

## Bushfire Threat Assessment

### Cobbora Solar Farm

State Significant Development (SSD-29491142)

Prepared for  
AECOM



<b>Project Name:</b>		Cobbora Solar Farm (J2874)	
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## 1. Summary

Table 1 is a summary of compliance with relevant documents and approaches to limit bushfire attack and meet the requirements of the NSW planning framework for new development in Bushfire Prone Areas.

**Table 1: Summary**

<b>Planning for Bushfire Protection 2019 Classification</b>	Other Development – solar farm and BESS
<b>NCC Classification</b>	Class 3, 7 & 8 – to be finalised during later stages
<b>Location</b>	Golden Highway, 6 km south-west of Cobbora township
<b>Local Government Area</b>	Warrumbungle Shire Council & Dubbo Regional Council
<b>Can this proposal comply with AS3959:2018</b>	Yes – based on NCC classifications
<b>Does this development comply with the requirements of <i>Planning for Bushfire Protection 2019</i>?</b>	Yes – based on the detailed design phase
<b>Does this development comply with the Aims and objectives of <i>Planning for Bushfire Protection 2019</i>?</b>	Yes – based on the detailed design phase
<b>Is the proposal for a State Significant Development (SSD)</b>	Yes
<b>Is referral to the NSW RFS required?</b>	No
<b>Is a Bush Fire Safety Authority (BFSA) required?</b>	No
<b>Assessment Framework</b>	<input checked="" type="checkbox"/> <i>Planning for Bushfire Protection 2019</i> : <input checked="" type="checkbox"/> Meets the deemed to satisfy provisions <input type="checkbox"/> Alternate solution/ performance-based assessment

## 2. Glossary

This section defines core terms and concepts which are adopted throughout the body of this report.

Term	Definition
<b>Asset Protection Zone (APZ)</b>	A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defensible space within which firefighting operations can be carried out. The size of the required APZ varies with slope, vegetation and FFDI.
<b>Bushfire Emergency Management &amp; Operations Plan (BEMOP)</b>	A plan developed during the detailed design phases and as part of the Fire Safety Study response, to clearly detail bushfire protection measures and risk mitigation strategies to be undertaken on an ongoing basis to prepare for the eventuality of bushfires.
<b>Bushfire Emergency Response Plan (BERP)</b>	A plan developed to assist and direct the emergency response of staff, contractors, visitors and emergency services in the event of a bushfire igniting on site, or a bushfire impacting the site.
<b>Battery Energy Storage System (BESS)</b>	An energy storage system that can store and deploy generated energy, typically by a group of batteries that charge (i.e., collect energy) and store electrical energy from the grid or energy generation facility and then discharge that energy at a later time to provide electricity or other grid services when needed.
<b>Bushfire</b>	A general term used to describe fire in vegetation, includes grass fire.
<b>Bushfire attack mechanisms</b>	The various ways in which a bushfire can impact upon people and property and cause loss or damage. These mechanisms include flame contact, radiant heat exposure, ember attack, fire wind and smoke.
<b>Bushfire Attack Level (BAL)</b>	A means of measuring the severity of a building's potential exposure to ember attack, radiant heat, and direct flame contact. The BAL is used as the basis for establishing the requirements for construction to improve protection of building elements and to articulate bushfire risk.
<b>Bushfire Design Requirements</b>	A separate design document to assist the master planning with requirements and specifications to provide compliance with PBP.
<b>Bushfire prone land (BPL)</b>	An area of land that can support a bushfire or is likely to be subject to bushfire attack, as designated on a bushfire prone land map.

<b>Bushfire Hazard</b>	Any vegetation that has the potential to threaten lives, property, or the environment.
<b>Bushfire Threat</b>	Potential bushfire exposure of an asset due to the proximity and type of a hazard and the slope on which the hazard is situated.
<b>Development Footprint</b>	The indicative developable area whereby Project Infrastructure (including access tracks and temporary construction support areas) would occupy, covering approximately 1,600 hectares.
<b>Forest Fire Danger Index (FFDI)</b>	FFDI provides a measure of the potential danger of a bushfire on a given day and location <a href="https://research.csiro.au/bushfire/assessing-bushfire-hazards/hazard-identification/fire-danger-index/">https://research.csiro.au/bushfire/assessing-bushfire-hazards/hazard-identification/fire-danger-index/</a>
<b>Hazard</b>	A hazard is any source of potential harm or a situation with a potential to cause loss. A hazard is therefore the source of risk.
<b>Likelihood</b>	The chance of an event occurring. Likelihood may be represented as a statistical probability (such as an annual exceedance probability), or whether this is not possible, it can be represented qualitatively using measures such as 'likely', 'possible' and 'rare'.
<b>Managed land</b>	Land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. This may include developed land (residential, commercial, or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas are managed to meet the requirements of an APZ.
<b>Mitigation</b>	The lessening or minimizing of the adverse impacts of a bushfire event. The adverse impacts of bushfire cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures include engineering techniques, retrofitting and hazard-resistant construction as well as on ground works to manage fuel and separate assets from bushland.
<b>Planning for Bushfire Protection 2019 (PBP)</b>	NSW Rural Fire Service publication effective from 1 March 2020 which is applicable to all new development on bushfire prone land in NSW.
<b>Project (the)</b>	construction, operation and decommissioning of the Cobbora Solar Farm and BESS. The Cobbora Solar Farm would be a large scale solar photovoltaic (PV) generation facility and BESS with associated infrastructure.

<b>Project Area</b>	Overall site area covers approximately 3,000 hectares.
<b>Resilience</b>	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management. UNDRR 2017
<b>Risk</b>	The degree of risk presented by that interaction will depend on the likelihood and consequence of the bushfire occurring. Risk may be defined as the chance of something happening, in a specified period of time that will have an impact on objectives. It is measured in terms of consequences and likelihood.
<b>Risk assessment</b>	A systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking, having regard to factors of likelihood, consequence, vulnerability, and tolerability.
<b>Risk-based land use planning</b>	The strategic consideration of natural hazard risk and mitigation in informing strategic land use planning activities.

### 3. Introduction

AECOM Australia Pty Ltd (AECOM) has engaged Blackash Bushfire Consulting to complete a Bushfire Threat Assessment for the Project. This is part of the State Significant Development (SSD) consent process, to construct, operate and decommission Cobbora Solar Farm in Central West New South Wales (NSW). The solar farm is a large-scale solar photovoltaic (PV) generation facility, a Battery Energy Storage System (BESS), and associated infrastructure for its management and connection to the national electricity market. The Project Area is located nearby Cobbora, approximately 20kms south-west of the township of Dunedoo and 55kms east of Dubbo in Central West NSW (the Project Area).

Blackash Bushfire Consulting has been commissioned to undertake a bushfire impact assessment for the Project. The assessment considers construction, operational and decommissioning (where relevant) bushfire impacts associated with the Project.

#### 3.1. Project overview

The Project would connect to the Central West Orana Renewable Energy Zone (CWOREZ) grid infrastructure via up to four onsite grid substations, connecting to the Elong Elong Energy Hub.

Key features of the Project would include:

- Construction and operation of a 700 MW (AC) solar farm
- Installation of a 400 MW / 1600 MWh BESS
- Installation of up to four substations, comprising:
  - One substation connecting the BESS to the Elong Elong Energy Hub
  - Up to three substations connecting the solar farm to the Elong Elong Energy Hub.
- Supporting facilities and infrastructure, including internal roads, upgrades to external access roads (if required), underground and overhead cabling, waterway crossings, staff office, meeting facilities, operations and control room, workshop, amenities, temporary accommodation, car parking, storage facilities, fencing, and landscaping.

#### 3.2. Project area

The Project Area is approximately 3,000 hectares (ha) in size and spans two local government areas (LGAs): Warrumbungle Shire Council and Dubbo Regional Council. Within these LGAs the Project Area also spans three suburbs: Dunedoo, Elong Elong and Cobbora, though is predominantly located within the suburb of Cobbora. To the north the Project Area is bordered by the Golden Highway and to the

east by Spring Ridge Road. The Project Area is zoned Primary Production (RU1) under both the *Dubbo Regional Local Environmental Plan 2022* (Dubbo Regional LEP) and the *Warrumbungle Local Environmental Plan 2013* (Warrumbungle LEP). There is also a small area which is not zoned under either of the LEPs.

Land within the Project Area is characterised by undulating mostly cleared land used primarily for sheep and cattle grazing or dry land cropping. The Project Area is largely clear of canopy vegetation, with some scattered trees and rows of trees along fence lines. Rural land surrounds the Project Area with residential premises located at varying distances.

The Project Area location and context are shown in Figures 1-4.

### 3.3. Development Footprint

The Development Footprint covers approximately 1,600 ha of land, which would be occupied by the solar farm and associated infrastructure (including access tracks and temporary construction support areas) within the Project Area (the developable area). This area was identified through eliminating land which is subject to environmental constraints (for example, areas with substantial native vegetation present, Aboriginal heritage sites or areas subject to flooding). The study assesses the Project Area as a whole.

### 3.4. Secretary’s Environmental Assessment Requirements

This report addresses the Secretary’s Environmental Assessment Requirements (SEARs) issued for the project. The SEARs presented in Table 2 have informed the preparation of this Bushfire Assessment Report. Final SEARs for the Project were issued on 7 November 2024.

**Table 2: SEARs - Bushfire**

SEARs General Requirement	Response
<p><b>Hazards</b> – including:                      Bushfire - a bush fire hazard assessment completed by a suitably qualified consultant and identifies potential hazards and risks associated with bushfires including the risks that a solar farm would cause bush fire and demonstrate compliance with <i>Planning for Bush Fire Protection 2019</i>;</p>	<p>Preparation of this Bushfire Threat Assessment Report.</p>

