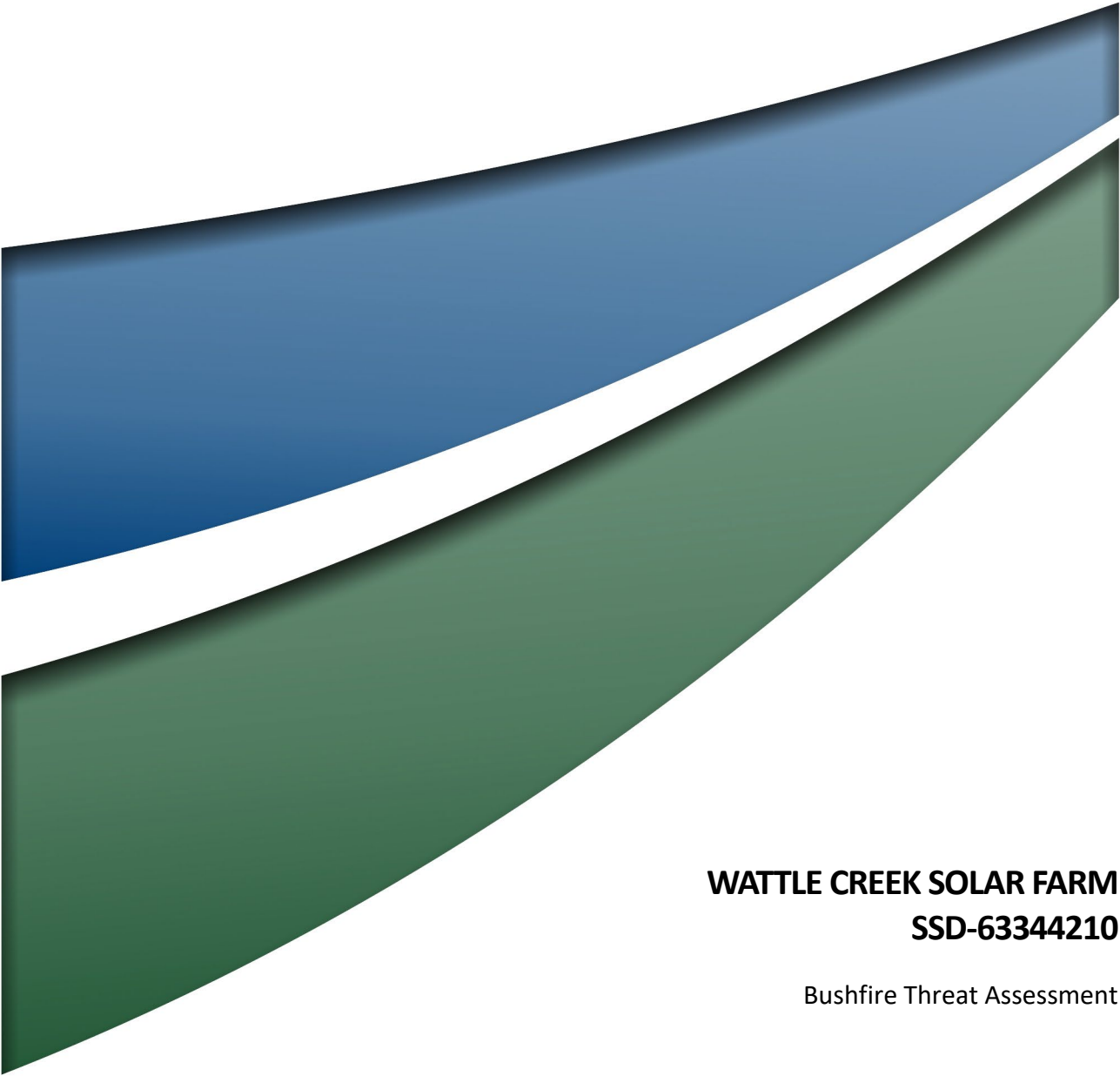


APPENDIX 12

Bushfire Threat Assessment



**WATTLE CREEK SOLAR FARM
SSD-63344210**

Bushfire Threat Assessment

FINAL

March 2025

WATTLE CREEK SOLAR FARM SSD-63344210

Bushfire Threat Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Spark Renewables Pty Ltd

Project Director: Paul Douglass
Project Manager: Penelope Williams
Report No. 22492/R19A
Date: March 2025



75 York Street, Teralba, NSW, 2284



This report was prepared using
Umwelt's ISO 9001 certified
Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Final	Penelope Williams	5/03/2025	Penelope Williams	5/3/2025

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1.0 Introduction

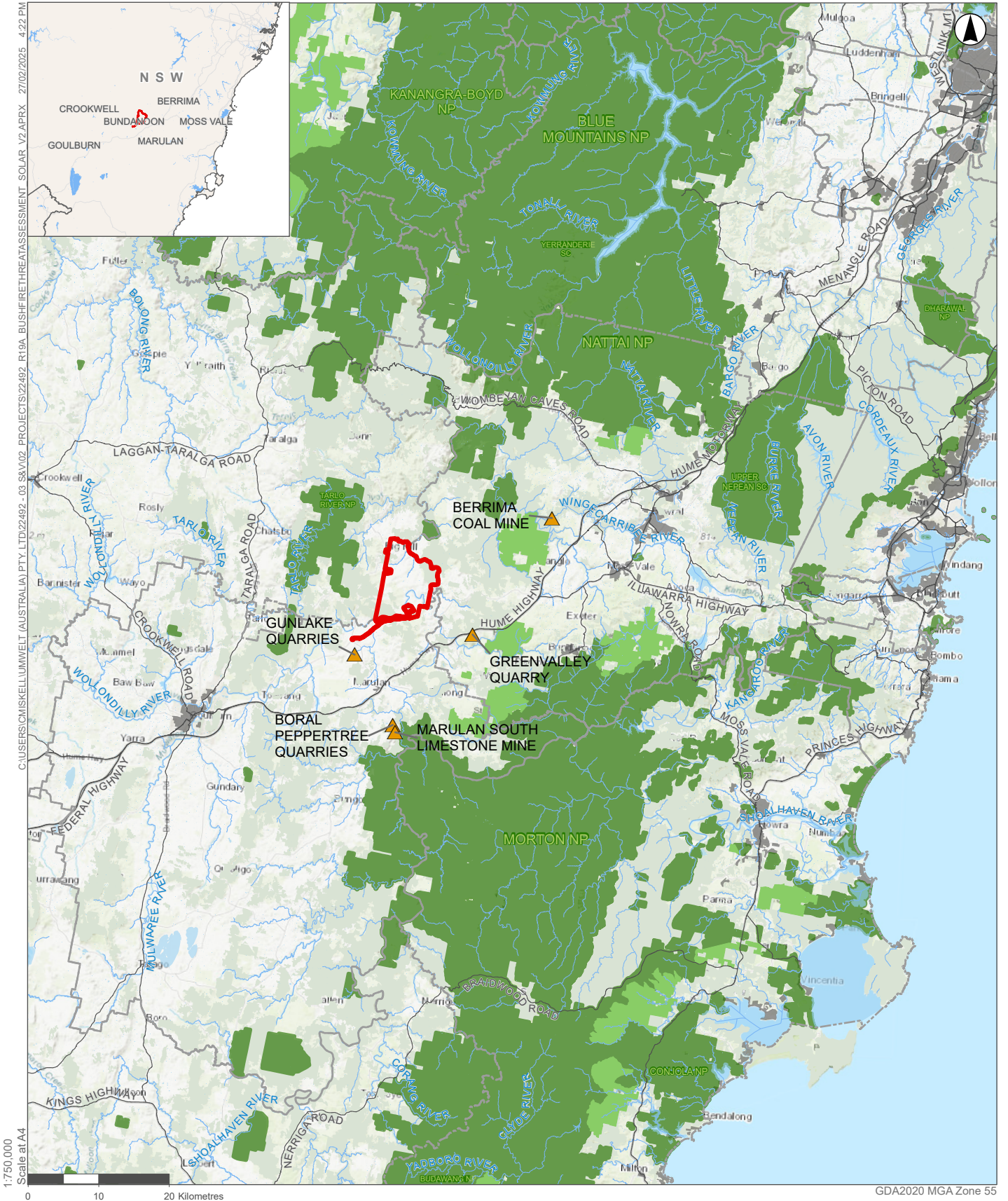
Spark Renewables propose to develop the Wattle Creek Solar Farm located on Arthursleigh Farm (Lot 3 of DP 1120270), approximately 80 kilometres (km) west of Wollongong and 15 km northwest of Marulan within the Upper Lachlan Shire Council Local Government Area (LGA). The Project Area abuts the Wingecarribee Shire LGA to the east, and Goulburn Mulwaree Shire Council LGA to the south, refer to **Figure 1.1**.

