's operational life.

The effective management of vegetation and fuel can reduce the risk of fire entering the development footprint, and the consequences of fire. The following measures are recommended:

- Long grass and deep leaf litter must not be present in areas where heavy equipment will be working.
- Maintenance of grassland within the asset protection zone (refer Figure 4-3) during the Fire Danger Period.
- Remove any accumulation of combustible materials (including leaf litter) in or within 22m of any BESS and related infrastructure; and
- Landscape screening (if required) should occur outside of the APZ and consider the potential increase in fire risk due to the type (species), density, height, location and overall width of the vegetation screening.

Substation APZs & electricity supply

Substation design should aim for a high level of bush fire protection for critical assets and a rapid return to service following a bush fire event.

Network Standard NS187 Passive Fire Mitigation Design of Major Substations is an Ausgrid document that details the minimum levels for passive fire protection systems at Ausgrid's major substations (sub-transmission and zone substations).

Radiant heat is the most likely cause of damage to substation equipment and structures. Other causes of fire spread are embers to combustibles in the substation. Therefore, consideration shall be given to protecting combustible substation equipment against ember damage.

The radiant heat exposure limits for critical substation structures and high voltage components are provided in Table 5-1. Critical elements are deemed essential for returning to service following a bush fire event.

APZ widths may potentially reduce where critical exposed elements nearest the boundary are able to be locally protected and/or rapidly replaced following a bush fire event.

Table 5-1 – Radiant heat exposure limits for switchyard equipment (Ausgrid 2020)

Item	*Maximum allowable radiant heat flux (RHF) (kW/m2)*	*Comment*
Cable	12.5	Polyvinyl chloride cables begin to distort and may ignite
	20	Ignition of cross-linked polyethylene cables between 85 and 550 seconds
Steel support structure	35	To 60% of yield strength after a maximum duration of 5 minutes. This applies where elastic deflections due to elevated temperatures are not critical
Porcelain bushing/insulators	>30	Damage may occur requiring replacement or in extreme case resulting in catastrophic failure. See Note 1

Item	*Maximum allowable radiant heat flux (RHF) (kW/m2)*	*Comment*
Polymeric bushing/insulators	>30	Damage may occur requiring replacement or in extreme case resulting in catastrophic failure. See Note 1
Aluminium busbar	20	Based on 250°C after a maximum duration of 5 minutes. Comparable to withstand temperature under fault conditions
Copper busbar	25	Busbars may undergo significant distortion and impose significant stresses on rigid insulators
Transformer tank	>35 (see Note 2)	Refer to above regarding bushings and cables
Combustibles	12.5	Piloted ignition may occur on timber

Note 1: Detailed information on radiant heat exposure limits is not available. However, in service applications exposed to bush fire indicate a high radiant heat limit and low risk of damage or failure.

Note 2: Transformers always have some more vulnerable components such as bushings and cables.

Ideally, the APZ should be wide enough to reduce radiant heat flux from any bush fire burning in nearby vegetation to less than that which may be tolerated by the most sensitive component (polymeric bushing/insulators; maximum allowable radiant heat flux of 12.5 kW/m^2). This would require a separation (of the more sensitive components) from bush fire-prone vegetation of 22m (calculated using AS5339-2018 Construction of buildings in bushfire-prone areas).

The setbacks provided are large enough (i.e. 22m) to ensure the radiant heat exposure to the substation components is 12.5kW/m^2 or lower (refer to Figure 4-3). BAL 12.5 is depicted in blue and corresponds to a radiant heat flux of 12.5kW/m^2 or lower at a distance of >22m.

5.2.2 Building construction

Essential equipment should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies. It should also be designed and maintained so that it will not serve as a bush fire risk to surrounding bush.

Each BESS must be regularly serviced to manufacturers' specifications and regularly inspected for signs of mechanical damage to external containers/enclosures. It is recommended that BESS infrastructure is:

- Installed on a non-combustible surface such as concrete.
- Fencing and retaining are constructed from fire-resistant materials.
- All buildings are designed for adequate fire protection.
- Insulation around the battery module to limit heat effects.