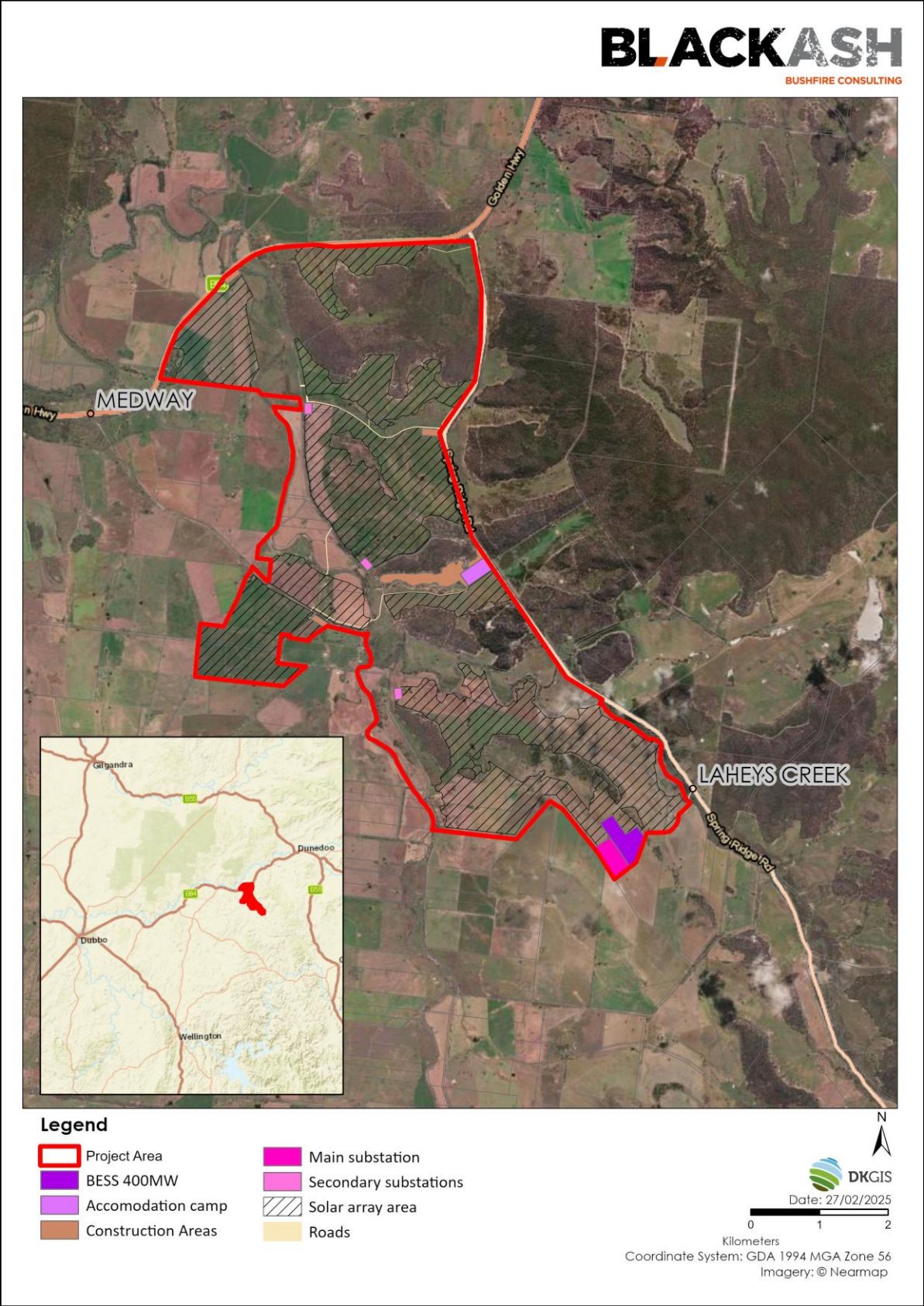


Figure 1: Project Area Location

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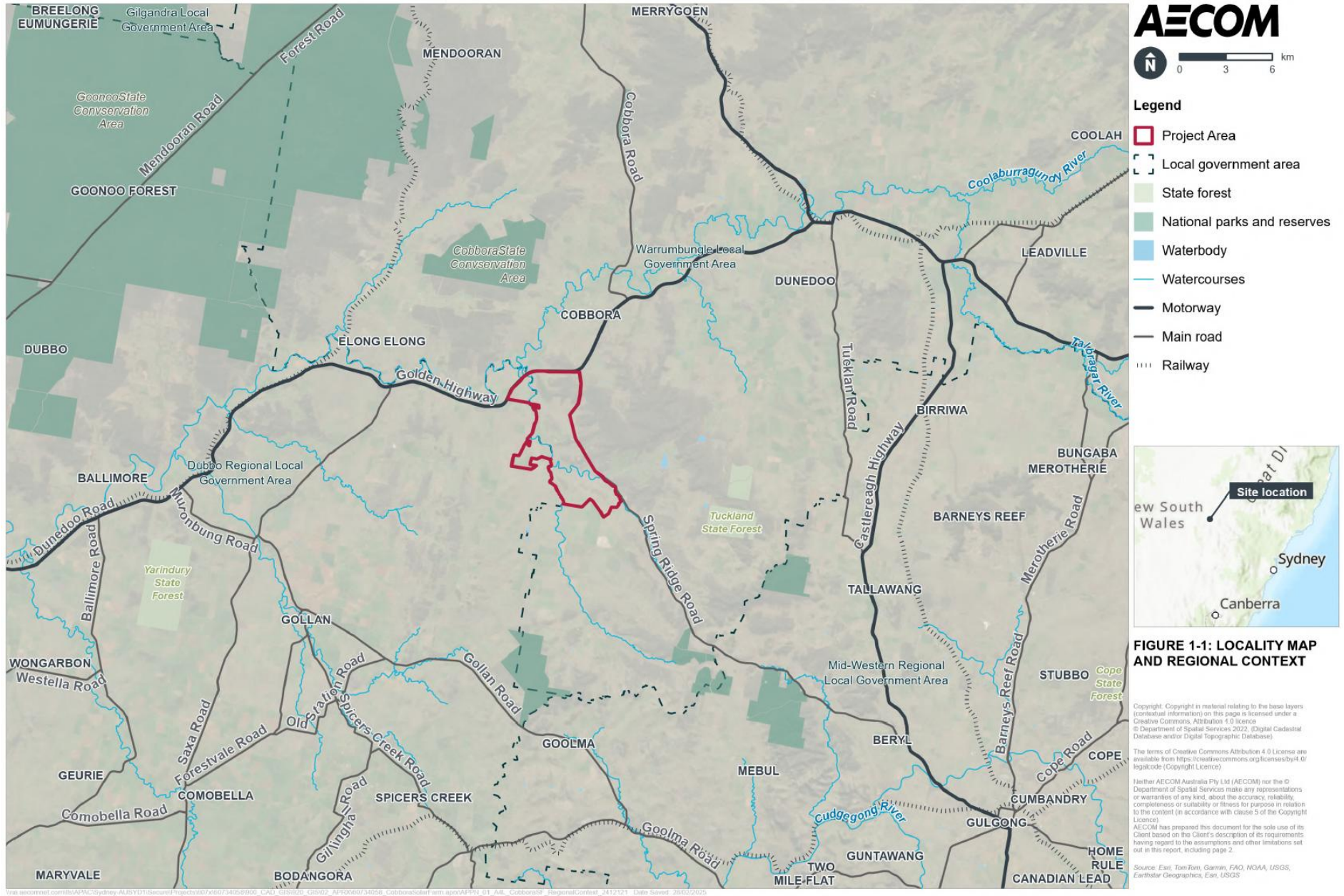


Figure 2: Project Area wider context

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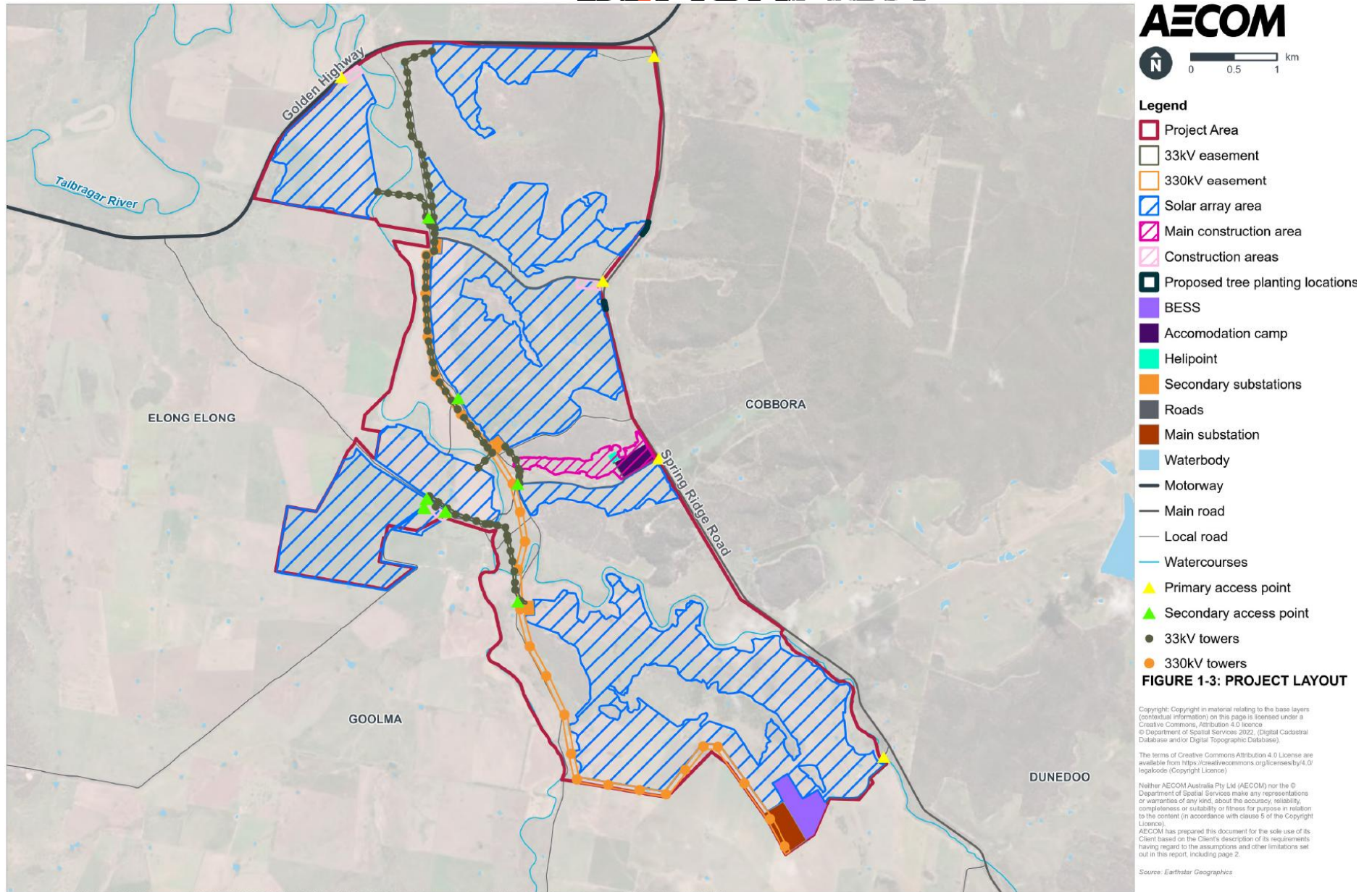


Figure 3 - Indicative Project Area Layout

### Legend

- Project Area
- Development Footprint
- Roads (6m)
- Roads (12m)
- Waterbody
- Watercourses
- Motorway
- Main road
- Primary access point
- Secondary access point

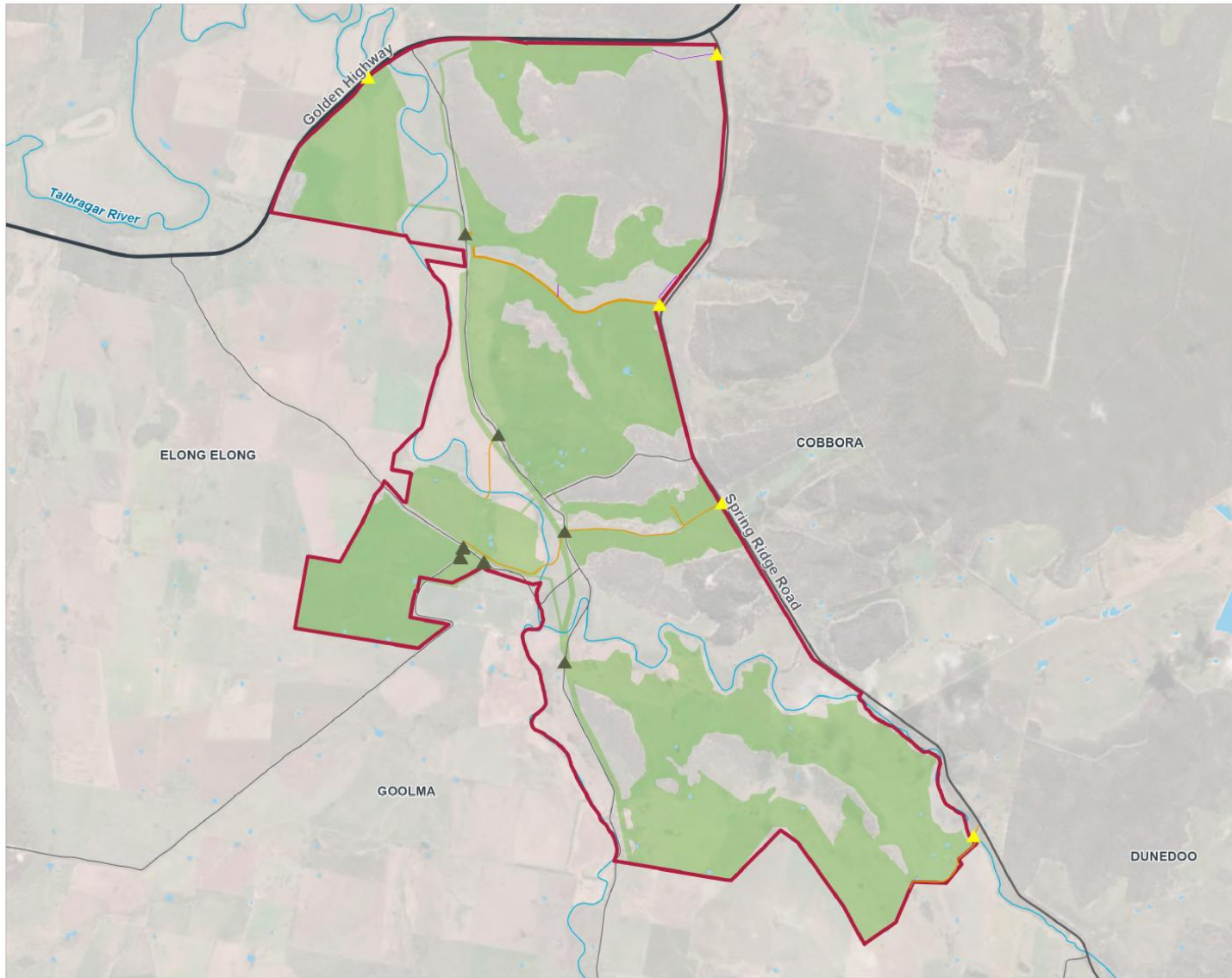


FIGURE 3-2: INTERNAL ROADS AND ACCESS POINTS

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Source: Earthstar Geographics

Figure 4: Project footprint and access points - note south-eastern access is adjacent to Dapper RFS Brigade

## 4. Project Area Description

The Project Area covers part of what was the historical Cobbora Coal mine, an open-cut coal mine proposed by Cobbora Holding Company Pty Ltd, which is now redundant. The Project Area is located approximately 20km south west of Dunedoo and 55km east of Dubbo in Central West NSW. The nearest national parks to the Project Area are the Cobbora State Conservation Area and the Goonoo State Conservation Area, approximately 6km and 16km to the northwest; Goulburn River National Park, approximately 50kms to the east and the Yarrobil National Park, approximately 15kms to the south-east. Other areas of environmental conservation in the vicinity of the Project Area include Dapper Nature Reserve, Goodiman and Goonoo State Conservation areas.

