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Designing Bushfire Protection Measures

Reference: J24/0612 Date of Issue: 14 October 2024

## 2024

## **Bush Fire Assessment Report**

In relation to the proposed 6.3 MW Solar Farm & 11 MW BESS

at: 1000 Burkes Creek Road The Rock Lot 107 DP 754563









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## Document Tracking

Item	Detail
Project Name	Bush Fire Assessment Report, proposed 6.3
	MW Solar Farm & 11 MW BESS
Project Address	Lot 107 DP 754563
	1000 Burkes Creek Road The Rock
Client Name	Arup Australia Pty Ltd
Project Number	J24/0612
Plan Reference	Plans by Green Gold Energy, revision B,
	dated 8/05/2024
Prepared by	Laura Richards
Approved by	Catherine Gorrie

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## **Document Control**

Version	Primary Author	Description	Date
			Completed
1	Laura Richards	Draft	11/10/2024
2	Catherine Gorrie	Final	14/10/2024
3	Catherine Gorrie	Final, minor edit	18/10/2024

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#### Disclaimer

Any recommendation or advice expressed in this report is made in good faith and in accordance with the relevant legislation for bushfire prone development in New South Wales. Bushfire Consulting Services Pty Ltd has endeavoured to ensure that the information in this document is correct. However, many factors outside our current knowledge or control affect the recipient's needs and project plans. Bushfire Consulting Services Pty Ltd does not warrant or represent that the document is free from error or omissions and does not accept liability for any errors or omissions. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. To the fullest extent possible Bushfire Consulting Services Pty Ltd excludes any express or implied warranty as to condition, fitness, merchantability or suitability of this document and limits its liability for direct or consequential loss at Bushfire Consulting Services Pty Ltd option to re-supplying the document or the cost of correcting the document. In no event shall Bushfire Consulting Services Pty Ltd responses to questions or any other information in this document be deemed to be incorporated into any legally binding agreement without the express written consent of an officer of Bushfire Consulting Services Pty Ltd.

It should be borne in mind that the measures recommended in this report cannot guarantee that a building will survive a bushfire event on every occasion. This is due to the degree of vegetation management, the unpredictable behaviour of bushfires and extreme weather conditions. As such, the author is not liable to any person for any damage or loss whatsoever which has occurred or may occur in relation to the person taking action or not taking action based on the recommendations of this report.

NOTE: This bush fire assessment shall remain valid for 12 months from the date of issue.

## **Executive Summary**

Bushfire Consulting Services was commissioned by Arup Australia Pty Ltd to provide a bush fire assessment report for the construction, operation and maintenance of a 6.3 MW Solar Farm & 11 MW Battery Energy Storage System (BESS) at Lot 107 DP 754563, 1000 Burkes Creek Road The Rock. The report is intended to support a Development Application (DA) to be submitted to Wagga Wagga City Council (WWCC).

The proposal is a form of "other non-residential" development and, as such, this report makes recommendations in accordance with the aim and objectives of Chapter 1 and 8 of the NSW RFS document 'Planning for Bush Fire Protection' (PBP) (NSWRFS 2019). The recommendations address these tailored objectives including:

- 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 is available
- provide for ongoing management and maintenance of Bushfire Protection Measures (BPMs)
- ensure that utility services are adequate to meet the needs of firefighters
- Provide safe access to/from the public road system for firefighters providing property protection during a bush fire
- Provide adequate services of water for the protection of buildings during and after the passage of bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building
- Provide for the storage of hazardous materials away from the hazard wherever possible

This report also demonstrates that the proposal is not to be defined as a "hazardous industry" as described in PBP 8.3.9 (with reference to the Preliminary Risk Screening).

Where all recommendations are implemented, the report concludes that the proposal can comply with the aim and objectives of PBP.

## Compliance Summary

This Assessment has been Certified by:	
Catherine Gorrie	Myouis
BPAD-Level 3 Accredited Practitioner	Chuyan
FPAA Cert No: BPAD20751	U
Does this development comply with the aim	Yes
and objectives of PBP?	
Is referral to the NSW Rural Fire Service (RFS)	Yes
required?	