5.2.3 Access for firefighting operations

Access to the project will extend from the existing internal road to the east. The access will be semi-sealed and 5.5 m wide. This road will link with the existing perimeter track around the solar farm, also available for emergency access/egress if required.

The existing internal network of access tracks has been established to enable responding emergency services to access all facility areas, including fire service infrastructure (water tanks), substations, BESS and related infrastructure.

The internal access tracks will include:

- A perimeter track (within the APZ) a minimum 4m-wide.
- Connecting 4m wide (minimum) access tracks between rows of BESS containers to facilitate access.

Access to the development footprint complies with the acceptable solutions outlined in Table 5-2 below.

Table 5-2 – Performance criteria for access (PBP 2019)

Performance criteria	*Acceptable solution*	*Compliance with acceptable solutions*	*Comment*
Firefighting vehicles are provided with safe, all weather access to structures and hazard vegetation	Property access roads are two-wheel drive, all-weather roads	☑	Can comply
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 / causeways are to clearly indicate load rating.	☑	Can comply
There is appropriate access to water supply	Hydrants are provided in accordance with AS 2419.1:2021	☑	Hydrants can comply
	There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available	☐	
Fire fighting vehicles can access the dwelling and exit the property safely	At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200m from a public road	N/A	CFA recommends a minimum of two access points to the facility. This can be achieved with access provided to the east and west of the BESS.
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.	☑	Can comply

Performance criteria	*Acceptable solution*	*Compliance with acceptable solutions*	*Comment*
Firefighting vehicles can access the development footprint and exit the property safely.	Minimum 4m carriageway width;	☑	Complies
	In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay;	☑	Can comply
	A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;	☑	Can comply
	Provide a suitable turning area in accordance with Appendix 3 of PBP 2018	N/A	The dead end roads will be linked to provide through access as part of the detailed design.
	Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	☑	Can comply
	The minimum distance between inner and outer curves is 6m;	☑	Can comply
	The crossfall is not more than 10 degrees;	☑	Complies
	Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and	☑	Complies
Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed.			

5.2.4 Water supply

In the event of a fire (structure, grass fire or bush fire), sufficient water must be available and safely accessible to emergency services to ensure fire suppression activities are safe and effective. The water supply must be provided to cover BESS infrastructure and substation/s.

Additional fire protection systems or equipment required under any Australian Standards for dangerous goods must be provided as prescribed.

The following outlines the performance criteria for water supply. This criterion does not necessarily relate to BESS infrastructure in all circumstances, and therefore additional comments in relation to CFA (2022) guidelines have been incorporated where applicable.

The solar farm currently supports two (2) 1,000 L trailer-mounted firefighting tanks and pump for portable water usage in the event of a fire.

It is recommended that water supply for firefighting purposes is located at the primary vehicle access point to the project (as a minimum) and at least 10m from BESS infrastructure & electrical substation. Dedicated fire fighting supply tanks – with volume (and siting) to be determined through the Fire Safety Study.

Table 5-3 – Performance criteria for water supplies (PBP 2019)

Performance criteria	*Acceptable solutions*	*Achievable for the project*	*Comment*
An adequate water supply is provided for firefighting purposes.	Reticulated water is to be provided, where available.	..	Can comply. Additional static water is to be provided
	A static water supply is to be provided where no reticulated water is available	☑	
The integrity of the water supply is maintained.	All above-ground water service pipes are metal, including and up to any taps.	☑	Can comply

Performance criteria	*Acceptable solutions*	*Achievable for the project*	*Comment*
A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	Where no reticulated water supply is available, water for firefighting purposes is provided in accordance with Table 5.3d of PBP 2019. These requirements are designed for residential development.	☑	Water requirements are to be determined in consultation with the district RFS, Fire Rescue NSW & as determined through the Fire Safety Study
	A connection for firefighting purposes is located within the IPA or non-hazard side and away from the structure; 65mm Storz outlet with a ball valve is fitted to the outlet	☑	CFA (2022) recommends tanks be located at vehicle access points to the facility and must be positioned at least 10m from any infrastructure (i.e. BESS etc.)
	Ball valve and pipes are adequate for water flow and are metal	☑	Can comply
	Supply pipes from tank to ball valve have the same bore size to ensure flow volume	☑	Can comply
	Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank	☑	Can comply
	A hardened ground surface for truck access is supplied within 4m	☑	Can comply
	Above-ground tanks are manufactured from concrete or metal	☑	Can comply