The detailed layout and overall developmental configuration will be informed by the technical assessments performed during the preparation of the EIS and the detailed design phase of the Project. Project infrastructure would be positioned, where possible, to avoid identified constraints. The project would involve subdivision of the land surrounding the BESS to separate it from the rest of the project area. Subdivision of the grid substation would also be required to separate the land from the rest of the Project Area, as this is a typical requirement of Transgrid.

The Project Area spans two local government areas (LGAs): Warrumbungle Shire Council and Dubbo Regional Council. Within these LGAs the Project Area also spans three suburbs: Dunedoo, Elong Elong and Cobbora, though is predominantly within the suburb of Cobbora. To the north the Project Area is bordered by the Golden Highway and to east the Project Area is bordered by Spring Ridge Road.

Most of the land within the Project Area is zoned RU1 - Primary Production under the Warrumbungle Local Environmental Plan 2013 (Warrumbungle LEP) and the Dubbo Regional Local Environmental Plan 2022 (Dubbo LEP). A small portion of land at the northern end of the Project Area is zoned as UL Unzoned Land under the Warrumbungle LEP.

Renewable energy development is growing in the area. This includes several other proposed, approved, under construction and operational renewable energy projects within and around the CWOREZ. The Sandy Creek Solar Farm and Spicers Creek Wind Farm are adjacent to the Project.

The development footprint within the Project Area covers approximately 1,600 ha. During the preparation of the EIS, the developmental footprint within the Project Area has been refined based on stakeholder engagement, environmental assessment, constraints identification and Project design requirements.

Land surrounding the Project Area to the north, west and south is characterised by undulating cleared land used primarily for sheep and cattle grazing or dry land cropping. Tuckland State Forest is 5km to the east and there are large areas of private commercial forest on the eastern side of Spring Ridge Road. There are 51 non-associated dwellings (private) located within 4 km with a line of sight of the Project.

Land bordering the Project Area is zoned as RU1 Primary Production. Other land use zones within five kilometres of the Project Area include:

- C1 National Parks and Nature Reserves;
- RU3 Forestry; and
- R5 Large Lot Residential.

The Project would be developed on predominantly freehold land, with the exception of Danabar Road and sections of Sandy Creek Road, Tallawonga Road and Sweeneys Lane, which are located within the Project Area. Extending over approximately 21 lots, the Project Area covers approximately 3,000 hectares (refer Figures 3 & 4).

The Project Area is greenfield comprising large paddocks used exclusively for grazing sheep and cattle. There are four abandoned and dilapidated dwellings in the northern portion of the Project Area and a house, large shed and cattle yards in the south of the Project Area. These will be demolished to allow for the placement of the proposed solar array. Remnant native vegetation is present across some internal areas of the Project Area, which typically are in the form of paddock trees, pockets of vegetation on ridgelines and vegetation along local roads and drainage lines.

Several watercourses associated with the Talbragar River are located within the Project Area. These watercourses, including Sandy Creek and Laheys Creek, follow a generally north or north-westerly direction. Multiple farm dams are also present.

Road access to the Project Area is via the Golden Highway and Spring Ridge Road, which are sealed all-weather public roads. These roads are graded roads which carry minimal traffic, with their use being generally limited to access routes for rural properties. These roads would remain open and available for public use during the construction and operation of the Project.

The Dapper Rural Fire Service is located at 1006 Spring Ridge Road Cobbora, which is located adjacent the southeastern boundary of the Project Area at the southern access point (Figure 4).

The Central Ranges gas pipeline aligns with a small section of the Project Area's north-western boundary. The Project would be designed to avoid this asset.

The Project is in a designated bushfire prone area. All new development on (BPL) must comply with the NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2019* (PBP). This Bushfire Risk Assessment supports the environmental impact statement (EIS) for the Project. It documents the assessment of bushfire risk in accordance with PBP. As State Significant Development (SSD), the Project must comply with the aim and objectives of PBP.

This bushfire risk assessment report considers the potential impacts of the Project on the surrounding landscape and the potential to be impacted by bushfire as required by PBP, with special consideration for the vulnerability of the Project and specific mitigation measures with regard to bushfire.

## 5. Legislative Framework

### Statutory Requirements

The statutory requirements outline the relevant statutory and regulatory obligations relevant to bushfire risk management for the Project. This section also includes relevant policies, standards, and guidelines for the consideration of bushfire risk for new development.

### State Significant Development

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act) as it satisfies the requirements of Clause 2.6 of the *State Environmental Planning Policy (Planning Systems) 2021* (PS SEPP), being:

1. Development is declared to be State significant development for the purposes of the Act if—
  - a. The development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
  - b. The development is specified in Schedule 1 or 2 of the PS SEPP.

Schedule 1, Clause 20 identifies electricity generating works and heat or co-generation, which states: Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distillate, waste, hydro, wave, **solar** or wind **power**) that—

- a. **Has a capital investment value of more than \$30 million**, or
- b. Has a capital investment value of more than \$10 million and is located in an environmentally sensitive area of State significance.

The NSW *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TI SEPP) aims to facilitate the effective delivery of infrastructure across NSW. Division 4 of the TI SEPP applies to electricity generating works or **solar energy systems**.

Clause 2.36 (9) of the TI SEPP provides that solar energy systems development for the purpose of a solar energy system may be carried out by any person with consent on any land. As such, the Project is permissible with development consent under the TI SEPP

### Environmental Planning and Assessment Act 1979

The (NSW) EP&A Act requires that any development on BPL for any purpose complies with the aim and objectives of PBP. SSD is exempt from this requirement but is generally encouraged to comply with PBP. As such, a Bush Fire Safety Authority (BSFA) is not required for SSD. However, the SEARs issued under the EP&A Act for this SSD project requires this Project to be assessed for the potential hazards and risks to bushfires, which aligns with compliance against the PBP.

## **Environmental Planning and Assessment Act, 1979: Section 10.3 Bushfire Prone Land**

The designation of BPL in NSW is required under the EP&A Act (s.10.3). BPL Maps provide the trigger for the various development assessment provisions. The BPL Map is a trigger for the consideration of bushfire matters for new development. It is not intended as a detailed measure of risk.

## **Environmental Planning and Assessment Act, 1979: Section 4.41 Approvals legislation that does not apply**

A consented SSD project is not required to secure a BSFA under section 100B of the Rural Fires Act 1997.

## **Rural Fires Act, 1997**

The (NSW) Rural Fires Act 1997 (RF Act) establishes the NSW Rural Fire Service, defines its functions and makes provision for the prevention, mitigation and suppression of rural fires. Section 63 of the RF Act requires public authorities and owners and occupiers of land to prevent bushfires and to manage land they are responsible for. The RF Act states that it is the duty of public authorities, landowners and occupiers to take all notified and practical steps to prevent ignition and minimise spread on or from their land. Permits are required to light fires for bushfire fuel hazard reduction or to clear fire breaks. The RF Act reiterates that certain instruments under the EP&A Act, National Parks & Wildlife Act 1974, Local Government Act 1993, Biodiversity Conservation Act 2016, and the Local Land Services Act 2013 do not apply when responding to fire emergencies.

The RF Act provides for the RFS Commissioner to declare the bushfire danger period which generally runs from October to March (inclusive), which can be modified by the RFS. Total fire bans (TOBANS) may be issued by the RFS Commissioner in the interests of public safety. Section 63 places an ongoing bushfire management requirement on the Project to mitigate the risk of bushfire within the Project Area.

## 5.1. Government plans, policies, standards and guidelines

The relevant guidelines and requirements in NSW for the consideration of bushfire risk for new development are:

### **Planning for Bushfire Protection 2019 NSW Rural Fire Service (RFS)**

This document contains specifications for planning and building on land identified as bushfire prone. PBP seeks to provide for human safety (including fire fighters) during bushfire events and minimise the effects of bushfires on property; while considering development potential, site characteristics and protection of the environment. As an SSD, the Project is exempt from the requirement under the EP&A Act to comply with PBP. However, the SEARs issued under the EP&A Act for SSD projects requires this Project to be assessed for the potential hazards and risks to bushfires, which aligns with compliance against the PBP.

PBP addresses the considerations and requirements for solar farms in Section 8.3.5, with a focus on minimum Asset Protection Zones (APZ) for buildings and infrastructure.

### **Standards for Asset Protection Zones NSW Rural Fire Service**

This document provides standards for the establishment and maintenance of APZ. Preliminary APZ as identified in this assessment require consideration and refinement in later detailed design phases of this Project. The tolerable risk of radiant heat at the assets will be determined by The Proponent during the detailed design. Subsequent mitigation strategies depending on the vulnerability, will then be put into place. The actual location of heat-sensitive components within the development would not be confirmed until detailed design.

### **Guide for Bush Fire Prone Land Mapping**

The identification of BPL in NSW is required under the EP&A Act. It is the responsibility of local government to prepare the Bushfire Prone Land Map (BPLM) for the local government area. The RFS Commissioner certifies the BPL according to guidance provided by NSW RFS (2015). BPL assessments are based on allocation of the vegetation present into one of three broad 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, but it is limited in its connectivity to larger areas and contain land management practices and a bushfire plan that identifies the appropriate management of bushfire risk;
- 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 hectare and greater than 100 metres 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 bushfire prone.

The Project Area is affected by BPL as per section 8.1.

## **ISSC 20 – Guideline for the Management of Activities Within Electricity Easements and Close to Electricity Infrastructure (September 2012)**

The Project is required to comply with *ISSC 20 - Guideline for the Management of Activities Within Electricity Easements and Close to Electricity Infrastructure* (ISSC, 2012) which was written to protect public safety and electricity assets and by offering guidance on the management of activities in electricity easements including the consideration of access and safety aspects associated with the operation and maintenance, repair, replacement, upgrade or renewal of electricity infrastructure on property, whilst being mindful of the property owner's rights to maximise use and enjoyment of the land.

Lighting of fires, including planned or prescribed burns, is a controlled activity under ISSC 20 and is subject to consultation and negotiation with the network operator.

## **Department of Planning, Housing & Infrastructure – Large-Scale Solar Energy Guideline (August 2022)**

The Project is required to comply with the *Large-Scale Solar Energy Guideline* (2022). Development consent for a large-scale solar energy development will typically be subject to a range of conditions for managing and mitigating the impacts of the development, including but not limited to:

- Visual impact mitigation, such as landscaped screening at affected dwellings;
- Road upgrades, site access and maintenance requirements;
- Stormwater management, erosion and sediment control and flood mitigation works;
- Biodiversity management and mitigation measures;
- Heritage protection measures;
- Obligations to manage risks associated with bushfire and dangerous goods;
- Decommissioning and rehabilitation of the site including performance objectives; and
- Requirements for the minimisation and management of waste.

If development consent is granted for a large-scale solar energy development, the conditions of consent will continue to apply to the Project and the land on which it is located throughout its construction and operational life as well as during decommissioning and rehabilitation phases.

## 5.2. Planning for Bushfire Protection 2019: Solar Farms

Section 8.3.5 of PBP (p. 77) provides the following considerations and requirements for solar farms:

*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:*

- A minimum 10m APZ for the structures and associated buildings/infrastructure; and
- The APZ must be maintained to the standard of an IPA for the life of the development.