## List of Abbreviations

alian Standard 3959 – 2018, Construction of Buildings in re Prone Areas re Attack Level
re Attack Level
re Planning and Design (Accreditation Scheme)
re Protection Measures
re Prone Land Map
ga Wagga City Council
lopment Application
Il Elevation Model
nmental Planning and Assessment Act – 1979
anger Index
rotection Association of Australia
Protection Area
atts per metre squared
Detection and Ranging
& Property Management Authority
nal Construction Code
ing for Bush Fire Protection 2019
Fires Act – 1997
Rural Fire Service
Environmental Planning Policy
al Information Exchange
Water Supply

## 1. Introduction

This report has been commissioned by Arup Australia Pty Ltd to provide a bush fire assessment report for a new 6.3 MW Solar Farm & 11 MW Battery Energy Storage System (BESS) at Lot 107 DP 754563, 1000 Burkes Creek Road The Rock.

The subject property is "bushfire prone land" as per the local Council bushfire prone land map (Figure 3) as defined by section 10.3 (s10.3) of the *Environmental Planning & Assessment Act* (EP&A) 1979 and therefore the requirements stipulated by legislation apply to any new development on the site.

*Planning for Bush Fire Protection 2019* (Chapter 8) describes this type of development as "other non-residential development" and therefore the aim and objectives of Chapter 1 and 8 of PBP are applicable.

The bush fire assessment and recommendations provide the information required for the consent authority to be satisfied that the development conforms to the specifications and requirements of the Rural Fire Service document *Planning for Bush Fire Protection 2019* as mandated by s4.14 of the EP&A Act.

## 2. Purpose of this Report

The purpose of this report is to provide the owners, the Consent Authority, the Certifier and the Rural Fire Service with a description of the proposed development as well as the vegetation type, slope and any other factors influencing the likely bushfire behaviour, sufficient to show that the development will be protected from the likely bushfire threat as outlined in current legislation.

This assessment includes an analysis of the hazard, threat and subsequent risk to the development and provides recommendations that satisfy the aim and objectives of Planning for Bush Fire Protection.

## 3. Location

The site is located and known as Lot 107 DP 754563, 1000 Burkes Creek Road The Rock. It is located approximately six (6) kilometres northeast of the township of The Rock. The property is part of the Wagga Wagga City Council local government area.





Figure 2. Aerial Map. Source: LPMA SIX Viewer (NSW Government 2024a)



Site location outlined in red

# Figure 3. Bushfire Prone Land Map. Source: NSW Government Planning Portal (NSW Government 2024b)



Site location outlined in yellow

Vegetation Category 1 Vegetation Category 3

## 4. Property Description

The property is comprised of Lot 107 DP 754563, 1000 Burkes Creek Road The Rock, covering approximately 1950473.75m<sup>2</sup> in area (Figure 2). It is bounded by large private farming allotments to the approximate north, Pearson School Lane to the approximate east, Byrnes Road to the approximate south and Burkes Creek Road to the approximate west. The proposal is to occupy approximately 15ha of the north western portion of the site. The remaining land outside the facility's fence will remain "as is", which is an existing farm including a dwelling and associated ancillary structures, which will be managed seasonally in accordance with the ongoing agricultural use of the farm.

#### 4.1 Zoning

The land is zoned RU1 Primary Production under Wagga Wagga City Council Local Environmental Plan/SEPP 2010. Adjacent lands are similarly zoned (Figure 4).



Figure 4. Zoning Map. Source: NSW Government Planning Viewer (NSW Government 2024b)

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SP2: Infrastructure

#### 4.2 Biodiversity Values

A <sup>1</sup>Flora and Fauna Assessment has been prepared by Habitat Innovation and Management to assess potential biodiversity impacts associated with the development, and therefore this report does not provide further commentary.