Performance criteria	Acceptable solutions	Achievable for the project	Comment
	Raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F of AS 3959(2018);	☑	Can comply
	Unobstructed access can be provided at all times;	☑	Can comply
	Underground tanks are clearly marked	☑	Can comply
	Tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters	☑	Can comply
	All exposed water pipes external to the building are metal, including any fittings	☑	Can comply
	Where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump, and are shielded against bush fire attack; any hose and reel for firefighting connected to the pump shall be 19mm internal diameter	☑	Pumps are not mandatory. If provided they are to comply with the acceptable solutions
	Fire hose reels are constructed in accordance with AS/NZS 1221:1997, and installed in accordance with the relevant clauses of AS 2441:2005	☑	Fire hose reels are not mandatory and are not proposed.

5.2.5 Other mitigation measures

In addition to the measures outlined above, other considerations apply to the operation of renewable energy assets to effectively manage bush fire risk. This is generally outside of the scope of this document but can be summarised as:

- The requirements of the dangerous goods legislative framework, and all relevant Australian Standards.
- Procedure/controls for correct storage of chemicals and combustible materials on-site (away from BESS units).
- Procedures to shut down BESS during conditions where fire can spread externally into the development footprint and when temperature exceeds high temperature threshold as outlined in the PHA.
- Appropriate monitoring for project infrastructure, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.
- The provision for direct alarm monitoring to the fire brigade for BESS automatic detection systems should be considered.
- Provision of a dry retention basin with the capacity to store contaminated fire water (as a safeguard to prevent potential runoff of contaminated fire water into the environment)

In addition to the above, the BESS will be equipped with the following as outlined in the PHA:

- BESS must be tested in accordance with UL9540A.
- Testing to demonstrate clearances required to prevent propagation of fires between separated units.
- BESS to be installed in accordance with manufacturer and UL9540A report recommended clearances based on testing.
- BESS to be installed with fire protection systems specified by the manufacturer and UL9540A report.
- Before construction, detailed design to validate the system can be installed in the project area whilst meeting the recommended clearances.
- UL testing information shall be made available to the certifying authority. It is noted that a confidentiality agreement may be required.

5.2.6 Potential environmental impact of bush fire mitigation measures

The direct impacts have been assessed as part of the SEE (Mecone, 2024) – including all bush fire mitigation measures, as these are wholly contained within the project area. There are no significant environmental constraints associated with the project.

5.2.7 Emergency Response Plan & Operational Environmental Management Plan

The Emergency Response Plan (inclusive of the Bush Fire Protection Plan) for the Junee Solar Farm must be updated for the project to incorporate the BESS. The Plan will inform operational and emergency management practices at the facility and will effectively describe all fire hazards and provide clear actions and accountabilities for their management.

6. CONCLUSION & RECOMMENDATIONS

6.1 Conclusion

This bush fire assessment report has been undertaken for the installation of a new BESS, a small grid-scale battery project associated with the existing approved and operational Junee Solar Farm.

This assessment has found that bush fire can potentially affect the project from the surrounding grassland and woodland vegetation.

The potential impact of bush fire both within and outside of the Project area will be mitigated with the adoption of the bush fire protection measures outlined in this document (as required by PBP 2019) and the controls outlined in the PHA. The project is categorised by the NSW RFS as 'other development' and complies with the following aims and objectives of PBP 2019.