*Infrastructure for the purposes of requiring APZ excludes:*

- road access to the site; and
- power or other services to the site and associated fencing.

The 10 metre Asset Protection Zone (APZ) as prescribed by PBP is a general requirement and does not factor in the criticality of infrastructure and the associated tolerable risk of radiant heat at those assets. The tolerable level of radiant heat exposure to the critical infrastructure and assets will need to be confirmed by The Proponent during the detailed design phase, with the proposed APZ discussed in Section 8.9 of this report. Larger APZs can be implemented with other mitigation strategies, depending on the determined vulnerability, to address the heightened criticality of those infrastructure and assets.

A Bush Fire Emergency Management and Operations Plan should be prepared for the development that identifies all relevant risks and mitigation measures associated with the construction and operation of the Project. 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; and
- Appropriate bush fire emergency management planning.

PBP raises the expectation for the operators of solar farms and BESS to understand and nominate any industry specific activities that may increase risk that need to be carried out on days of TOBAN. Any such activities would require notification, risk mitigation and subsequent exemptions by the Commissioner of the NSW RFS.

## 6. Limitations

Australia has a history of high consequence bushfires, which have caused loss of life, damage and disruption. Risk based land use planning provides the tolerable bushfire risk levels through documents such as PBP, legislation, policy and guidelines. Risk based land use planning has consistently been identified as one of the key means to reduce natural disaster risks to assets and communities. Improved risk-based land use planning in areas that are subject to natural hazard are fundamental to developing and enhancing resilient development, critical infrastructure and communities.

The objectives of PBP articulates the criteria to determine tolerable risk to assets and people associated with 'other' development. As SSD, the Project is exempt from the requirement under the EP&A Act to comply with PBP and does not require a BFSAs. However, the SEARs issued under the EP&A Act for SSD projects requires this Project to be assessed for the potential hazards and risks to bushfires, which aligns with compliance against the PBP. The level of bushfire risk to and from the proposed development means PBP should be considered in the design and operation of the Project. Solar farms are addressed in PBP under Section 8.3.5, however in general terms, electricity assets such as battery storage, substations and high-voltage transmission lines are not specifically addressed in PBP.

In order to understand the nature of bushfire risks posed to the assets, people working on the Project Area and people using the access road to and from the Project Area, it is critical to contemplate the elements of bushfire risk which may be relevant. The tolerable level of bushfire risk (i.e. bushfire from outside the site impacting the Project) to the infrastructure and Project assets will be determined by The Proponent during the detailed design phase.

The proponent understands that the bushfire risk assessment uses a Bushfire Attack Level of  $<29\text{kW/m}^2$  (BAL-29) as the basis of assessment for this Project. The Project design currently works on meeting and mapping BAL-29 standard Asset Protection Zones (APZ). APZ will be finalised at detailed design stage, with consideration of bushfire risk to assets.

A site inspection was not performed under the scope of the assessment.

This assessment has been prepared by David Lemcke, Senior Planner & Bushfire Specialist and Lew Short, Principal Bushfire (FPAA BPAD Level 3 Certified Practitioner No. BPD-L3-16373) who is recognised by the NSW RFS as qualified in bushfire risk assessment and have been accredited by the Fire Protection Association of Australia as a suitably qualified consultant to undertake alternative solution proposals.

## 7. Bushfire Risk

Bushfires are a normal part of the Australian landscape, and due to climate change, are predicted to become more severe, more frequent and an increasingly common part of life in eastern Australia. Climate change modelling predicts increasing frequency and severity of fire events correlating with altered rainfall and drought patterns and increasing numbers of severe and intense heat events. As the dryness of more areas increases beyond levels historically considered 'normal', the footprint of areas with a propensity to burn are likely to increase.

Not all bushfires lead to loss of life or damage to assets. Bushfires of low to moderate intensity often pose little threat to life, property and community assets. Fire agencies are very successful at extinguishing low to moderate intensity fires before they lead to injury or death. However, bushfires that burn during dangerous conditions have a much higher risk of leading to loss of life and property and causing significant injuries and environmental impact. The risk is greatest when fire occurs on hot, dry windy days, and where ignition occurs in heavy fuels, and in steep terrain. These conditions present fire that can spread rapidly, crown in forests, produce powerful convection columns and create extensive spot fires ahead of the fire front. This often makes their control impossible until weather conditions moderate.

When fires reach a certain intensity, they are beyond the capacity of firefighting resources to suppress. Firefighting resources are allocated where they will be most effective at protecting lives, not necessarily where property losses are most likely. Firefighting resources are also unlikely to be allocated to property infrastructure and community assets that cannot be defended safely. The Project is in a remote area and may not be actively defended by fire fighters.

Radiant heat is the primary cause of death or serious injury in a bushfire, and this can impact people at the Project Area or travelling to or from the Project Area. In addition, wind conditions can cause branches and trees to fall and block access roads, making driving hazardous. Smoke and embers will make driving hazardous.

Fires burning under extreme conditions can behave erratically and with intensity well above what has been assessed in this report. This report takes a balanced approach to considering bushfire risk and has assumed a credible worst case fire scenario burning up to a Catastrophic Fire Danger Rating (FDR). It is possible that fires could burn through the wider area and impact the Project Area and surrounds with significantly higher Forest Fire Danger Index (FFDI). The risk-based approach used in this assessment is that provided by PBP with a credible worst-case scenario of FFDI 80 or a 1:50 year bushfire event. Additional redundancy will be considered by The Proponent during the detailed design phase.

## 8. Assessment Methodology

This SSD project is subject to the Department of Planning, Housing & Infrastructure SEARs which requires an assessment of potential hazards and risks including but not limited to bushfires, spontaneous ignition, electromagnetic fields or the proposed grid connection infrastructure against the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for Limiting Exposure to Time-varying Electric, Magnetic and Electromagnetic Fields'.

Section 2.4.2 of the PBP in relation to SSD projects states "Given the scale of SSI and SSD projects, the requirements of this document (PBP) should still be applied and seeking advice from the NSW RFS is encouraged." To comply with PBP, SSD projects are required to comply with the aim and objectives of PBP. The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, 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 bushfire
- 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 bushfire protection measures (BPMs); and
- ensure that utility services are adequate to meet the needs of firefighters.

PBP articulates the regulatory framework for new development in NSW, along with the relevant bushfire protection measures to be contemplated in the delivery of bushfire-resilient development design. The document provides detailed provisions for various types of development which is focussed at residential and Special Fire Protection Purpose development which are vulnerable uses such as schools, hospitals, aged care etc.

The Project is considered as 'other development' in PBP. 'Other development' includes industrial, commercial and infrastructure development. PBP does not provide a framework for the Project in a meaningful way as the document is focussed on new residential development on BPL. However, 'other development' must satisfy the aim and objectives of PBP. This assessment includes an analysis of the hazard, threat and subsequent bushfire risk to the Project and provides recommendations that satisfy the aims and objectives of PBP.

PBP identifies the methodology to determine Bushfire Attack Levels (BAL) based on calculated radiant heat levels at a site. This assessment is based on mapping of vegetation formations and slope

assessment in accordance with PBP. This assessment is based on a detailed GIS analysis of the Project Area with publicly accessible data, including:

- Planning for Bushfire Protection (RFS, 2019);
- Aerial mapping; and
- Detailed GIS analysis.

Bushfire risk, as influenced by fire history and future mitigation strategies (e.g., hazard reduction burning), has no bearing on the determination of bushfire protection strategies for future development of the Project. This is due to the fact that PBP assesses bushfire threat based purely on vegetation and slope (i.e., hazard and not risk), making the assumption that a fire may occur at a near worst-case fire weather scenario and with maximum fuel loads.

In undertaking the report, Blackash has undertaken a landscape wide assessment of the bushfire risk and review of the Orana and Castlereagh Bush Fire Risk Management Plans to gain an appreciation of the broader risk affecting the Project.

The bushfire landscape assessment considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.

The more detailed consideration of bushfire risk to the Project has followed the methodology outlined in accordance with PBP. The following methodology is from PBP (p. 80) and is used to determine the Bushfire Attack Level (BAL) at locations around the Project. The process to determine BAL is outlined below:

- Step 1: Determine vegetation formation in all directions around the building to 140 metres
- Step 2: Determine the effective slope of the land from the building for 100 metres
- Step 3: Determine the relevant FFDI for the council area in which the development is to be undertaken
- Step 4: Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall of an asset
- Step 5: Match the relevant FFDI, appropriate vegetation, distance, and effective slope to determine the appropriate BAL using the relevant tables in PBP.

The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the Project Area, and which determine the planning and building response of PBP. A detailed assessment has been undertaken to determine the bushfire hazard and likely radiant heat at the Project Area. The key to managing bushfire hazard for infrastructure is understanding likely radiant heat flux impacts and providing effective mitigation measures.

## 8.1. Bushfire prone land

The identification of bushfire prone land (BPL) in NSW is provided under Section 10.3 of the EP&A Act. The Project Area is on designated BPL (Figure 5) and the surrounding vegetation is not managed which causes a bushfire risk. The Bushfire Prone Land Maps provide the trigger for the consideration of bushfire matters for new development. Much of the internal vegetation within the Project Area is mapped as Category 2, with pockets of Category 1 BPL and extensive areas of Category 3 Grasslands to the west of the site.

BPL is considered an area of land that can support a bush fire or is likely to be subject to bush fire attack. This map is a trigger for development assessment for bushfire risk only and does not provide detailed risk assessment information.

By its nature the vegetation often changes quicker than the map updates due to new development or agricultural land use changes. The three vegetation categories are defined on page 11 of the RFS *Guide for Bushfire Prone Land Mapping* (Version 5b – November 2015).

*Vegetation Category 1 is considered to be the highest risk for bush fire. It is represented as red on the bush fire prone land map and will be given a 100m buffer. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production.*

*Vegetation Category 2 is considered to be a lower bush fire risk than Category 1 and Category 3 but higher than the excluded areas. It is represented as light orange on a bush fire prone land map and will be given a 30 metre buffer. This vegetation category has lower combustibility and/or limited potential fire size due to the vegetation area shape and size, land geography and management practices.*

*Vegetation Category 3 is considered to be medium bush fire risk vegetation. It is higher in bush fire risk than category 2 (and the excluded areas) but lower than Category 1. It is represented as dark orange on a Bush Fire Prone Land map and will be given a 30 metre buffer.*