#### 4.3 The Proposal

The Project involves construction and operation of a Solar Farm and BESS facility over approximately 40 acres (15 Ha) and includes

- The solar PV array installation will consist of 10,854 modules, each with a capacity of 580 W and model LRS-72HTH-580M (or similar), resulting in a total DC capacity of 6.30 MW
- For power conversion, the project will utilise one SG4950-MV-MV (or similar) inverter. The battery energy storage system will comprise 4 battery units with a total capacity of 11 MWh, using the ST-375KWh battery model and an LC-1000 local controller
- Site infrastructure development involves constructing approximately 600m of internal roads, installing 3622m of security fencing around the perimeter, creating a site entry point from Burkes Creek Road, establishing a site amenity area, and preparing a 1050 m<sup>2</sup> lay down area. A parking area measuring 3.5m x 7.0m will also be constructed
- Electrical infrastructure will include a PV switchboard, an inverter station, underground cabling for customer-owned connections, and connection to existing Essential Energy (EE) 22kV distribution lines.

The proposal, once constructed, will operate with minimal activity and staffing, except for the movement of tracking arrays. The construction phase, therefore, represents the most significant period of impact in the proposal's lifecycle. Although this phase is brief, proper management can effectively control its effects to acceptable levels. Construction is planned to commence in 2026 and is expected to last up to 12 months, progressing through three key stages:

<sup>&</sup>lt;sup>1</sup> Flora and Fauna Assessment by Habitat Innovation and Management dated 30/09/2024

**Stage 1 (Civil):** focuses on civil works, including land preparation, road construction, drainage installation, and site establishment

**Stage 2 (Mechanical):** involves mechanical works such as foundation piling and installation of solar arrays, trackers and battery modules

**Stage 3 (Electrical):** encompasses electrical works, from solar cabling and BESS to grid connection and system commissioning.

Once operational, the facility will transition to a low-impact, largely autonomous operation, contributing clean energy to the local grid with minimal ongoing disturbance to the surrounding area.

## 5. Site Assessment

The assessment relates to the new development shown in the site plans (reference Appendix 1 below). The NSW Spatial Services mapping website has also been used as a reference (NSW Government 2024a), and 'Ocean Shores to Desert Dunes' by David Keith (Keith 2004), and the Flora and Fauna Assessment, in determining the vegetation type.

### 6. Bush Fire Attack Assessment

#### 6.1 Determine Vegetation Formations

The hazardous vegetation formations for each aspect of the development within 140m of the asset have been identified according to Keith (2004). The site contains a wheat crop within the development area and remnants of native bushland at the northern and western periphery of the development area.

Based on a determination of vegetation formation using the Keith (2004) Identification Key, the primary bushland vegetation having the potential to affect the subject building is most representative both Woodland and Grassland to the north and west, and Grassland to the east and south.

Figure 5. Hazardous vegetation affecting the subject building. Source: NearMap (2024) with overlays by BFCS P/L. Aerial Photography date: 21/03/2024



#### 6.2 The effective slope

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the level of radiant heat flux. The effective slope of the land from the new building for a distance of 100m is derived from the most detailed contour data available. The slope is then categorised into one of following classes, relative to the location of the hazard:

- all upslope vegetation (considered 0 degrees)
- >0 to 5 degrees downslope vegetation
- >5 degrees to 10 degrees downslope vegetation
- >10 degrees to 15 degrees downslope vegetation, and
- >15 degrees to 20 degrees downslope vegetation.

1m DEM data is sourced from NSW Spatial Services which is captured using LiDAR and has a horizontal accuracy of 0.3m and vertical accuracy of 0.8m at 95%.

The effective slope has been measured manually on site over a distance of 100m from the proposed development where accessible, under the classified vegetation community constituting the hazard. The slope was found to be consistent with the topographical information from NSW Spatial Services LiDAR data.

Figure 6. Slope Diagram. Source: NearMap (2024) and LiDAR (NSW Government 2024a) with overlays by BFCS P/L: Aerial Photography Date: 21/03/2024



Site location outlined in red, 1m contours

North and east slope is All upslopes and flat land (0°)

South Slope is  $((233-232)/144) \times 1/tan = 0.3^{\circ}$  downslope

West slope is ((231-230)/66.51) x 1/tan = 0.8° downslope

Direction from Building Footprint	Slope Description
North	All upslopes and flat land (0°)
East	All upslopes and flat land (0°)
South	Downslope >0- 5°
West	Downslope >0- 5°

#### 6.3 Fire Weather

The development is located in the Wagga Wagga City Council area, a part of the Eastern Riverina Region, which has a <sup>2</sup>Fire Danger Index of 80.