The Wattle Creek Solar Farm includes a large-scale solar photovoltaic (PV) generation facility (265 MW(AC)) combined with a 100 MW battery energy storage system (BESS) and associated infrastructure. The Project Area is identified as bushfire prone land by the NSW Rural Fire Service (RFS) bushfire prone land mapping (NSW RFS, 2021). Land within the Project Area is mapped as Category 1 vegetation associated with areas of forest vegetation with high fuel loads and Category 2 vegetation associated with isolated woodland and forest vegetation areas. The cleared areas of the site are not identified as bushfire prone land, refer to **Figure 1.2**.

The Project is State significant Development (SSD) as defined under State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) and requires development consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

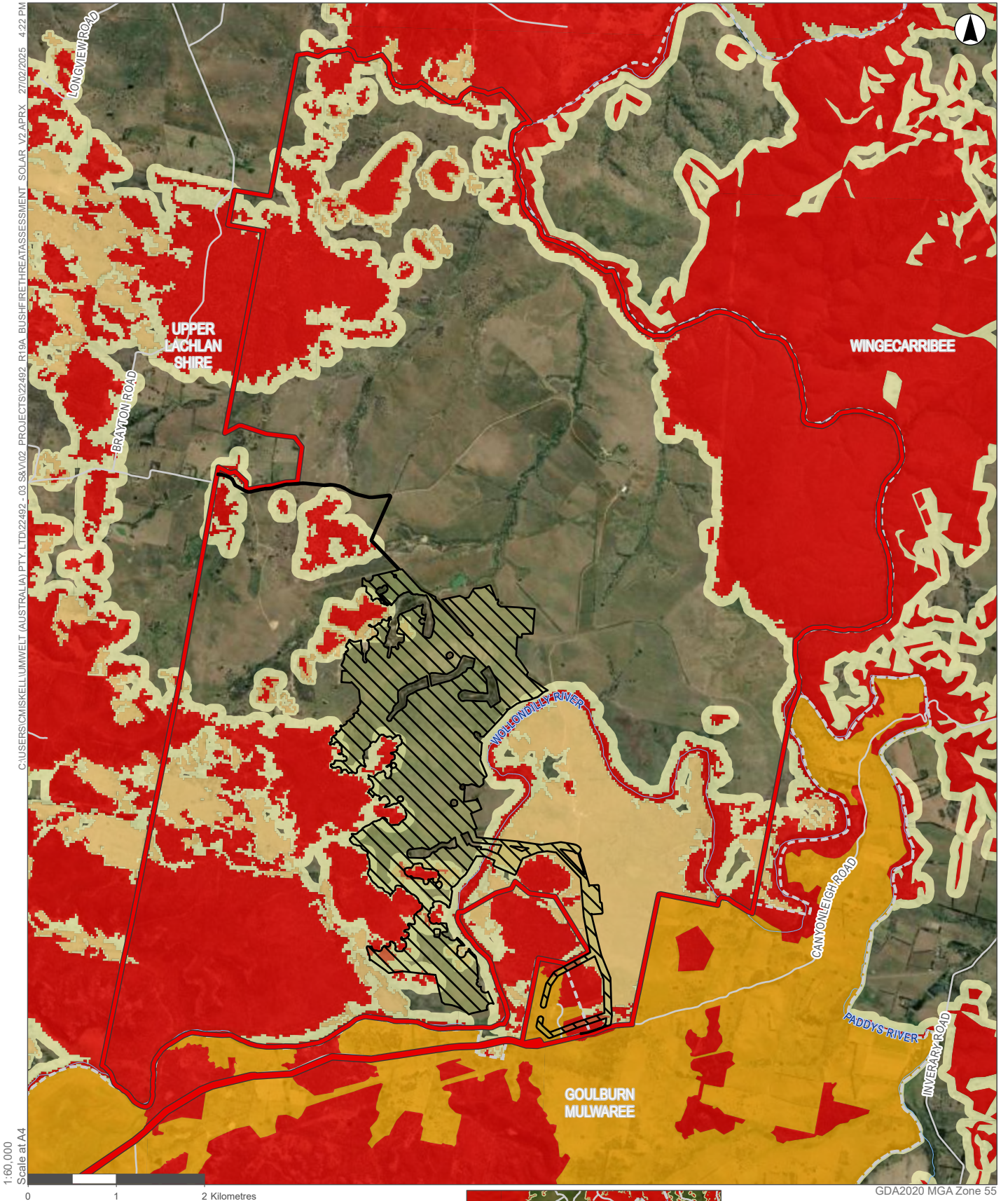
This Bushfire Threat Assessment has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for the Project which require assessment of hazards including:

Identification of the potential hazards and risks associated with bushfires / use of bushfire prone land including the risks that a solar farm would cause bush fire and demonstrate compliance with Planning for Bush Fire Protection 2019.



- Legend**
- ▭ Project Area
 - Local Government Areas
 - Native Vegetation Areas
 - Major Roads
 - State Forest
 - Hydro Areas
 - Watercourses
 - NPWS Estate
 - ▲ Mines/Quarries

FIGURE 1.1
Project Location



- Legend**
- Project Area
 - Local Government Area
 - Development Footprint
 - Roads
 - Watercourses
- NSW Bush Fire Prone Lands**
- Vegetation Category 1
 - Vegetation Category 2
 - Vegetation Category 3
 - Vegetation Buffer