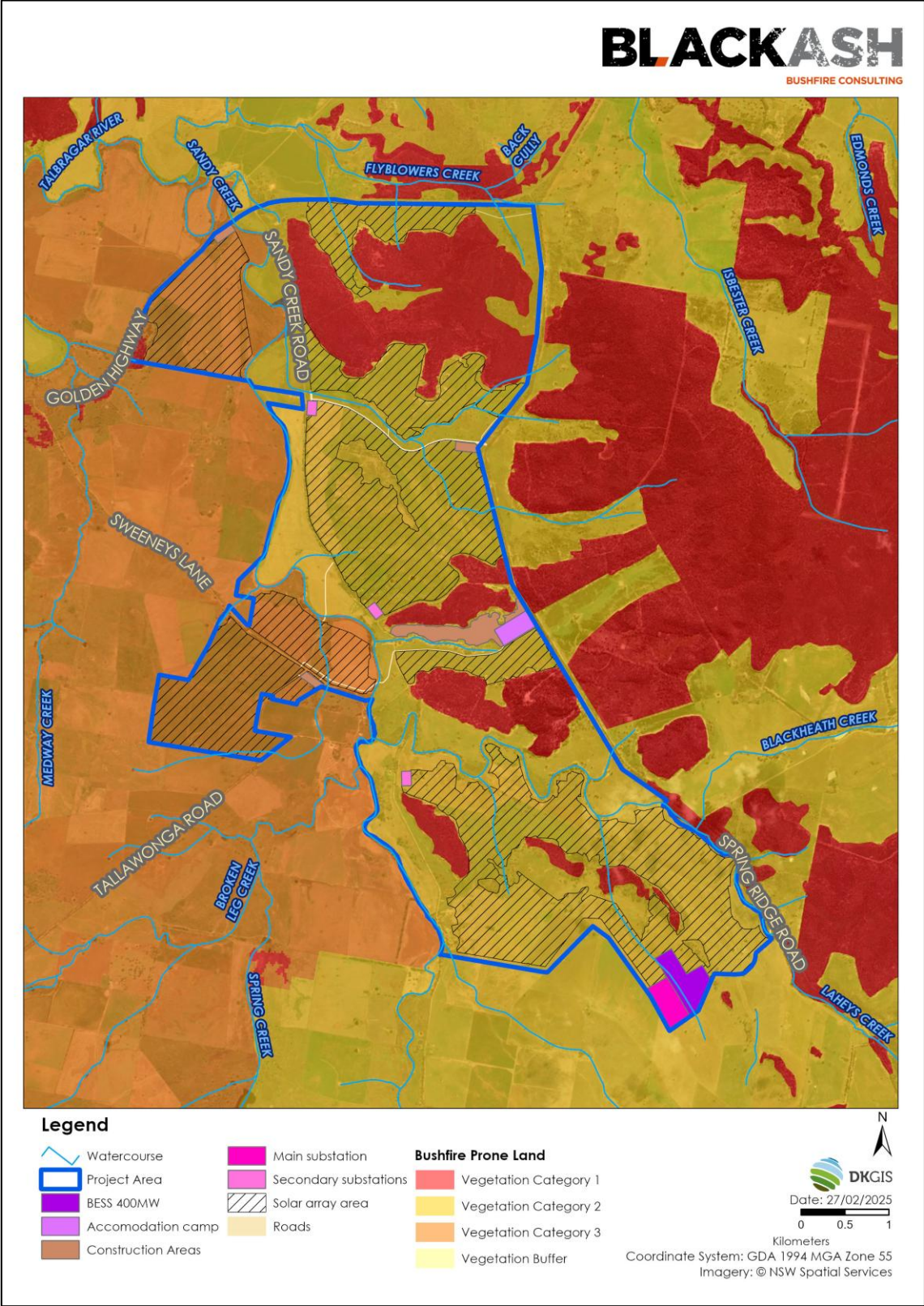


Figure 5: Bushfire Prone Land Map

## 8.2. Landscape Scale Bushfire Assessment

The Victorian Planning Permit Applications Bushfire Management Overlay – Landscape Scale Threat Assessment is the only statutory framework to assess the broader landscape scale potential of bushfire affecting the Project Area. NSW does not have a landscape scale risk assessment process for new development. Blackash has expanded and modified the criteria to emphasise the priority of life safety, and the criticality of bushfire emergency management and evacuation planning as part of the broader landscape risk assessment process.

The Blackash Landscape Scale Assessment Tool (LSAT) combines quantitative and qualitative techniques which are scaffolded by the Landscape Scale Threat Assessment and associated documentation. The approach is shown in Table 1 and uses elements of the Bayesian decision making model and Expert Judgment techniques backed by data. Bayesian decision making has been used where there is both objective and subjective data to analyse, and decisions need to be made on the probability of successful outcomes where there are high levels of uncertainty. Expert Judgement has been used in the assessment and determination of the landscape scale risk.

The likelihood of a bushfire, its severity and intensity, and the potential impact on life and property varies depending on where a site is in the broader landscape. Landscape scale fires will place greater pressure on emergency response capability and will have a wider impact on roads and the length of time roads cannot be safely used. This will affect the likelihood of successful evacuations taking place across larger areas. Multiple factors have been considered for the landscape scale assessment. Key considerations in our assessment have included:

- Extent and continuity of vegetation
- Topography
- Prevailing winds
- The potential fire run and area that is likely to be impacted by the fire
- The impact on evacuation routes to safer places considering road networks, distances, and landscape factors
- The location and exposure of the development to bushfire
- The ability to seek bushfire shelter on site or at alternative locations
- The extent of neighbourhood-scale damage the bushfire may produce.

The Landscape Scale Assessment Tool (LSAT) rates the overall landscape scale bushfire risk as High Threat for the Project (see Table 3). It is critical to note the LSAT is based primarily around life safety for new urban development. As an infrastructure project, the bushfire risk is significantly reduced in comparison due to the limited number of staff on Project Area and contemporary practice in weather forecasting, bushfire detection and mitigation, and the nature of the development being largely non-combustible materials.

**Table 3: Landscape Scale Assessment Tool summary**

Landscape Scale Assessment Tool					
Parameter	Low landscape scale threat	Moderate landscape scale threat	High landscape scale threat	Extreme landscape scale threat	Rating
1. Surrounding Vegetation	Bushfire cannot directly approach the site as it is surrounded by urban development and non-mapped vegetation or managed land.	Bushfire can only approach from one aspect and the site is within a suburban, township or urban area considered managed land. Typically an island of bushfire vegetation within a wider urban development area or interface site impacted only by linear vegetation corridors of 100m width or less.	Bushfire can approach from more than one aspect and site is on the bushland-urban interface with the developed area considered as managed land. Typically contiguous bushfire vegetation with a typical fire run in any direction of 0.1-2.0 km distance.	Bushfire can approach from more than one aspect and/or fires have many hours or days to grow and develop before impacting and/or site is surrounded by significant unmanaged vegetation. Typically large areas of contiguous bushland with fire runs of more than 2 km possible.	Extreme
2. Bushfire Behaviour	Extreme bushfire behaviour at the site is not possible given the broader landscape.	Extreme bushfire behaviour at the site is unlikely in this broader landscape due to combination of factors of vegetation type, vegetation fragmentation, aspect and topography.	Extreme bushfire behaviour at the site is likely in this broader landscape due to combination of factors of vegetation type, vegetation fragmentation, aspect and topography.	Extreme bushfire behaviour is very likely in this broader landscape due to combination of factors of vegetation type, vegetation fragmentation, aspect and topography.	High
3. Impact of severe fire behaviour (FFDI 80 or 100 as relevant) coming onto site from wider fire catchment	There is little vegetation beyond 150 metres of the site (except grasslands and low-threat vegetation) and will not result in neighbourhood scale destruction of the site.	The type and extent of vegetation beyond 150m from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to the site.	The type and extent of vegetation beyond 150m is likely to result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to the site.	The type and extent of vegetation beyond 150m will result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to the site.	Moderate
4. Vegetation Corridors	Vegetation within the site cannot enable fire to enter and move through the site by a continuous fire path from the primary fire source.	Vegetation within the site is unlikely to enable fire to enter and move through the site by a continuous fire path from the primary fire source.	Vegetation within the site may enable fire to enter and move through the site by a continuous fire path from the primary fire source.	Vegetation corridors on site provide for passage of fire to enter and move through the site from the primary fire source.	High
5. Separation	Hazard separation between extreme bushfire hazard and buildings of greater than 100m. Extreme bushfire hazard does not include vegetated corridors of less than 100m width or grasslands.	Hazard separation between extreme bushfire hazard and buildings of 50-100m. Extreme bushfire hazard does not include vegetated corridors of less than 100m width or grasslands.	Hazard separation between extreme bushfire hazard and buildings of 20-50m. Extreme bushfire hazard does not include vegetated corridors of less than 100m width or grasslands.	Hazard separation between extreme bushfire hazard and buildings of <20m. Extreme bushfire hazard does not include vegetated corridors of less than 100m width or grasslands.	High
6. Shelter	Immediate access is available to a place that provides shelter from bushfire. This includes existing or proposed buildings on site constructed in accordance with PBP.	Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area.	Access to a place that provides shelter from bushfire is not certain during a wildfire and existing buildings are not built to PBP standards.	Access to a place that provides shelter from bushfire is not possible during a wildfire.	Low
7. Evacuation	Multiple evacuation routes are available and unlikely to be impacted by fire.	Evacuation to alternate location that provides life safety refuge is <1km and can be completed by foot or vehicle.	Evacuation to alternate location that provides life safety refuge is 1km-10km.	Evacuation to alternate location that provides life safety refuge is > 10km.	Low
8. Isolation and emergency services	Seamless integration with existing settlement - no impact on evacuation or access for emergency services.	Short bushland pinch points that may carry fire across roads and restrict access briefly during passage of fire. Unlikely impact on evacuation or access for emergency services.	Short bushland pinch points that are likely to carry fire across roads and restrict access temporarily. Likely impact on evacuation or access for emergency services.	Large areas of bushland or multiple pinch points that are likely to carry fire across roads in forest areas and will block evacuation or emergency service access routes for extended time.	High
9. Firefighting water supplies	Site is within urban area and has access to reticulated water supply OR site has dedicated firefighting water supply in accordance with PBP requirements.	Site is on the periphery of urban area and has access to reticulated water supply that may be more susceptible to interruption.	Site is outside urban area and relies on an on site water supply not in accordance with PBP.	Site is in an isolated area and relies on an on site water supply not in accordance with PBP.	Low
<b>Overall Threat Rating</b>			<b>High Risk</b>	<b>Total</b>	<b>210</b>
Assessed at Forest Fire Danger Index of 100 as the design fire, using Method 1 in accordance with PBP 2019					
The scoring system uses a multiplier for each Threat level based on a conservative life safety approach.					
The scaled scores for each Threat assessment are totalled and final scores are placed within a range to produce the final Risk Rating					

### 8.3. Bushfire Risk Management Plan

The *Orana Bush Fire Risk Management Plan 2020* and the *Castlereagh Bush Fire Risk Management Plan 2013* (BFRMP) are the strategic documents that identifies community assets at risk and sets out a five-year program of coordinated multi-agency (state and local) treatments to reduce the risk of bushfire to the assets. The Project Area is located across the boundary of the Dubbo and Warrumbungle LGAs

The *Orana BFRMP* (p. 7) identifies the typical climate in the Orana Bushfire Management Committee (BFMC) (in which part of the Project Area is located):

*The typical / average climate in the Orana BFMC area is:*

- *Warm to hot summers, ranging from 17°C to 34°C with some extremes exceeding 38°C for many days.*
- *Winter temperatures ranging from -4°C to 16°C with the regular early morning frosts in the southern area of the Dubbo Regional LGA.*
- *Mean average rainfall for the area is between 500-600mm per annum. Rainfall is usually fairly evenly distributed throughout the year with a slightly greater average in the summer months. January is on average, the wettest month with 60mm.*

*The bush fire season generally commences on the 1<sup>st</sup> October and concludes 31<sup>st</sup> March.*

*Prevailing weather conditions associated with the bush fire season in the Orana BFMC area are North to Westerly winds created by consecutive high pressure systems causing the high daytime temperatures. Such hot winds are usually very dry with low relative humidity often going below 20%.*

The Castlereagh BFRMP is a considerably older document however provides the same broad information as the Orana BFRMP.

A BFRMP follows the RFS guidelines for the assessment of bushfire risk. Identifying the level of bushfire risk firstly involved identifying important community assets considered to be at risk from bushfire in the respective Orana and Warrumbungle BFMC areas, and then assessing the likelihood and consequence ratings. The risk planning process requires that all asset types assess the likelihood of a bushfire occurring. This involves considering fire history, including ignition cause and patterns, known fire paths, access, containment potential and potential fire run (size of the vegetated area).

Neither BFRMP specifically identifies the Project Area (see Figures 6 & 7), nor do they identify the broader local landscape context with specific risk to be managed. The Bodangora Wind Farm is noted as Asset No. 77 in the Orana BFRMP (Figure 6) and is rated 3A High Risk.