## 7. Relevant objectives of PBP

The objectives for the development are outlined in PBP Chapter 1 and 8. There are no buildings proposed that can be classified as Class 1-4, 5-8, 9 or 10.

Objective	Comment
Afford buildings and their	The BESS and solar farm footprint can be separated
occupants protection from	from the Grassland and Woodland hazard by 13m
exposure to a bush fire	in all directions to ensure no Flame contact is
	anticipated. These non-habitable structures are
	separated from the hazard by sufficient distance to
	afford buildings protection from exposure to a bush
	fire
Provide for a defendable	A defendable space of at least 13m is proposed
space to be located	around all structures and accessways, which meets
around buildings	the requirements of PBP

#### 7.1 Objectives of Chapter 1 (PBP Part 1.1)

<sup>&</sup>lt;sup>2</sup> The Fire Danger Index (FDI) is a numerical rating that indicates the level of fire danger in a specific area. The FDI takes into account factors such as the chance of fire starting, its rate of spread, its intensity, the chance of a fire starting, and the difficulty potential for its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long and short-term drought effects

Objective	Comment	
Provide appropriate	The relevant FDI (80), vegetation formation	
separation between a	(Grassland and Woodland) and effective slope (0°	
hazard and buildings which,	-Downslope <5°) have been matched using Table	
in combination with other	A1.12.6 of PBP, and the available separation	
measures, prevent the likely	distance between the development and the	
fire spread to buildings	hazard of 13m in all directions, exceeds the	
	minimum distance for APZs of 10-13m, indicating	
	that direct flame contact on the development	
	area is not anticipated	
Ensure that appropriate	Can comply as road widths, curvatures and grades	
operational access and	and swept paths can be designed to enable	
egress for emergency	appropriate operational access and egress for	
service personnel and	emergency service personnel and occupants	
occupants is available		
Provide for ongoing	Normal property maintenance will ensure that	
management and	BPMs are maintained	
maintenance of BPMs, and		
ensure that utility services	Can comply, see above	
are adequate to meet the		
needs of firefighters		

To ensure that flame contact is not anticipated, the relevant FFDI, vegetation formation and effective slope are matched using Table A1.12.2 of PBP.

## Table A1.12.2 of PBP - Minimum distances for APZs – residential development, FFDI 100 areas (<29kW/m<sup>2</sup>, 1090K)

Aspect	Distance	Vegetation	Slope Under Classified	APZ required
	from	Classification	Vegetation	
	hazard			
North	13m APZ	Woodland	All upslopes and flat land (0°)	Woodland – 11m
	proposed	Grassland		Grassland – 10m
East	13m APZ	Grassland	All upslopes and flat land (0°)	10m
	proposed			
South	13m APZ	Grassland	Downslope >0- 5°	llm
	proposed			
West	13m APZ	Woodland	Downslope >0- 5°	Woodland – 13m
	proposed	Grassland		Grassland – 11m

It is proposed to implement and maintain an APZ from the BESS and Solar Farm footprint for a distance of 13m in all directions, as outlined in PBP 2019 Appendix 4.

## 7.2 Objectives of Chapter 8 (PBP Part 8.3.1)

Objective	Comment
Provide safe access to/from	Can Comply, the lot has direct access to Burkes
the public road system for	Creek Road, which is a public road. Internal
firefighters providing property	access provides a minimum road width of
protection during a bush fire	approximately 4m, with hard surfaces around the
and for occupant egress for	development, sufficient for fire trucks and other
evacuation	emergency vehicles to enter and egress the lot in
	a forwards direction. It is not anticipated that
	there will be any occupants of the development.
	Suitable access for fire-fighting vehicles is
	available