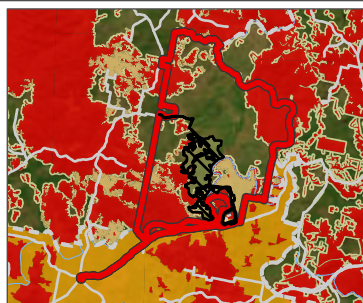


FIGURE 1.2
Bushfire Prone Land Map

1.1 Project Overview

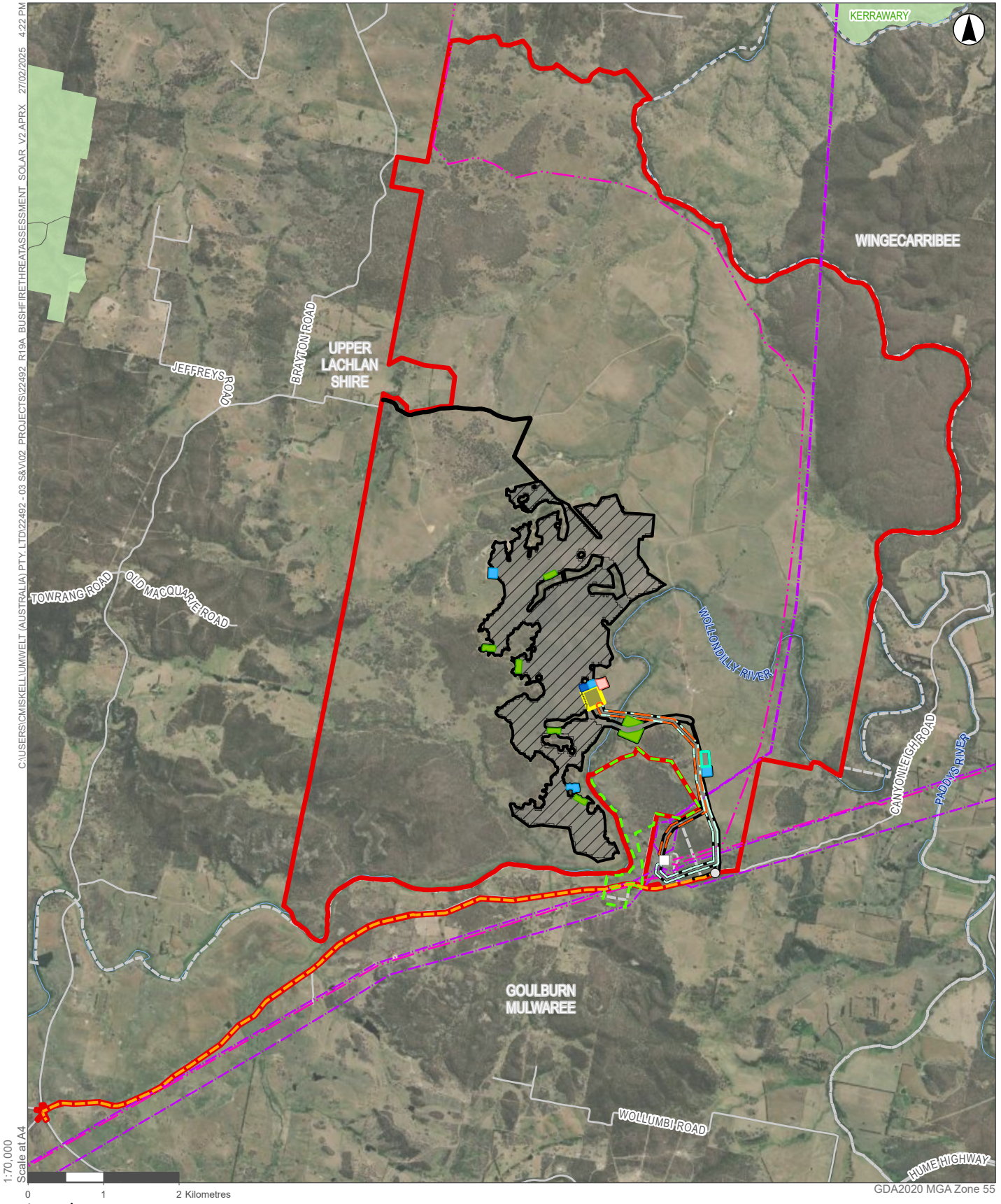
The Project comprises a large-scale solar PV generation facility supported by associated infrastructure. The Solar Project will have a generation capacity of up to approximately 265 MW(AC) and a storage capacity of 100 MW (approximately 2 hours). The key infrastructure proposed includes:

- Approximately 490,000 PV modules will be mounted on single-axis tracking systems within the development footprint. The Project will also include power conversion units (PCUs), a cable network and internal access tracks.
- A Solar Hybrid BESS with 100 MW capacity electrically isolated with its own transformers and metering infrastructure.
- On-site collector substation to connect the Project to the electricity transmission network via Marulan Substation. An 80 m communication mast is also included at the substation location.
- Two overhead transmission line options are being investigated to connect the Project to the transmission network, to allow for optionality during the assessment process and greater flexibility in the connection design, both options are being assessed separately.
- Internal electrical reticulation network, i.e., electrical connections between the proposed panels and collector substation consisting of a combination of underground cables and overhead powerlines.
- Operation and maintenance (O&M) facility – including a site office, O&M buildings, amenities, equipment sheds, storage, and parking areas.
- Other associated permanent infrastructure including hardstands, new access tracks, upgrades to existing access tracks, minor upgrade to the existing access point from Canyonleigh Road, operation and maintenance buildings, static water tanks.
- Road resurfacing works to Canyonleigh Road to facilitate delivery of solar farm components to the Project Area as required.
- Temporary and permanent meteorological monitoring masts.
- A research Test-Bed Facility – comprising of a 1.4 ha hard standing area, demountable buildings, security fencing, parking, 200 kVa power supply and 100 kVA dummy load (simulated electrical load for testing purposes).
- Temporary construction facilities

The Conceptual Project layout represents a total development footprint of approximately 580 ha, including associated ancillary infrastructure (i.e. Solar hybrid BESS, substations, the operations and maintenance facility, test bed and two transmission line corridors for optionality). The conceptual project layout is shown on **Figure 1.3**, with the indicative project components outlined in **Table 1.1**.

Table 1.1 Indicative Solar Layout and Approximate Dimensions

Project component(s) / infrastructure	Approximate dimensions	Quantity
Solar Farm PV Modules		
Maximum height	Up to 4.7 m	490,000 individual modules (subject to tender)
Minimum height	0.3 m or above flood depth level	
Portrait configuration	1 or 2 in portrait (1P/2P) (subject to detailed design)	
Row configuration	5–10 m between rows	
Ancillary Infrastructure		
100 MW Solar Hybrid BESS	2 ha	1
Collector (on-site) substation	6 ha	1
Inverters	4200 MVA SMA inverters (subject to tender)	72
Overhead transmission lines (high to low voltage)	Up to 7 km of internal overhead cables i.e. high voltage transmission lines from the solar farm to the grid connection point	n/a
Underground transmission cables (medium to low voltage)	Approximately 30 km	n/a
Internal access tracks	Approximately 30 km (subject to detailed design)	n/a
Primary site access point	Subject to intersection design	1
Operations and maintenance facility	100 m x 100 m	1
Communication mast	Up to 80 m high	1
Research Test Bed Facility	2 ha	1
Temporary Construction Facilities		
Construction site compounds, including: <ul style="list-style-type: none"> • construction laydown areas for equipment and supplies • concrete batching plants • construction compounds, site office, etc. 	100 x 100 m	Up to 5



- 1:70,000
Scale at A4
- 0 1 2 Kilometres
- GDA2020 MGA Zone 55
- Legend**
- ▭ Project Area
 - Development Footprint
 - Local Government Area
 - Marulan Gas Fired Power Station Project Area
 - NPWS Estate
 - Roads
 - Watercourses
 - Access Road Works
 - Access Point
 - Existing Substation
 - Solar Hybrid BESS
 - Construction Compound
 - Laydown Area
 - O&M Facility
 - Substation
 - Proposed Transmission Line Option 2 Easement
 - Proposed Transmission Line Option 1 Easement
- Existing Transmission Lines**
- 330kV
 - 132kV

FIGURE 1.3
Conceptual Project Layout

2.0 Planning Framework

2.1 Statutory Planning Context

The statutory provisions applying to the assessment and management of bushfire in NSW are outlined in **Table 2.1**.

Table 2.1 Relevant Statutory Requirements

Legislation	Relevance to the Project
NSW <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	Part 4 of the EP&A Act establishes the framework for assessing development that is permissible with consent. Section 4.14 of the EP&A Act restricts the granting of development consent on bushfire prone land unless the proposed development conforms with the requirements of PBP, 2019. The requirements of PBP, 2019 and how the Project complies with those requirements are outlined in Section 3.3 .
NSW <i>Rural Fires Act 1997</i> (Rural Fires Act)	The Rural Fires Act facilitates the prevention, mitigation and suppression of bushfire and other fires in local government areas and parts of the State considered to be rural fire districts. The risks to the Project and to public safety as a result of the development, associated with its location in the vicinity of bushfire-prone land, have been assessed. Consideration of the potential impact to the other surrounding land uses as a result of the Project has also been considered.