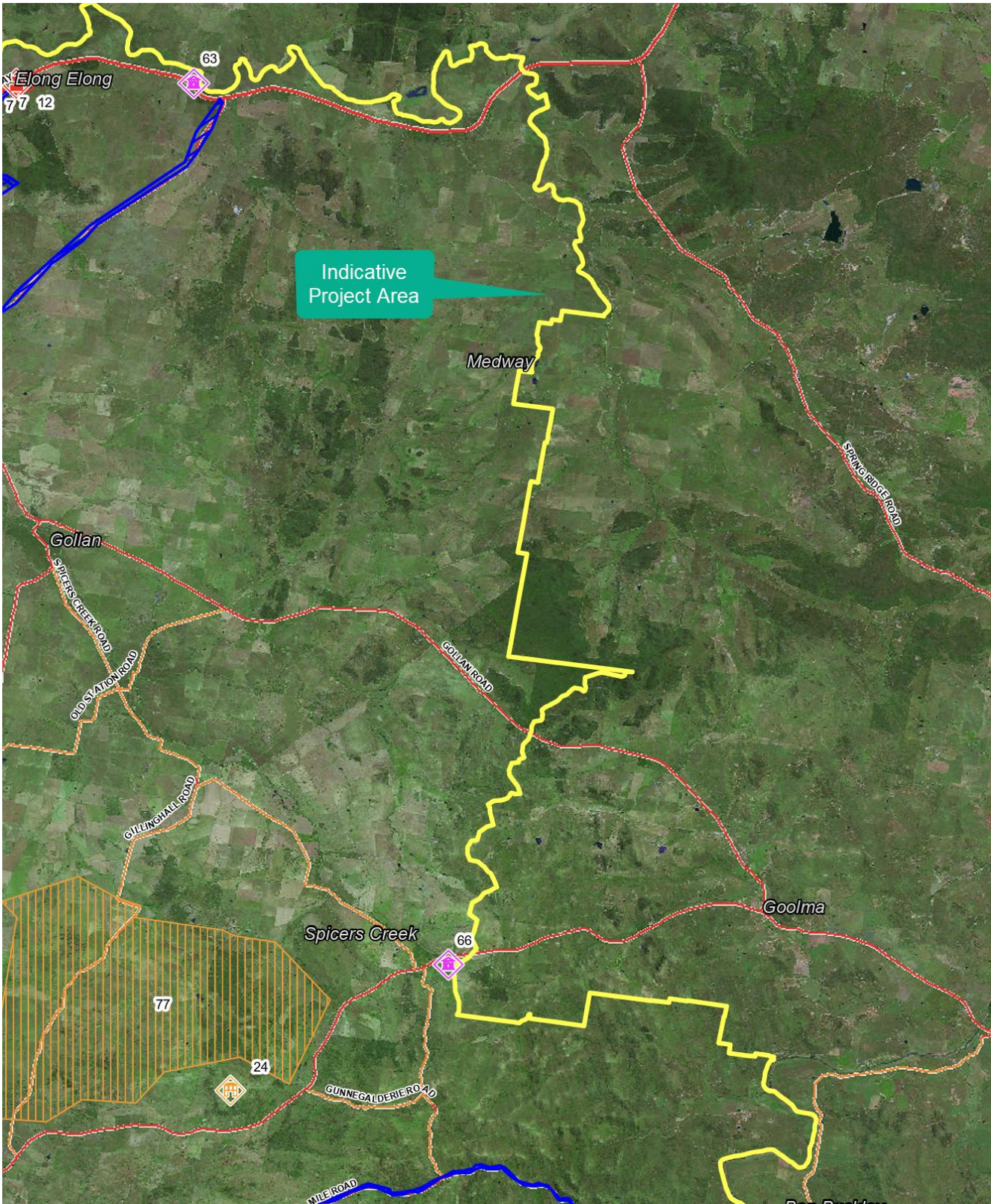


Figure 6: Extract from Bushfire Risk Management Plan for the Project Area (Orana BFRMP 2020)  
Bodangora Wind Farm shown as Asset 77 – High 3A Risk – no treatments identified

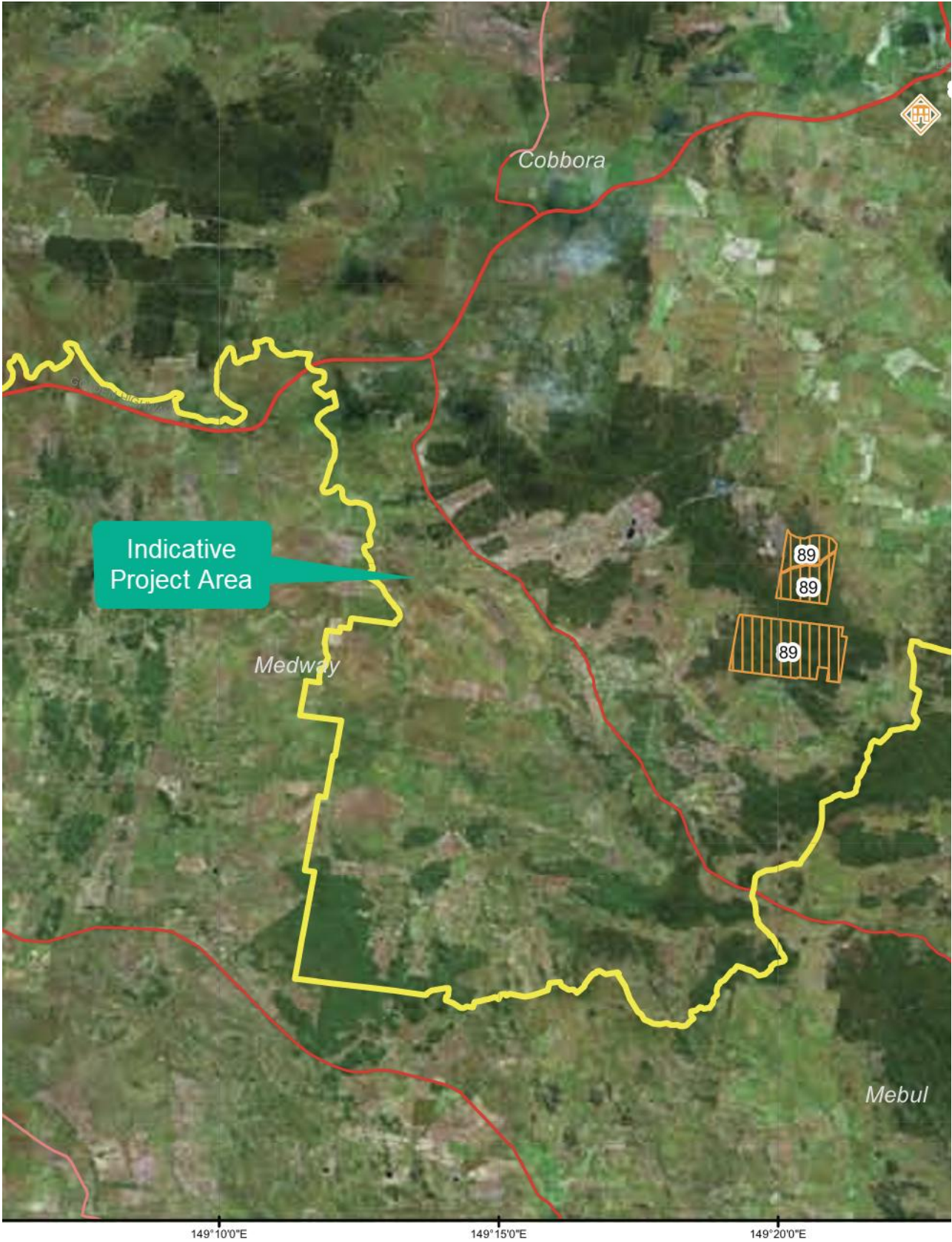


Figure 7: Extract from Bushfire Risk Management Plan for the Project Area (Castlereagh BFRMP 2013) Tucklan State Forest shown as Asset 89 – 4 Medium Risk – refer to Forest NSW Fuel Management Plan

## 8.4. Bushfire History

The Project Area and broader landscape have an assumed and documented history of bushfires. Figures 8 & 9 shows the fire history in the vicinity of the Project Area. No fire records directly affect the Project Area. However, the Goonoo Frost Road 2007/2008 bushfire was to the northwest of the Project Area which burnt an area of approximately 26,600 ha and to the east the Sir Ivan Fire of 2016/2017 which burnt an area of approximately 55,000 ha.

The Orana BFRMP states (p. 8 & 9) states:

*The Orana BFMC area has on average 200-250 fires per year, of which 10-15 can be considered to be major fires. Prior to the 1990s, bush fire history records were not kept in any formal way. However, local knowledge has been available to provide necessary information.*

*Records and local knowledge indicates that seventeen major fire seasons occurred in the Orana Area.*

**Dubbo** – 1926/27, 1951/52, 1957, 1975/76, 1983/84, 1990/91, 1994, 2004 and 2007.

**Narromine** – 1957, 1964, 1979, 1987 and 2001.

**Wellington** – 1975, 1990, 1998/99, 2005/06, 2009 and 2017.

*These years have generally reflected periods of healthy vegetation growth after good winter and spring rainfall followed by a very hot summer. However severe fires were also experienced during the drought. Local knowledge indicates that major fires occur approximately every 10 to 15 years. Recent experience shows that major fires are now occurring much more frequently. It has also been identified that there are two areas within the Dubbo LGA that have a natural fire path phenomenon; these are south-west of the Dubbo urban fringe from Dungary Road in the Minore Rural Fire Brigade area through to the Benalong and Mountain Creek Rural Fire Brigade areas travelling in a south-easterly direction. The other area is in the north-east of the Dubbo urban area, starting at The Haystack Pinnacle, Mendooran Road, travelling in an easterly direction towards the village of Ballimore or in a south-easterly direction towards Mitchell Creek depending on conditions at the time. These areas are characterised by a large amount of timbered areas and/or timbered corridors. There are five fires on record that could only be described as being "Fire Storms", these are:*

- *The first two were on Christmas Day 1984 (Dubbo): the main fire started at Dungary Road and burned 7,800 ha where a fire fighter lost his life.*
- *The second started at the Haystack Pinnacle, Mendooran Road. This fire travelled 12 kilometres to the Mitchell Creek at the Golden Highway.*
- *The third fire occurred when a southerly change caused a change of direction at the Goobang Fire in 2001.*

- The fourth fire being the Euchareena s17 Fire of 1975.
- The fifth fire started on 12 January 2007 (Goonoo s44), burnt 26,000 ha and lasted for 13 days. It was started by lightning in the south east corner of Goonoo National Park. This fire had very erratic fire behaviour which was different to most fire patterns and behaviour previously experienced in the region. Initially the fire took a major run to the north crowning with flame heights up to 10 metre above the tree canopy. A change in weather conditions following the fire's run to the north caused it to take a westerly run for approximately 20km. Under such conditions no amount of equipment or personnel would be able to control a fire of this magnitude.

In 95-99% of cases of fires in the Orana area the normal fire suppression methods generally brings these fires under control within a few hours. The other 1-5% of cases can only be described as major fires or fire storms, these can only be brought under control with steadying or changing weather conditions combined with normal fire suppression methods, including the use of water-bombing aircraft and back burning.

The main sources of ignition for bush/grass fires in the Orana BFMC area are:

- Careless acts by individuals;
- Farm Machinery;
- Campfire Escapes;
- Lightning strikes;
- Electrical Power Supply Lines;
- Burning of Stolen Vehicles;
- When motor vehicle exhaust systems come into contact with vegetation on sides of roads;
- Escaped controlled permit burns; and
- Arson activity.

The Castlereagh BFRMP states on page 9:

The Castlereagh BFMC area has on average 80 bush fires per year, of which 3 on average can be considered to be major fires. The main sources of ignition in the Castlereagh BFMC area are:

1. lightning,
2. escape from legal burns,

3. farm machinery,
4. incendiaries and
5. campfires.

Lightning activity in the area is mainly associated with spring and summer electrical storms (November through to the end of March). These storms are usually accompanied by heavy rainfall, however, periodically they happen with little or no rain causing the possibility of ignition where strikes occur. Generally these storms follow ironstone outcrops, Warrumbungle Mountains, Pilliga scrub and dry sclerophyll forests within the Castlereagh area.

Most escapes from legal burns occur mainly in the rural farming and grazing managed lands spread through the whole of the Castlereagh BFMC area and rural subdivisions or rural/urban interface areas around the major towns. Farm machinery and mechanical ignitions usually happen during the summer grain harvest period from mid November to the end of January and are generally the result of poor maintenance of machinery. During the summer school holiday periods the possibility of incendiaries can increase.

While the Project Area has not been subject to direct bushfire attack, the surrounding region has a history of high intensity and landscape scale bushfires.