Objective	Comment
Provide suitable emergency	N/A as there are no occupants of the
and evacuation (and	development
relocation) arrangements for	
occupants of the	
development	
Provide adequate services of	Can Comply, as
water for the protection of	<ul> <li>A 40000L water supply tank is to be</li> </ul>
buildings during and after the	provided
passage of bush fire, and to	<ul> <li>Where practical, electrical transmission</li> </ul>
locate gas and electricity so	lines are underground
as not to contribute to the risk	<ul> <li>Gas is not proposed</li> </ul>
of fire to a building	
Provide for the storage of	Can comply, as wherever possible, the storage of
hazardous materials away	hazardous materials will be away from the hazard
from the hazard wherever	
possible	

### 7.3 Objectives of Chapter 8 Wind and Solar Farms (PBP Part 8.3.5)

According to PBP, wind and solar farms require special consideration and should be provided with adequate clearances to combustible vegetation as well as firefighting access and water.

The following should be provided for wind and solar farms:

Objective	Comment
a minimum 10m APZ for the	Can Comply, as a 13m APZ is proposed
structures and associated	
buildings/infrastructure	
the APZ must be maintained	Can comply as development consent conditions
to the standard of an IPA for	can provide an ongoing legal framework
the life of the development	

Objective	Comment
Essential equipment should	Can comply as appropriate separation from
be designed and housed in	hazards is provided
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	
A Bush Fire Emergency	A Bush Fire Emergency Management and
Management and	Operations Plan can be required as part of the
Operations Plan should	Development Consent conditions
identify all relevant risks and	
mitigation measures	
associated with the	
construction and operation	
of the development. This	
should include:	
<ul> <li>detailed measures to</li> </ul>	
prevent or mitigate fires	
igniting	
<ul> <li>work that should not be</li> </ul>	
carried out during total	
fire bans	
<ul> <li>availability of</li> </ul>	
fire-suppression	
equipment, access	
and water	

Objective	Comment
<ul> <li>storage and</li> </ul>	
maintenance of fuels	
and other flammable	
materials	
<ul> <li>notification of the local</li> </ul>	
NSW RFS Fire Control	
Centre for any works	
that have the potential	
to ignite surrounding	
vegetation, proposed	
to be carried out	
during a bush-fire fire	
danger period to	
ensure weather	
conditions are	
appropriate	
<ul> <li>appropriate bush fire</li> </ul>	
emergency	
management planning	

### 7.4 Objectives of Chapter 8 Hazardous Industry (PBP Part 8.3.9)

The NSW Rural Fire Service have indicated that section 8.3.9 of PBP be taken into account when assessing this type of development in relation to any portion of the development that may constitute a Hazardous Industry.

Section 8.3.9 states;

Some developments are considered by their very nature to be hazardous, as much for their ability to start bush fires as their susceptibility to bush fire impacts. A Fire Safety Study prepared under the DPIE Hazardous Industry Planning and Assessment Papers (HIPAPs) should be considered. This study provides details of all credible fire hazards and the associated fire prevention and mitigation measures for the development. Hazardous industries include but are not limited to:

- power generating works
- junk yards
- hazardous industries/storage
- service stations
- fireworks manufacture/storage
- sawmills
- liquid fuel depots
- chemical industries/storage
- ammunition storage/manufacture

A <sup>3</sup>Preliminary Risk Screening has been completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), to determine whether the development is considered to be a "potentially hazardous industry" or "potentially offensive industry" by virtue of the storage and use of dangerous goods on site.

The screening assessment demonstrates that all classes of dangerous goods are below the applicable threshold quantity. The transportation screening assessment shows that the quantity of dangerous goods and the number of vehicle movements are below the required thresholds. As the Resilience and Hazards SEPP screening thresholds are not exceeded, the development is not considered a potentially hazardous industry and no PHA is required.

<sup>&</sup>lt;sup>3</sup> Preliminary Risk Screening, Reference: PRS\_01 Draft 1 dated 3 October 2024

## 8. Recommendations

The following recommendations are made for the bushfire measures for the proposed development of a 6.3 MW Solar Farm & 11 MW BESS at Lot 107 DP 754563, 1000 Burkes Creek Road The Rock, and are based upon the relevant provisions of the NSW Rural Fire Service Guideline entitled *Planning for Bush Fire Protection 2019*.