2.2 Planning for Bushfire Protection 2019

All development on bushfire prone land is required to satisfy the aims and objectives of PBP 2019. The aim of PBP 2019 is to *provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment*.

The objectives are to:

- Afford buildings and their occupants protection from exposure to a bush fire.
- Provide for a defensible space to be located around buildings.
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.
- Ensure that appropriate operational access and egress for emergency service personnel and occupants is available.
- Provide for ongoing management and maintenance of BPMs.
- Ensure that utility services are adequate to meet the needs of firefighters.

PBP 2019 requires strategic planning to consider whether future land uses are in appropriate locations to minimise the risk to life and property from bushfire attack. The broad principles that apply to bushfire strategic planning include:

- Ensuring land is suitable for development in the context of bush fire risk.
- Ensuring new development on BFPL will comply with PBP.
- Minimising reliance on performance-based solutions.
- Providing adequate infrastructure associated with emergency evacuation and firefighting operations.
- Facilitating appropriate ongoing land management practices.

Chapter 8 of PBP 2019 applies to 'Other Development', this includes commercial uses, industrial uses and infrastructure development. Specifically, chapter 8.3.5 applies to wind and solar farms. PBP 2019 states that adequate clearances to combustible vegetation is required as well as firefighting access and water.

The following should be provided for solar farms:

- Minimum Asset Protection Zone (APZ) for the structures and associated buildings/infrastructure.
- The APZ must be maintained to the standard of an Inner Protection Area (IPA) for the life of the development.

An IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1 cm in height and be discontinuous.

Infrastructure for the purposes of requiring an APZ excludes:

- Road access to the site.
- Power or other services to the site and associated fencing.

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.

A Bush Fire Emergency Management and Operations Plan should identify all relevant risks and mitigation measures associated with the construction and operation of the wind or solar farm. 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.
- Appropriate bush fire emergency management planning.

It is important to be aware of operations that may be carried out on days of Total Fire Ban and any prohibited activities or exemptions that are notified by the Commissioner of the NSW RFS under the *Rural Fires Act*.

Chapter 8.3.9 applies to hazardous industry and relevant to the hybrid BESS proposed as part of the Project. PBP states that some developments are considered hazardous due to their ability to start bushfire and susceptibility to bushfire impacts. A Preliminary Hazard Analysis (PHA) has been prepared for the Project (Appendix 15 of the EIS).

The PHA included the identification of potential hazards that may be present at the site as a result of the operation of the Project or storage of associated materials. Based on the identified hazards, scenarios were assessed that may result in an incident with the potential for offsite impacts, including fire. Any scenarios that would not impact offsite were eliminated from further assessment. Scenarios not eliminated were then carried forward for consequence analysis.

A review of all possible incidents associated with the Project indicates that there were no observed offsite impacts. The PHA concluded that the risks at the site boundary are not considered to exceed the acceptable risk criteria. This resulted in the Project being classified as only potentially hazardous and would be permitted within the current land zoning for the site.

The PHA indicates that through the implementation of appropriate bushfire management measures and appropriate design measures to prevent fire ignition and propagation, bushfire risk associated with the Project can be appropriately managed.

2.3 Large-Scale Solar Energy Guideline

This Large-Scale Solar Energy Guideline provides guidance on the planning framework for the assessment of large-scale solar energy projects under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Section 5.7 provides guidance on matters to hazards including bushfire. The guideline states:

The location of solar energy infrastructure should avoid any land subject to identified natural hazards (such bushfires, flooding or land instability) and should not contribute to an increase in risk of a natural hazard.

Any natural hazards or risks associated with the construction, operation and decommissioning of the solar energy project must be assessed. These include those associated with hazardous materials (for instance, from PV panels and battery storage), and the threat of fire spreading to a solar development or being caused by associated infrastructure such as cables, panels or transmission lines.

If the project is located in a bushfire prone area, applicants must prepare a strategic bushfire study in accordance with PBP 2019.

A strategic bushfire study has been undertaken and provided in **Section 3.0**.

2.4 Current Bushfire Management

The Project Area sits within the Southern Tablelands Bushfire Management Committee Zone, which includes the Yass Valley, Upper Lachlan and Goulburn/Mulwaree LGA's. The Southern Tablelands Zone is subject to the Southern Tablelands Bushfire Risk Management Plan (BRMP, 2019) (Southern Tablelands Bushfire Management Committee, 2019). The BRMP is a strategic document that identifies community assets and sets out a program of treatment to reduce the risk of bushfire to the assets. These treatments may include hazard reduction burning, grazing, community education, fire trail maintenance and establishing community fireguard groups. The Project Area is not identified as a specific asset requiring treatment in the BRMP.

The BRMP also establishes four categories of bushfire management zones including Asset Protection Zones (APZ), Strategic Fire Advantage Zones (SFAZ), Land Management Zones (LMZ) and Fire Exclusion Zones (FEZ). These zones identified the fire management intent for a specific area and do not apply to the Project Area.

The BRMP also includes zone wide treatments which are included to reduce the overall bushfire risk within the RBMP area. The treatments are not linked to specific assets rather applied across the entire area as designated by relevant legislation and guidelines, these treatments include:

Bushfire Prone Land Map – identification of bushfire prone land and utilised to trigger whether a development application requires assessment under PBP 2019.

Ensure development in bushfire prone land complies with PBP 2019 – assessment process requires new applications to include bushfire protection measures.

Local Environment Plans (LEPs) – control development in areas with a bush fire risk and exclude development in extreme bush fire risk areas or where bush fire protection measures cannot be implemented.

Bush Fire Danger Period – in years where the weather is particularly adverse the bush fire danger period may be revised (longer or shorter). This is assessed every year by the BFMC.

Permit process for bush fire danger period – during bush fire danger period a fire safety permit is required to light a fire in the open. Permits specify conditions such as firefighting equipment that must be on site, or restrict burns based on weather conditions.

Prosecution of offenders in relation to deliberate ignitions – under the *Rural Fires Act 1997* persons may be prosecuted for breaching the conditions on a fire permit, lighting a fire during a Total Fire Ban, allowing fire to escape their property, or other breaches of the Act. The member agencies of the BFMC will co-operate with the NSW Police in relation to the prosecution of arsonists under the *Crimes Act 1900*.

Investigation of bush fire cause – all bushfires without known cause are investigated to identify how they started.

Fire suppression activities – responding to bush fire is a normal business activity for the firefighting authorities.

Assessing and managing compliance with strategic firefighting resource allocation provisions – strategic firefighting resource allocation provisions is the process used to identify the number of stations, brigades and appliances required in an area, and considers members, training, assets and hazards.

Preparation of a S52 Operations Coordination Plan – the Operations Coordination Plan is prepared biannually and sets out how coordinated firefighting will occur. It includes specific operational restrictions on fire fighting techniques in certain areas, where fires will be managed from, and how agencies involved can communicate during operations.

Fire Management Plans or Plans of Management – some land management agencies have developed fire management plans or plans of management with specific fire or fuel management strategies, for example a Forests NSW Regional Fuel Management Risk Plan, a NPWS Fire Management Strategy.

Bush Fire Hazard Complaints – concern relating to possible bush fire hazards on a neighbouring property or any other land, can be reported to the RFS Commissioner or their local RFS Fire Control Centre. The complaint will be investigated and may result in a notice being issued to the landowner or manager to reduce the hazard.

These zone wide treatments apply to the Project Area and assessment of the Project.