Table 6-1 – Aims and objective of PBP 2019

Aims and objectives	Statement of compliance
Afford buildings and their occupants protection from the exposure to bush fire	A defendable space of at least 22m will be provided around the boundary of the BESS footprint.
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 personnel and occupants is available	Access to the BESS will extend from the existing internal network of access tracks to enable responding emergency services to access all areas of the facility, including fire service infrastructure (water tanks), BESS and related infrastructure. Internal access tracks include:

Aims and objectives	Statement of compliance
	• A perimeter track up to 4m-wide • Internal access tracks between BESS rows to allow for safe and effective firefighting operations.
Provide for ongoing management and maintenance of bush fire mitigation measures.	All bush fire mitigation measures are confined to the property boundary. The Emergency Response Plan and associated Bushfire Protection Plan are to be updated to ensure ongoing management and maintenance.
Ensure that utility services are adequate to meet the needs of firefighters	All utility services will comply with PBP 2019. It is recommended that water supply for firefighting purposes is located at the primary vehicle access point to the facility and elsewhere in consultation with the NSW RFS District Office for the Riverina Zone, Fire and Rescue NSW and as detailed within the Fire Safety Study.

6.2 Recommended mitigation measures

The following recommendations are provided to ensure that the project has adequate clearances to combustible vegetation, firefighting access and water supplies in accordance with the requirements of *PBP 2019*.

Table 6-2 – Mitigation measures

Ref. no.	Mitigation measure	Timing
1	The BESS and associated substations is maintained to the standard of an inner protection area (IPA) in accordance with the requirements of Appendix 4 of *Planning for Bush Fire Protection 2019*. A minimum 22m APZ is to be provided around the development footprint.	Pre-construction/ construction & operation

Ref. no.	Mitigation measure	Timing
2	Access roads are to comply with the property access road requirements as outlined in Table 7.4a of *Planning for Bush Fire Protection 2019*, with additional considerations as outlined in Section 5.2.3 of this document. The dead end roads are to be refined as part of the detailed design and must be linked to provide through access.	Pre-construction/ construction
3	Water supply for firefighting purposes must be located at the primary vehicle access point to the facility and elsewhere in consultation with the NSW RFS District Office for the Riverina Zone, Fire and Rescue NSW and the fire Safety Study. Further: • a SWS must be provided on site located within the IPA or non-hazard side and away from structures; • unobstructed access is to be provided within 4m of the SWS at all times; • a 65mm Storz connection with a ball valve is fitted to the outlet of the SWS; • ball valve and pipes are adequate for water flow and are metal; • supply pipes from tank to ball valve have the same bore size to ensure flow volume; • underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank and a hardened ground surface for truck access is supplied within 4m; • underground tanks are clearly marked; • above-ground tanks are manufactured from concrete or metal; • raised tanks have their stands constructed from non-combustible material or bush fire-resisting timber (see Appendix F of AS 3959); • tanks on the hazard side of a building are provided with adequate shielding for the protection of firefighters; • all exposed water pipes external to the building are metal, including any fittings;	Construction & operation

Ref. no.	Mitigation measure	Timing
	• where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump, and are shielded against bush fire attack; • any hose and reel for firefighting connected to the pump must be 19mm internal diameter; and • any fire hose reels are constructed in accordance with AS/NZS 1221:1997 and installed in accordance with the relevant clauses of AS 2441:2005.	
4	The Emergency Response Plan (inclusive of the Bush Fire Protection Plan) for the Junee Solar Farm must be updated for the project to incorporate the BESS.	Construction & operation

7. REFERENCES

Cheney N.P., Gould J.S. Catchpole W.R. (2008) – *Grassfires: Fuel weather and fire behaviour*. CSIRO Publishing 2nd Edition, Collingwood, Vic.

Councils of Standards Australia AS3959 (2018) – *Australian Standard Construction of buildings in bush fire-prone areas.*

Country Fire Authority (CFA) (2023) - *Design Guidelines and Model Requirements Renewable Energy Facilities,*

GHD (2023) - *The Battery Energy Storage Systems Guidance Report*: Australian Energy Council Limited

Mytilineos (2022) – Bushfire Protection Plan, Junee Solar Farm

Mytilineos (2022) – Emergency Response Plan, Junee Solar Farm

Mytilineos (2022) – Operational Environmental Management Plan, Junee Solar Farm

Riverina Bush Fire Risk Management Committee (2018) – *Bush Fire Risk Management Plan*

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.

Rural Fire Service (2019) - *Planning for bush fire protection – a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service.