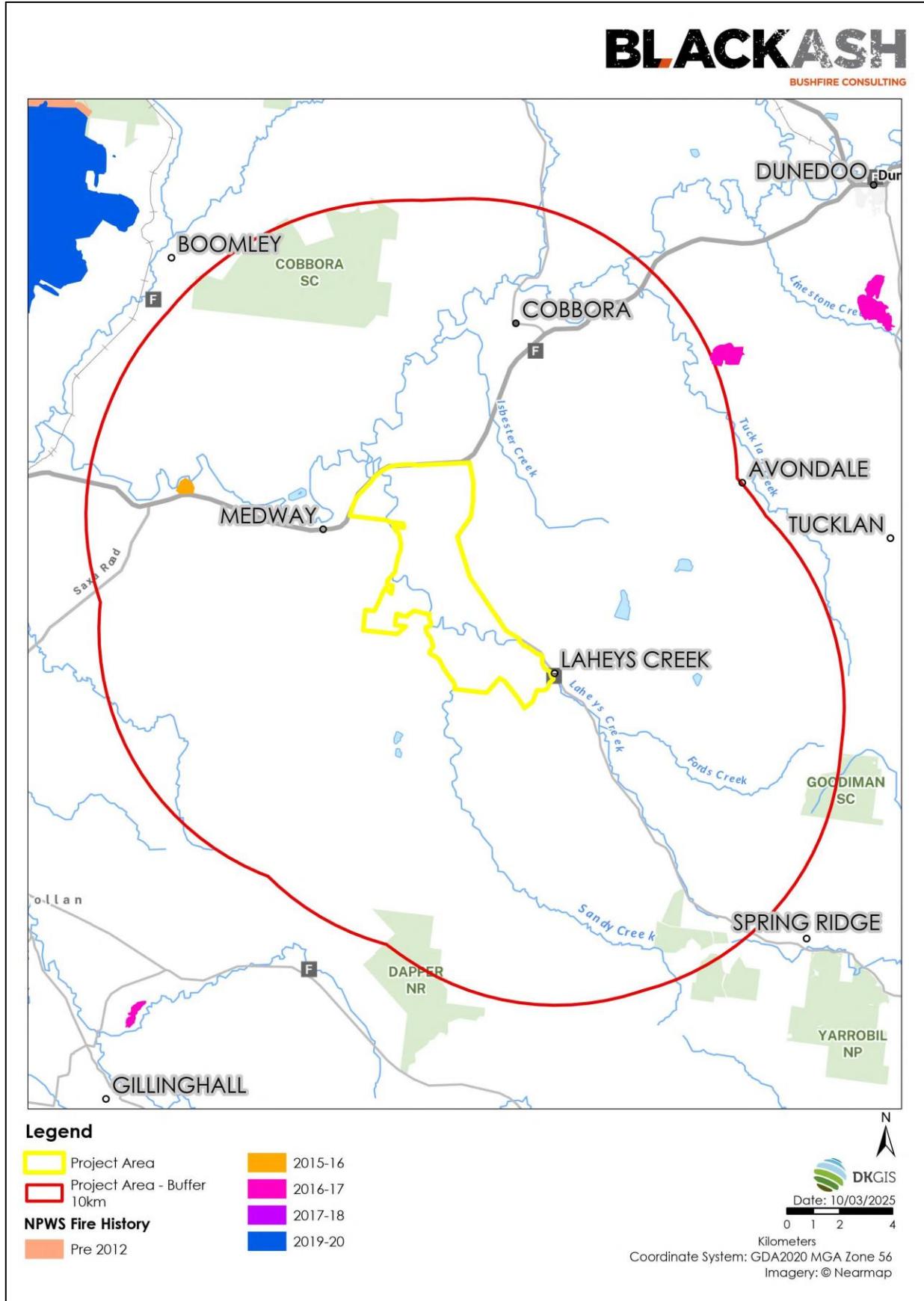
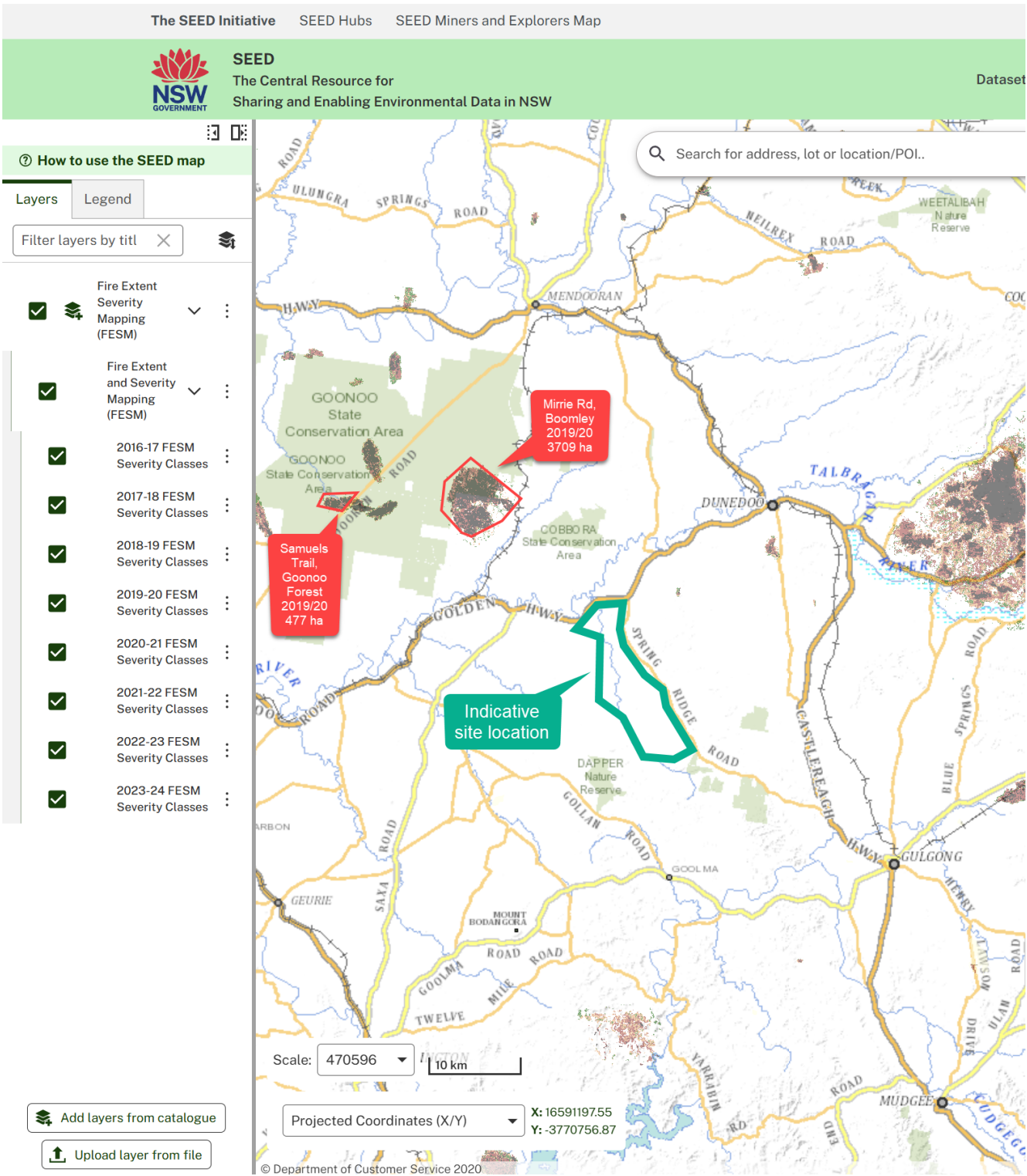


Figure 8: Bushfire history – pre 2012 – 19/20



**Figure 9: Fire Extent and Severity Mapping 2016/17 - 2023/24 (via NSW SEED Mapping) 2019/20 fire season fires are highlighted - Samuels Trail (477ha) and Mirrie Road (3709ha).**

## 8.5. Fire Weather

The fire weather is dictated by PBP and assumes a credible worst-case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds. The Forest Fire Danger Index (FFDI) is a numerical rating used to estimate the risk and severity of bushfire for a given day, based on weather and drought factor.

For the purposes of PBP, the FFDI is set for various areas based on likely worst case 1:50 year recurrence conditions. For development assessment purposes this is based on local government boundaries. The Project Area has a FFDI of **80** as required by the RFS and PBP.

It may be possible that days of higher FFDI may be experienced at the Project Area. This may result in fire situations where conditions challenge survivability of buildings and their occupants. The framework provided for by PBP has been used in this assessment.

## 8.6. Bushfire Hazard Assessment

The vegetation formations (bushfire fuels) and the topography (effective slope) combine with fire weather to create the bushfire threat that may affect bushfire behaviour at the site, and which determine the planning response. An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as setbacks from the hazard.

## 8.7. Vegetation Structure

Predominant vegetation is classified by structure or formation using the system adopted by David Keith (2004) and by the general description using PBP. Vegetation types give rise to radiant heat and fire behaviour characteristics. The predominant vegetation has been determined for the Project Area over a distance of at least 140 metres in all directions from the proposed Project Area boundary or key assets within the Project Area. Where a mix of vegetation types exist, the type providing the greater hazard to the Project is said to predominate. As noted in Section 8.1 above, different vegetation types result in different fire behaviour including rate of spread, ultimate radiant heat flux loads, quantity and type of embers and residence time (length of time the fire is burning).

The vegetation impacting on the Project Area is shown in Figures 10-13. Inside the Project Area would be managed with Asset Protection Zones (APZ) around retained vegetation and will be managed to APZ standards under arrays and around equipment. This includes APZ setbacks from all infrastructure assets to reduce the chance of bushfire spreading across the Project Area boundaries, and to reduce the risk of damage to critical infrastructure.

## 8.8. Slopes Influencing Bushfire Behavior

The slope assessment (Figure 8) for the Project Area has been undertaken in the GIS analysis and is a component of determining the BAL rating. 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 ultimate level of radiant heat flux. The effective slope is the slope of the ground under the hazard (vegetation). It is not the slope between the vegetation and the asset (slope located between the asset and vegetation is the site slope).

The effective slope is the slope under the vegetation which will most significantly influence the bushfire behaviour for each aspect. This is usually the steepest slope which has been used in this assessment. The detailed slope analysis has been completed and is demonstrated in Figures 10-13.

The slopes are highly variable across the site with a mixture of flat, upslopes and downslopes in the 0-5 degree range typical of the undulating nature of the area. There are no steep slopes likely to significantly impact fire behaviour. Upslopes and flat land typically reduce bushfire behaviour and