2.5 Community Consultation

Community engagement was undertaken to inform the preparation of the Social Impact Assessment (SIA) conducted by Umwelt to support the EIS.

Consultation activities undertaken to inform the SIA focused on providing information on the Project and planning process, understanding the social context within which the Project is being proposed, identifying the social impacts of the proposed Project, and gathering community feedback on potential management measures to address social impacts.

The community raised concern in relation to potential impacts associated with property damage due to heightened bushfire risk and reduced access to the project site for emergency services e.g. RFS resulting in subsequent safety impacts.

This feedback has been considered in the development of this assessment and the development of the bushfire protection measures applicable to the Project, discussed further in **Section 4.0**.

3.0 Bushfire Strategic Study

3.1 Bushfire Season and Climate

The bushfire season generally runs from October to March/April. Prevailing weather conditions associated with the bushfire season are north/north westerly winds. Lightning strikes during storms also occur more frequently during the bushfire season (BRMP, 2019).

The typical climate of the southern tablelands is temperate to cool characterised by warm to hot summers and cool winters, with peak rainfall generally occurring during winter and spring (BRMP, 2019). The annual average rainfall within the region is 790.2 mm, falling throughout the year over approximately 86 rainy days, with the average highest rainfall in the month of February and the lowest in the month of September (BOM, 2024).

The annual average maximum temperature recorded at the site is 19.0°C and the annual average minimum temperature is 8.2°C. The highest average maximum temperature of 26.1°C is recorded in January, while the lowest average maximum temperature of 12.0°C is recorded in July (BOM, 2024).

3.2 Fire History

The region surrounding the Project Area has an average annual accumulated Fire Danger Index Rating classification of 100 (RFS, 2024). The average annual accumulated rating is developed from the daily Forest Fires Danger Index which combines a measure of vegetation dryness with air temperature, wind speed and humidity. These daily values over a year are combined to determine the annual accumulated rating. The FDI measures the degree of danger of fire within the relevant vegetation, ratings range from 50, 80 and 100 (highest).

The BRMP 2019 states that the Southern Tablelands zone has on average 265 bush fires per year, of which 5 could be considered to be large fires. The frequency of significant or major fires has varied between the districts, Goulburn/Mulwaree has a history of major fires occurring in a cycle of 5 to 7 years, whereas Upper Lachlan has an approximately 7-to-10 year cycle. Lightning is the greatest source of ignition within the area and is mainly during late spring and summer thunderstorm activity which is normally (but not always) accompanied by some rainfall. Escape from legal (and illegal) burning, mainly in rural areas, are also a large source of ignition.

The Sharing and Enabling Environmental Data in NSW (SEED) Fire Extent and Severity Mapping (FESM) (Department of Planning and Environment, 2023), indicates the Project Area and surrounding land has not been subject to recorded bushfire. Land within surrounding region has been subject to bushfire, the Crookbundoon Nature Reserve to the west of the Project Area was subject to bushfire during the 2017–2018 bushfire season and large areas within the Morton National Park to the south east of Marulan were burnt during the 2019–2020 bushfire season.

3.3 Vegetation

The Project Area largely comprises land that has previously been disturbed and historically cleared for agricultural purposes, including cropping land and grazed land.

These areas are considered Managed land (reduced vegetation areas). The remaining remnant vegetation within the Project Area is predominantly comprised of woodland vegetation, with smaller patches of forest and riparian forests along the waterways. The Project Area also adjoins areas of cleared land utilised for agriculture and rural residential properties (refer to **Figure 3.1**).

Large areas of cleared land (>2 km) extend to the north and east of the proposed development footprint with Plant Community Types (PCTs) identified in the Regional Vegetation Mapping, refer to **Figure 3.1**, conforming to forest vegetation mapped along the Wollondilly River. The proposed disturbance area wraps around an isolated area of forest vegetation and adjoins PCTs conforming to forest vegetation to the south.

Larger areas of vegetation are mapped to the west of the proposed development footprint with PCTs conforming to forest vegetation intersected by areas of grassland. This vegetation within the western portion of the Project Area connects to the Tarlo River National Park and to the northwest which connect to the Bangadilly National Park. This vegetation and areas of forest vegetation extending to the south of the Project Area boundary represent the most significant fuel load within the vicinity of the Project Area and bushfire risk to any development.

3.4 Topography and Slope

Slope is critical in assessing bushfire risk. The slope of the Project Area can influence the rate of spread, causing the fire to slow if it is burning downhill or accelerate if it is moving uphill.

The topography across the Project Area includes valley floor, hillslopes, and ridges. The topography of the Project Area ranges from between 520 m–720 m Australian Height Datum (AHD). The proposed infrastructure is located centrally within the Project Area predominately across lower areas ranging in slope from 0–5 degrees, except for areas of steeper slope associated with drainage lines (refer to **Figure 3.2**). Steeper slopes extend to the west and northeast of the proposed development footprint associated with higher landforms of the Project Area with remaining areas generally undulating and ranging from 0–10 degrees.

3.5 Land Use

The predominant land use of the Project Area is agriculture. The Project Area is predominately surrounded by rural residential properties and agricultural land use. The existing TransGrid Marulan 330 kV/132 kV Substation and Switchyard is located within the southern area of the Project Area. There is also two 330 kV transmission lines and a 132 kV transmission line which run from east to west and intercept the Project Area in the south to also connect to the existing TransGrid Marulan 330 kV/132 kV Substation and Switchyard. The approved (but not constructed) Marulan Gas-Fired Power Station is located between the southern boundary of the Project Area and the Marulan Substation. This development received planning approval in 2009 and construction has not yet commenced.

The Project Area and areas surrounding the Project Area are currently subject to land management practices, this includes land management practices that reduce fuel loads through vegetation maintenance and grazing activities.

The proposed infrastructure would be located central to the Project Area maximising separation distance to surrounding rural residential land uses and existing infrastructure to the south of the Project Area. Use of the remainder of the Project Area (outside of the proposed development footprint) will continue to be utilised for agricultural land practices and be subject to land management practices including fuel load reduction.