#### 1. <u>Asset Protection Zones</u>

At the commencement of the development, and in perpetuity, the curtilage surrounding the subject development and access way shall be managed as an Inner Protection Area Asset Protection Zone (IPA APZ) from the from the proposal for a distance of 13m in all directions, as outlined in PBP 2019 Appendix 4.

#### 2. Fire Fighting Water Supply

A 40000L water supply tank is to be provided for a firefighting water supply.

#### 3. <u>Electricity and Gas Services</u>

Where practicable, electrical transmission lines are underground.

Where applicable, 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.

#### 4. <u>Storage of Hazardous Materials</u>

Wherever possible, the storage of hazardous materials will be away from the hazard.

#### 5. <u>Bush Fire Emergency Management and Operations Plan</u>

A Bush Fire Emergency Management and Operations Plan is to be prepared prior to the commencement of works on site that identifies all relevant risks and mitigation measures associated with the construction and operation of the development. This should include:

detailed measures to prevent or mitigate fires igniting

- work that should not be carried out during total fire bans
- availability of fire-suppression equipment, access and water
- storage and maintenance of fuels and other flammable materials
- notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate bush fire emergency management planning.

## 9. Summary

This report consists of a bush fire assessment for the proposed development of a Solar Farm and Battery Energy Storage System (BESS) at Lot 107 DP 754563, 1000 Burkes Creek Road The Rock. The report concludes that the proposed development is on designated bushfire prone land and the legislative requirements for development in bushfire prone areas are applicable.

This report has considered all the elements of bushfire attack and finds that the development satisfies the aim and objectives of 'Planning for Bush Fire Protection' 2019, subject to implementation of the recommendations made by this report.

Notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains and although the standard is designed to improve the performance of such buildings, there can be no guarantee because of the variable nature of bushfires that any one building will withstand bushfire attack on every occasion.

This report is a bush fire assessment that provides the required information to assist local Council and the Rural Fire Service in determining compliance in accordance with Planning for Bush Fire Protection. The local Council is the final consenting authority and the construction of the building must comply with the recommendations included in the Council's conditions of consent.

Myouis





#### Catherine Gorrie | Accredited Bushfire Planning and Design Practitioner

Fire Protection Association Australia BPAD-Level 3 (BPAD 20751)

(a person who is recognised by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment)

Grad Dip Bushfire Protection (UWS 2010)

Diploma Environmental Health & Building Surveying (TAFE 2005)

Corporate Silver Member Fire Protection Association Australia

#### Bushfire Consulting Services Pty Ltd

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## 10. References

ARUP 2024, Preliminary Risk Screening, Sydney

Habitat Innovation and Management 2024, Flora and Fauna Assessment, West Bathurst

Keith D 2004, Ocean Shores to Desert Dunes, the Native Vegetation of NSW and the ACT, Department of Environment and Conservation, Sydney

NearMap 2024, NearMap Photomap Aerial Imagery, NearMap Australia, Barrangaroo, NSW

NSW Government 2024a, NSW Spatial Services, NSW Department of Finance, Services and Innovation.

NSW Government 2024b, NSW Planning Portal, NSW Department of Planning and Environment.

NSW Government 2024c, Biodiversity Values Map, NSW Department of Environment and Heritage.

NSW RFS 2019, Planning for Bush Fire Protection, NSW Rural Fire Service, Sydney.

Standards Australia 2018, Australian Standard AS 3959-2018 'Construction of Buildings in Bushfire Prone Areas', SAI Global, Australia.

## 11. Legislation

Environmental Planning & Assessment Act 1979

Rural Fires Act 1997

Rural Fires Regulation 2013

## Appendix 1 - Site Plan



Appendix 2 – Photos of Site and Surrounds

#### Source: Provided by Arup P/L 2/10/2024



Subject site



Grassland and Woodland vegetation



Woodland vegetation to the west of the subject site