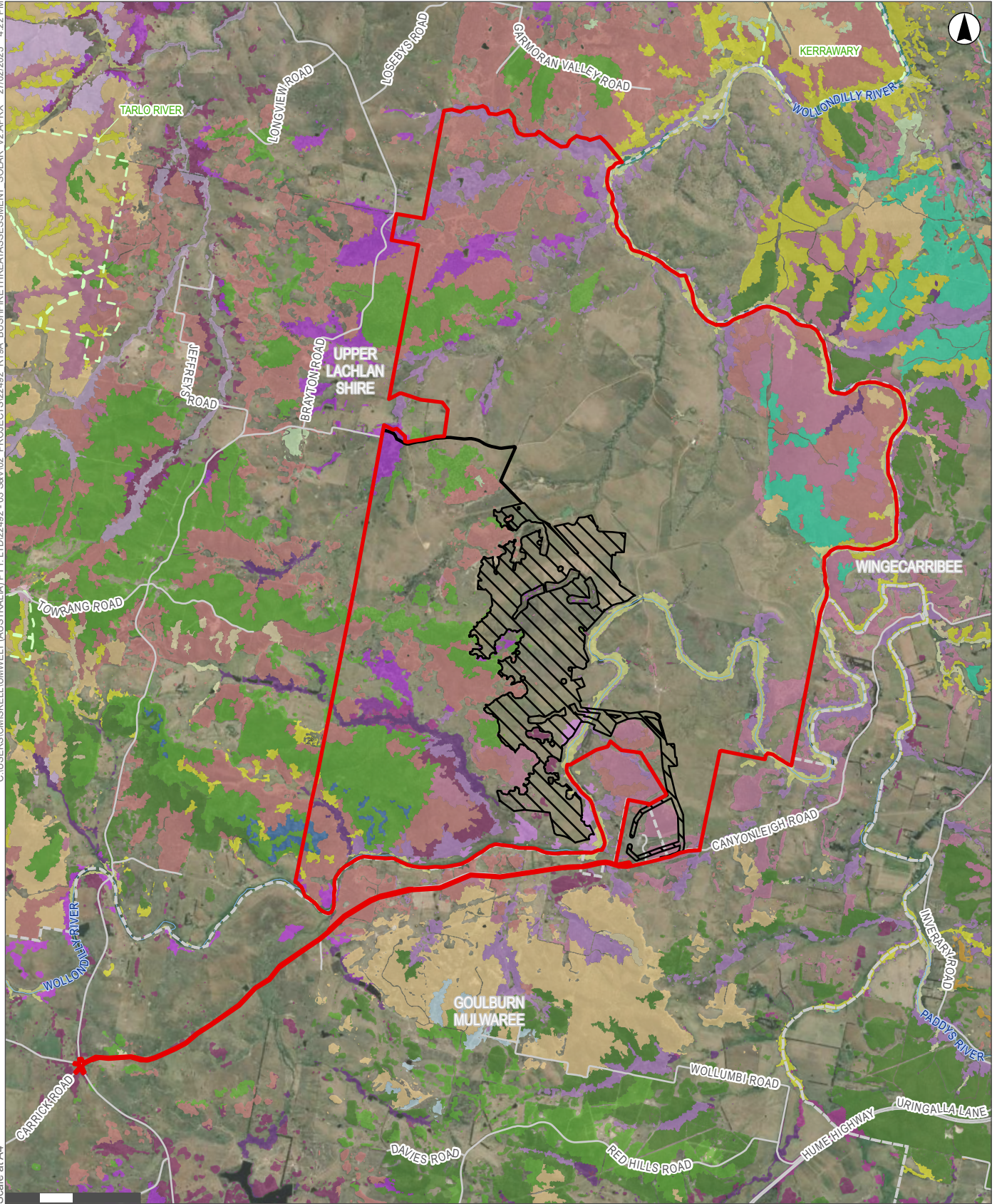
3.6 Emergency Services and Site Access

The main access to the Project Area is from the south directly off Canyonleigh Road. The Project Area is also accessible from the west via Arthursleigh Road at Big Hill. The Project Area contains an internal access track network utilised for the current agricultural land use. The Project Area is accessible from the west and east along Canyonleigh Road. Noting Spark Renewables have committed to only utilising the western end of Canyonleigh Road for access (with the exception of emergency situations).

The proposed Project conceptual layout includes an internal all-weather road network providing access through the proposed infrastructure and access/egress to the north and south through the Project Area.

The region is supported by existing emergency services. The RFS Fire Control Centre and NSW Fire and Rescue is located in Goulburn approximately 30 km south west of the Project Area. Local Fire Brigades are also located at Canyonleigh, Marulan and Goulburn.

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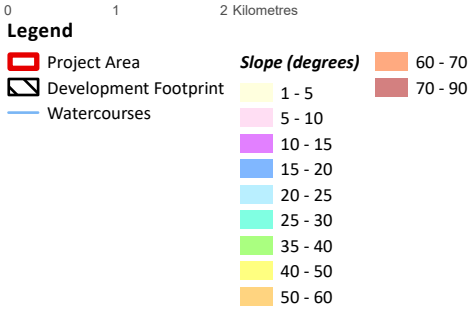
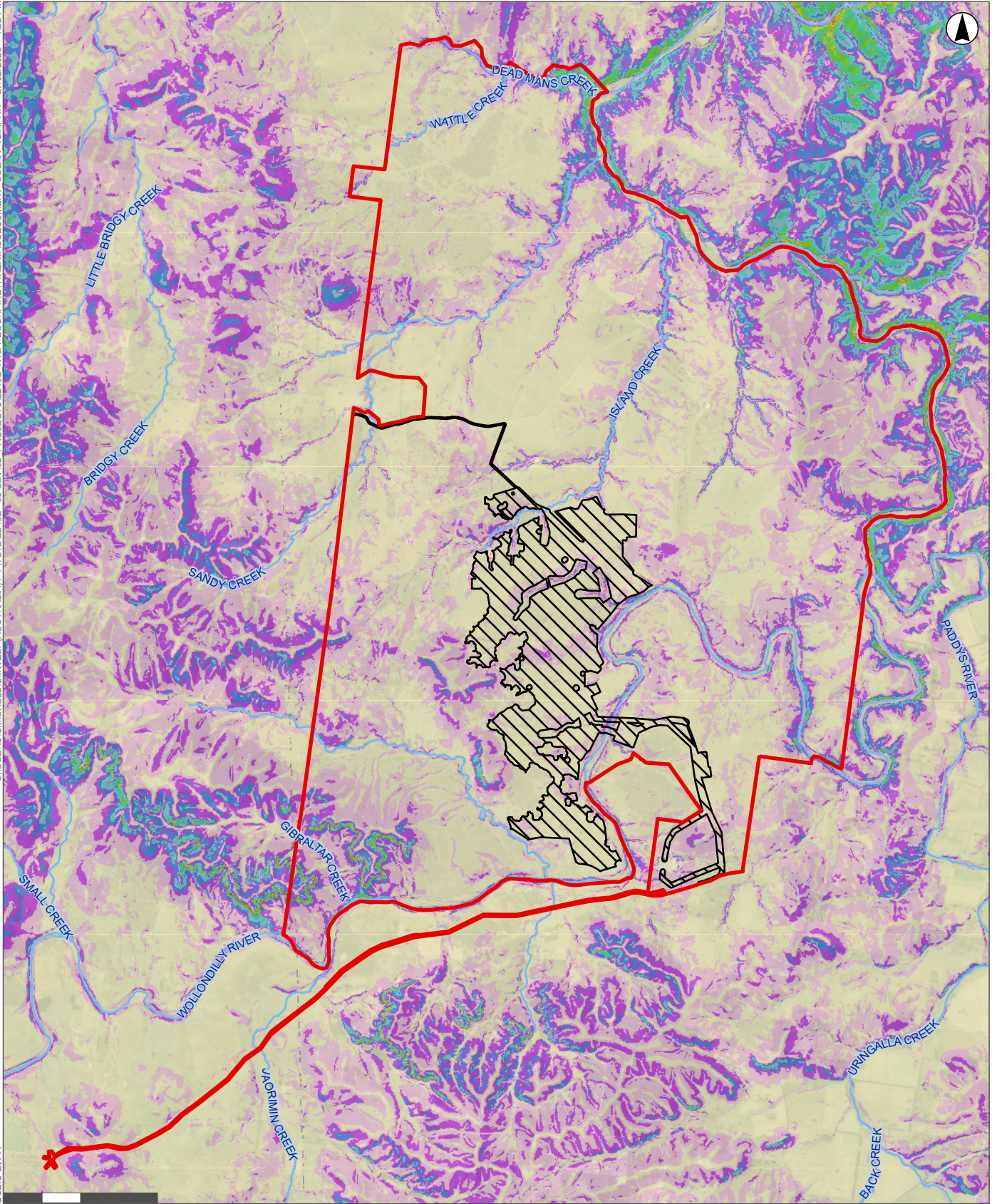
GDA2020 MGA Zone 55

Legend

- | | | | |
|---|---|--|--|
| Project Area | Central Eastern Ranges River Oak Forest | Southern Highlands Wet Swamp Heath | Wingecarribee Gorges Stringybark-Grey Gum Forest |
| Development Footprint | Central Gorges Box-Red Gum Grassy Forest | Southern Highlands Scribbly Gum Forest | Wingecarribee Sandstone Shrub Forest |
| Local Government Area | Central Tableland Ribbon Gum Sheltered Forest | Southern Tableland Creekflat Ribbon Gum Forest | Wollondilly-Shoalhaven Quartz Hills Forest |
| Roads | Central West Creekflat Grassy Woodland | Southern Tableland Granites Ribbon Gum Grassy Forest | Wollondilly-Shoalhaven Siltstones Sheltered Forest |
| Watercourses | Central and Southern Tableland River Oak Forest | Southern Tableland Grassy Box Woodland | Wollondilly-Shoalhaven Slopes Grassy Open Forest |
| NPWS Estate | Central and Southern Tableland Swamp Meadow Complex | Southern Tableland Red Grass-Spear Grass Grassland | |
| Regional Vegetation Mapping (SVTM) | | | |
| Bungonia Tableland Scribbly Gum Shrub Forest | Goulburn Tableland Box-Gum Grassy Forest | Southern Tableland Snow Gum-Candlebark Shrub Forest | |
| Bungonia Tableland Silvertop Ash-Stringybark Forest | Goulburn Tableland Frost Hollow Grassy Woodland | Southern Tableland Swamp Flats Shrub Woodland | |
| Burragorang Escarpment Ironbark Forest | Goulburn-Lithgow Tableland Hills Grassy Forest | Southern Tableland Valley Flats Damp Grassland | |
| Burragorang Gorges Felsic Stringybark Forest | Greater Sydney Enriched Grey Myrtle Dry Rainforest | Southern Tableland Western Hills Scribbly Gum Forest | |
| Central Eastern Ranges Riparian Dry Rainforest | Nattai-Morton Sandstone Peppermint Gully Forest | Sydney Basin Warm Temperate Rainforest | |
| | Southern Escarpment Montane Heath | Sydney Coastal Sandstone Riparian Scrub | |

FIGURE 3.1
Regional Vegetation Mapping

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GDA2020 MGA Zone 56

FIGURE 3.2
Slope Analysis

3.7 Project Bushfire Risk Profile

Based on the existing environment the potential bushfire hazards, risk of ignition associated with the construction and operation of the Project includes:

- Vegetation fuel loads to the west and south.
- Construction activities (earth moving equipment, power tools (particularly grinders and welders)).
- Operational phase (transmission/hybrid BESS failure or overheating, ignition from vehicles or machinery).
- Lighting strike.
- Accidental ignition (smoking etc).
- Poor site bushfire management and preparedness.
- Arson.

As outlined in **Section 2.4**, the Southern Tablelands BRMP (2019) identifies community assets and sets out a program of treatment to reduce the risk of bushfire to those assets. The BRMP includes a risk rating based on the *Australia/New Zealand Standard AS/NZS 4360: 2004 Risk Management* matrix (refer to **Table 3.1**), to determine the level of bushfire risk to the infrastructure and land management measures required.

Table 3.1 AS/NZS 4360:2004 Risk Management Matrix

Likelihood level	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Low	Moderate
Unlikely	Low	Low	Moderate	Moderate	High
Possible	Low	Moderate	Moderate	High	High
Likely	Low	Moderate	High	High	Extreme
Almost Certain	Moderate	High	High	Extreme	Extreme

The potentially hazardous nature of the Project, particularly the hybrid BESS is subject to a separate hazard assessment (refer to **Section 2.2**). The hazard assessment outlines the specific controls required to mitigate any potential hazards associated with the operation of the Project. This includes design requirements and management and mitigation to prevent and contain fire. This is separate to but does interact with the bushfire protection measures required for the Project in the prevention of the spread of fire to neighbouring properties.

Specifically, the PHA requires the following design controls in relation to control of potential fire hazard associated with the proposed hybrid BESS infrastructure:

- BESS infrastructure must be tested in accordance with UL9540A (test method).
- Testing to demonstrate clearances required to prevent propagation of fires between separated units.

- BESS infrastructure to be installed in accordance with manufacturer and UL9540A (test method) recommended clearances based on testing.
- BESS infrastructure to be installed with fire protection systems specified by the manufacturer and UL9540A (test method) report.
- Before construction, detailed design to validate the system can be installed in the project area whilst meeting the recommended clearances.
- Testing information shall be made available to the certifying authority.
- The vent covers of the BESS infrastructure shall be constructed of non-combustible material.
- The vents shall not be located above battery packs within the BESS container.

The proposed solar infrastructure is not considered to be hazardous, however design controls to manage electricity generation and transmission including management of easements for overhead powerlines will be required. The proposed transmission line infrastructure will be designed in accordance with relevant guidelines and regulations including Electricity Supply (Safety and Network Management) Regulation 2014 and *Utilities (Technical Regulation) Act 2014* – Technical Code and will be subject to monitoring and maintenance.

Existing infrastructure within the Project Area and surrounding land is not identified in the BRMP 2019. Applying the same principles of risk to the proposed infrastructure, the bushfire (un-mitigated) risk profile is moderate to high. This is based on the vegetation, slope and land use. However, it is noted that extensive cleared areas within the Project Area are not currently identified as bushfire prone land. Additionally, the Project Area and large areas surrounding the Project Area are subject to existing land management practices.

The moderate rating applies to the proposed solar array infrastructure areas to the north and east, which will adjoin land that supports large areas of cleared grazing land and significant separation distances to vegetation. High risk is associated with the western side of the proposed solar array infrastructure and exposure to higher fuel loads that represent potential fire runs to larger areas of vegetation to the west.

The BRMP 2019 requires a program of land management treatment to reduce the risk of bushfire to any assets where medium to high bushfire risk is identified. Similarly, appropriate bushfire protection measures in accordance with PBP 2019 will be required as part of the construction and operation of the Project to appropriately manage and mitigate the risk of bushfire to the Project, refer to **Section 4.0**.

3.8 Cumulative Impact

Spark Renewables are also proposing the development of the Wattle Creek Battery Energy Storage (BESS) Project, this is a separate but related development which will be located adjacent to the Hybrid BESS proposed to be associated with the Project. The Wattle Creek BESS Project also includes shared infrastructure (transmission connection and access). The Wattle Creek BESS Project is subject to a separate approval pathway (SSD-63345458) and therefore requires consideration from a cumulative impact perspective only.

The Wattle Creek BESS Project will consist of a lithium-iron phosphate battery system (subject to final provider selection) with a storage capacity of 350 MW for up to 4 hours. The Wattle Creek BESS project battery units would be housed in a series of outdoor containers, aggregated in one central location. These containers will be located adjacent to the proposed on-site substation, positioned within the central area of the Project Area (on the northern side of the development footprint). The Wattle Creek BESS project will include three 300 MVA high voltage transformers within the substation and 248 inverters rated at 4200 kVA, each paired with a medium voltage transformer. The Wattle Creek BESS project containerised system includes an APZ integrated within the battery design serving as a fire break, as well as a heating, ventilation and air conditioning system.

Fire protection design and bushfire threat management measures are proposed as part of the Wattle Creek BESS project. Additionally, the development of the detailed design for the Project and the relevant bushfire management measures will include consideration of the management and mitigation required for the Wattle Creek BESS project and any overlapping or integrated management requirements.

Similarly, the existing transmission infrastructure and Transgrid Marulan Substation is subject to land management practices to reduce fuel loads and appropriately management and mitigate bushfire threat. The proposed but not yet constructed Marulan Gas Fired Power Plant will also be subject to appropriate design and management controls (should it be constructed) to appropriately manage and mitigate bushfire threat.

4.0 Bushfire Protection Measures

The bushfire protection measures outlined below, have been developed in accordance with chapter 8.3.5 of PBP 2019 (solar farms).

4.1 Emergency Response Plan

An Emergency Response Plan will be developed for the Project, in consultation with the RFS and NSW Fire and Rescue, to outline the response to all potential hazard scenarios associated with both construction and operation. The Emergency Response Plan will outline the response required based on the level of applicable bushfire threat. This will include (but is not limited to):

- Developing specific management actions based on potential level of bushfire threat.
- Assigning responsibility for management actions.
- Identifying the relevant contact details (RFS, FRNSW etc) who should be contacted and when.
- Development of appropriate triggers for the implementation of management actions and/or evacuation of the Project based on the applicable fire danger rating and level of risk.
- Identification of emergency assembly points on site and appropriate safety procedures.
- Identification of safe assembly points offsite and relevant routes.

4.2 Asset Protection Zones

PBP 2019 requires solar farm developments to have adequate clearances to combustible vegetation. At a minimum, a 10 m Asset Protection Zone (APZ) will be applied to all proposed infrastructure (with the APZ being maintained to the standard of an Inner Protection Area (IPA)) for the life of the development.

The IPA provides a defensible space within which firefighting efforts can be safely undertaken to defend structures before and after the passage of bushfire. Vegetation within the IPA is required to be well maintained and kept to a minimum level (disconnected vegetation including tree canopies and shrubs, mown grass, ground free of leaves and debris). Appendix 4 of PBP 2019, includes the following management requirements for an IPA:

- Trees
 - Tree canopy cover should be less than 15% at maturity.
 - Trees at maturity should not touch or overhang any buildings.
 - Lower limbs should be removed up to a height of 2 m above the ground.
 - Tree canopies should be separated by 2 to 5 m.
 - Preference should be given to smooth barked and evergreen trees.

- Shrubs
 - Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided.
 - Shrubs should not be located under trees.
 - Shrubs should not form more than 10% ground cover.
 - Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- Grass
 - Grass should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and leaves and vegetation debris should be removed.

Vegetation will be cleared from the proposed transmission line easements. Maintenance and management will be undertaken in accordance with the Transgrid bushfire management requirements which include the application of inspection and maintenance activities prior to and during bushfire season.

4.3 Construction Standards

There are no specific bushfire protection requirements for Class 5-8 and Class 10 buildings and the proposed infrastructure. However, the solar panels and ancillary infrastructure are designed and constructed from fire resistant materials. Additionally, detailed design of the Project should consider the potential design and housing of equipment (hybrid BESS, substation, operation and maintenance buildings etc) to mitigate the risk of fire ignition and the spread of bushfire.

Construction of these elements should consider the objectives of the AS3959-2018 *Construction of Buildings in Bushfire Prone Areas*, to assist with reducing bushfire risk. This is particularly relevant to the Hybrid BESS, substation infrastructure and the operations and maintenance buildings. It is recommended that any buildings at a minimum be constructed to Building Attack Level (BAL) 12.5 construction standards. BAL-12.5 includes building treatments to provide for ember protection and to prevent the accumulation of debris which may contribute to sustaining and spreading bushfire.

4.4 Access Management

Access to the Project Area will be provided via Canyonleigh Road on the southern boundary and Arthursleigh Road on the western boundary. Internal access tracks will provide for appropriate all-weather access around the site. The existing Wollondilly River Crossing will be upgraded and fitted with depth indicators. Internal access roads will be designed in accordance with the relevant requirements outlined in Chapter 5 of PBP, 2019 during the detailed design phase.

4.5 Water Supply Services

The Project Area does not have a reticulated water supply, a dedicated minimum 100,000 litre firefighting water supply will be provided on site (to be implemented during the construction phase).

The water supply will be strategically located within the Project Area to provide adequate accessibility during firefighting. Water tanks will be constructed from either concrete or steel and provide connection suitable for firefighting purposes (65 mm Storz). The infrastructure fire hydrant/hose reel systems and all firefighting equipment installed and maintained in accordance with relevant Australian Standards.

4.6 Bushfire Management and Mitigation

The management and mitigation of the site will be implemented through a Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP). The bushfire protection measures applicable to the construction and operation of the Project will be outlined in the CEMP and OEMP. These measures will be developed in consultation with the RFS and the requirements of Section 8.3.5 of PBP 2019, including:

- Implementation and maintenance of APZ's.
- Design, implementation and maintenance of site access.
- Details of measures to prevent or mitigate fires igniting.
- Description of work that should not be carried out during total fire bans.
- Consideration of the management and mitigation required for the Wattle Creek BESS Project (should it be constructed) and any overlapping or integrated management requirements
- Notification process to 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.
- Details of the availability of fire-suppression equipment, access and water and emergency access.
- Details of storage and maintenance of fuels and other flammable materials.
- Monitoring and reporting requirements.

4.7 Compliance with Aims and Objectives of PBP 2019

The proposed infrastructure would be appropriately located within an area predominately cleared of vegetation and can be sited to provide separation from majority of adjoining vegetation providing and provide appropriate APZ to assist with containment of fire. Detailed design controls and management and mitigation can appropriately address fire and hazard risk associated with the proposed infrastructure.

With the implementation of the bushfire protection measures outlined in **Section 4.0** and an Emergency Response Plan, in consultation with the RFS, potential bushfire risk can be appropriately managed.

Table 4.1 provides an overview of compliance with the aims and objectives of PBP (2019).

Table 4.1 Compliance with the Aims and Objectives of PBP 2019

PBP Aims and Objectives	Compliant	Proposed Bushfire Protection Measures
Afford occupants of any building adequate protection from exposure to a bushfire.	Yes	Appropriate design controls and bushfire protection measures will be implemented to appropriately manage potential ignition and prevent the spread of bushfire via the implementation of APZs, site access, firefighting equipment and. Appropriate construction standards will be applied to all proposed buildings and emergency response procedures would be implemented to manage evacuation of the site in the event of a bushfire.
Provide for a defensible space to be located around buildings.	Yes	Appropriate APZs will be implemented during the construction phase and maintained during operation to provide a defensible space to all infrastructure.
Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings	Yes	Proposed infrastructure is appropriately sited to provide separation from adjoining vegetation and appropriate bushfire protection measures (APZ, access, firefighting equipment and emergency response procedures) will be implemented on site.
Ensure that safe operational access and egress for emergency service personnel and occupants is available.	Yes	The Project Area has direct access to the public road network providing access and egress for emergency vehicles. Appropriate access and egress will be provided for evacuation of the site and appropriate evacuation procedures will be implemented.
Provide for ongoing management and maintenance of bushfire protection measures.	Yes	<p>Implemented APZs and any proposed landscaping will be maintained in accordance with PBP, 2019. Access will be clear of any obstructions and maintained at all times.</p> <p>Appropriate firefighting equipment (including dedicated water supply) will be provided and maintained at all times.</p> <p>Appropriate emergency response procedures will be implemented and reviewed (as required).</p>
Ensure that utility services are adequate to meet the needs of firefighters.	Yes	Services will be installed and managed to meet the needs of firefighters.

5.0 Conclusion

The Project will be subject to detailed design controls to appropriately manage and mitigate fire risk associated with the operation of the Project. The proposed infrastructure has been appropriately sited centrally within the Project Area to maximise separation distances to the Project Area boundary and retained vegetation as far as practicable.

Through the implementation of an Emergency Response Plan and the identified Bushfire Protection Measures (in consultation with the RFS and NSW Fire and Rescue) it is considered that potential bushfire risk associated with the Project can be appropriately managed.

6.0 References

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NSW Rural Fires Services (2019b). Planning for Bush Fire Protection. A guide for councils, planners, fire authorities and developers. November 2019.

Riskcon Engineering (2025). *Preliminary Hazard Analysis – Solar Hybrid BESS*.

Southern Tablelands Bushfire Management Committee (2019). *Southern Tablelands Bushfire Risk Management Plan*.