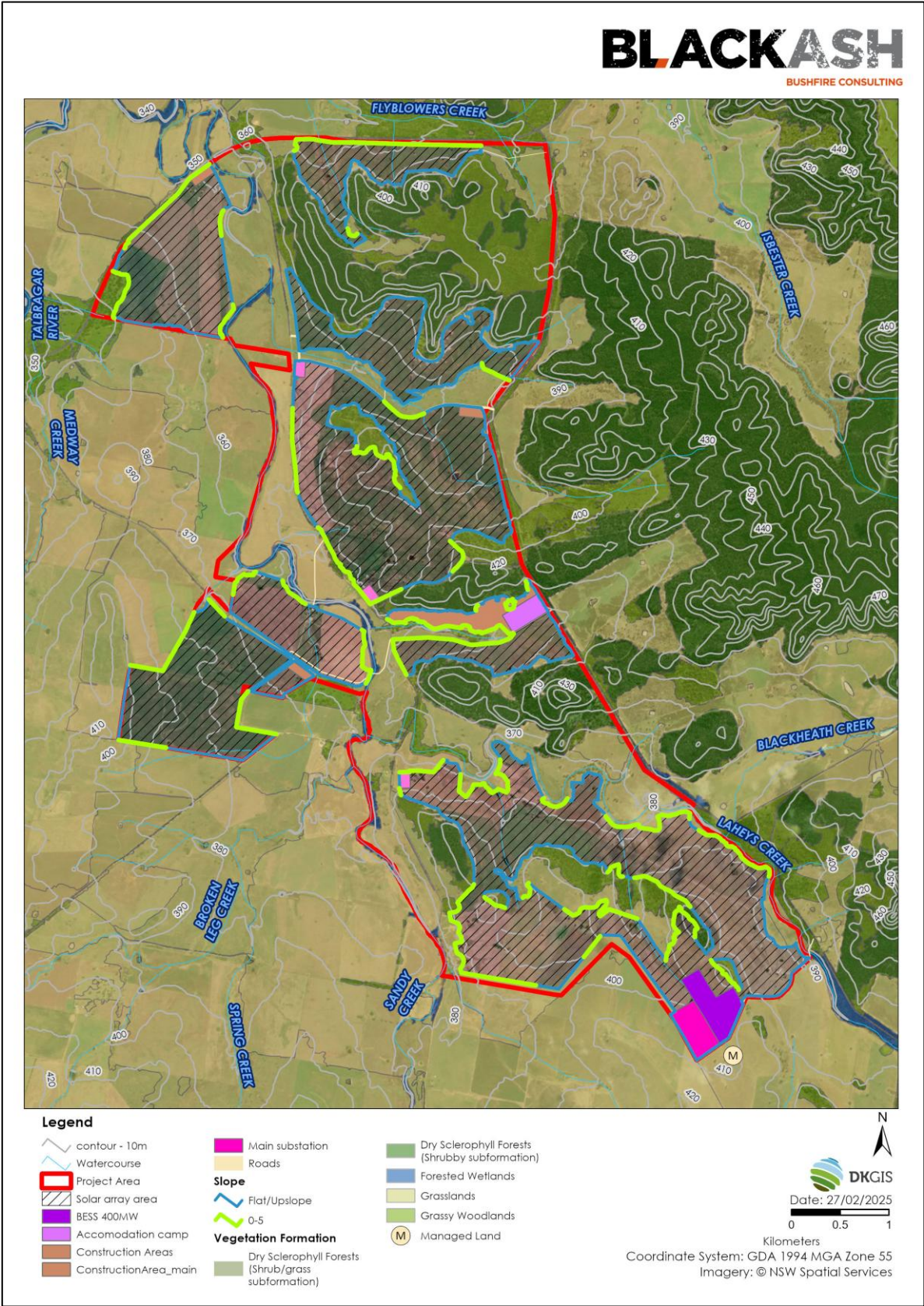
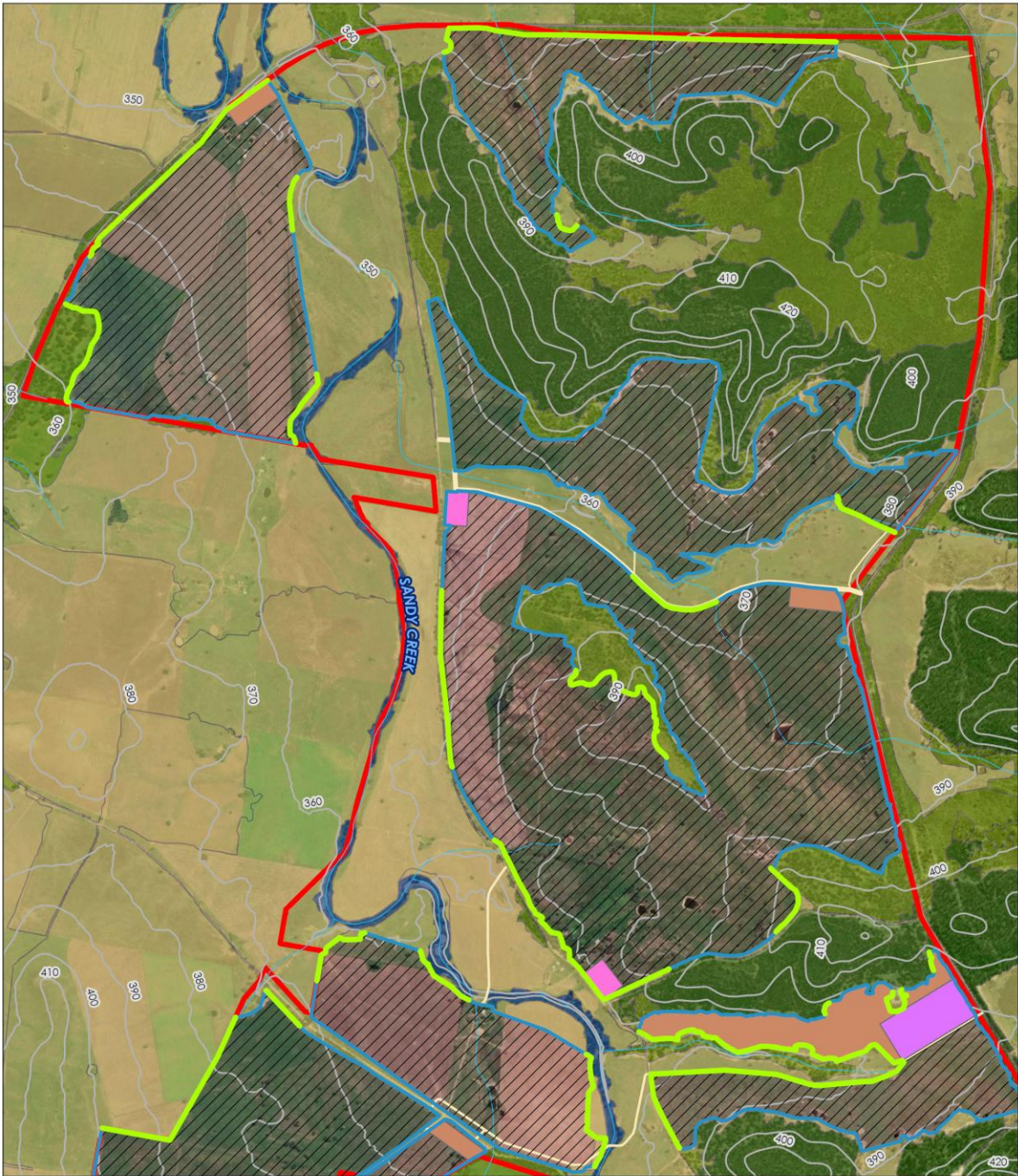


Figure 10: Slope and vegetation map - Project Area



**Legend**

- contour - 10m
- Watercourse
- Project Area
- Solar array area
- BESS 400MW
- Accommodation camp
- Construction Areas
- ConstructionArea\_main

- Main substation
- Roads
- Slope**
- Flat/Upslope
- 0-5

- Vegetation Formation**
- Dry Sclerophyll Forests (Shrub/grass subformation)
  - Dry Sclerophyll Forests (Shrubby subformation)
  - Forested Wetlands
  - Grasslands
  - Grassy Woodlands

N

**DKGIS**

Date: 27/02/2025

0      0.5      1

Kilometers

Coordinate System: GDA 1994 MGA Zone 55  
Imagery: © NSW Spatial Services


**Figure 11: Slope and vegetation map – northern area**



**Legend**

- contour - 10m
- Watercourse
- Project Area
- Solar array area
- BESS 400MW
- Accommodation camp
- Construction Areas
- ConstructionArea\_main
- Main substation
- Roads
- Slope**
- Flat/Upslope
- 0-5
- Vegetation Formation**
- Dry Sclerophyll Forests (Shrub/grass subformation)
- Dry Sclerophyll Forests (Shrubby subformation)
- Forested Wetlands
- Grasslands
- Grassy Woodlands

N

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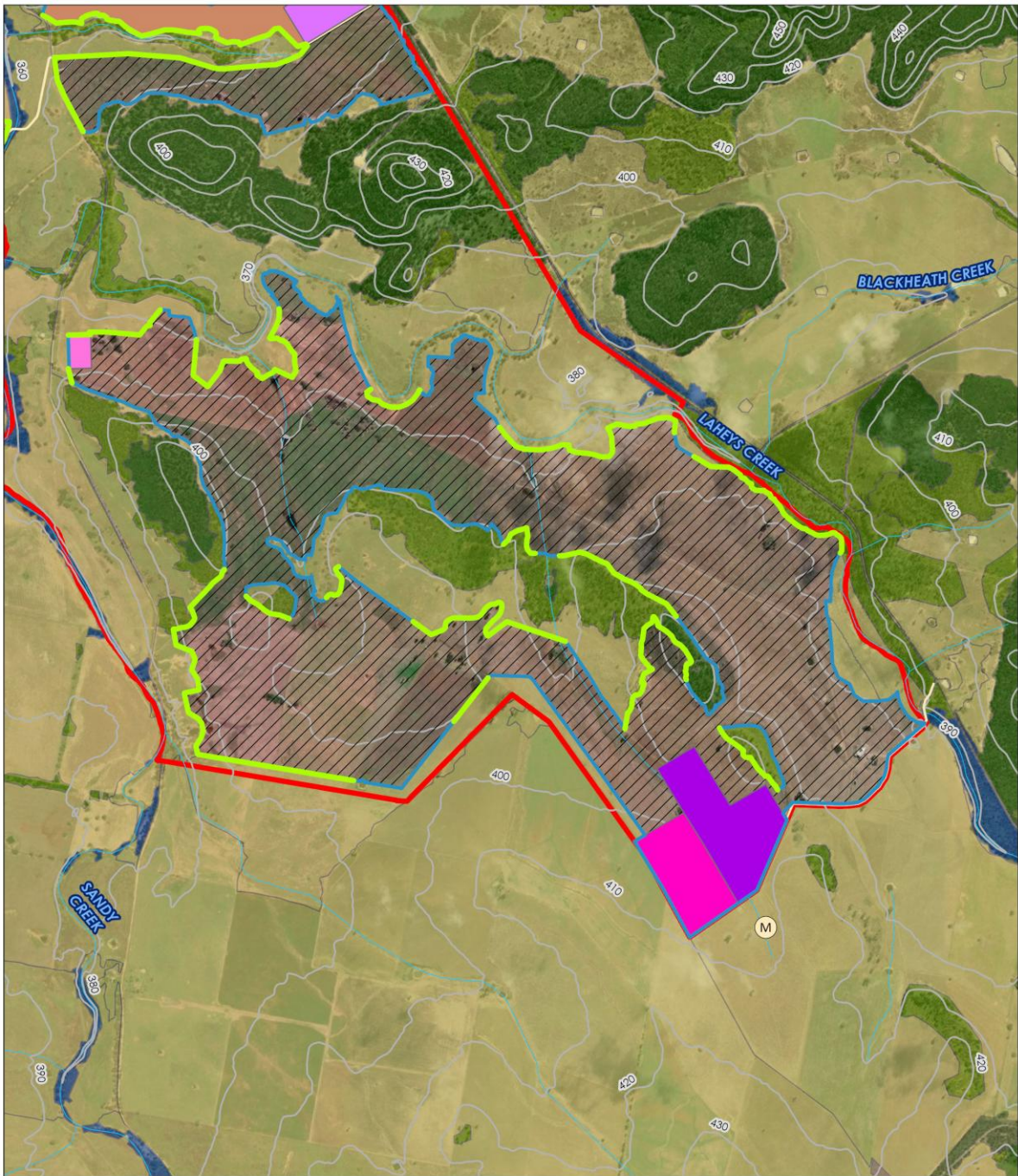
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Kilometers

Coordinate System: GDA 1994 MGA Zone 55  
Imagery: © NSW Spatial Services

**Figure 12: Slope and vegetation map – central area**



**Legend**

- |                       |  |  |
|-----------------------|--|--|
| contour - 10m         | Main substation                                    | Dry Sclerophyll Forests (Shrubby subformation) |
| Watercourse           | Roads  | Forested Wetlands                              |
| Project Area          | <b>Slope</b>                                       | Grasslands                                     |
| Solar array area      | Flat/Upslope                                       | Grassy Woodlands                               |
| BESS 400MW            | 0-5  | Managed Land                                   |
| Accomodation camp     | <b>Vegetation Formation</b>                        |  |
| Construction Areas    | Dry Sclerophyll Forests (Shrub/grass subformation) |  |
| ConstructionArea_main |  |  |

N

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Date: 27/02/2025

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Kilometers

Coordinate System: GDA 1994 MGA Zone 55  
Imagery: © NSW Spatial Services

**Figure 13: Slope and vegetation map – southern area**

## 8.9. Managing bushfire risk to the project

Whilst bushfires can start or spread under a wide variety of conditions, the predominant bushfire threat to the proposed Project is from grassfires or crop fires being driven by dry north westerly or westerly winds into the Project Area. This is somewhat mitigated overall by the limited slopes in this area and the fragmentation provided by the Talbragar River, the Golden Highway, the local road network, and rural properties and various agricultural activities that remove /modify fuel loads at various times of the year.

The risk posed by forest fire to the Project Area is less significant with the majority of forest vegetation upslope and to the east of the Project Area. Easterly winds are much less associated with bushfire risk in the region and are more likely to carry moisture, increasing humidity. Combined with the fragmentation provided by Spring Ridge Road and fires running downslope means there is a significantly lower chance of fire spreading from the east and impacting the project.

Given the presence of bushfire prone land, bushfire history and vegetation in proximity of the Project Area there is an existing bushfire risk to the proposed infrastructure assets, as well as potential for the Project to alter this risk in the local area by permanently managing 1,600 ha of vegetation.

Community concerns regarding new technology and practices have been identified during wider community engagement around renewable energy development. This includes how solar farms and BESS may impact the landscape and bushfires, and whether a suite of risk mitigation measures can be developed and maintained to reasonably manage risk.

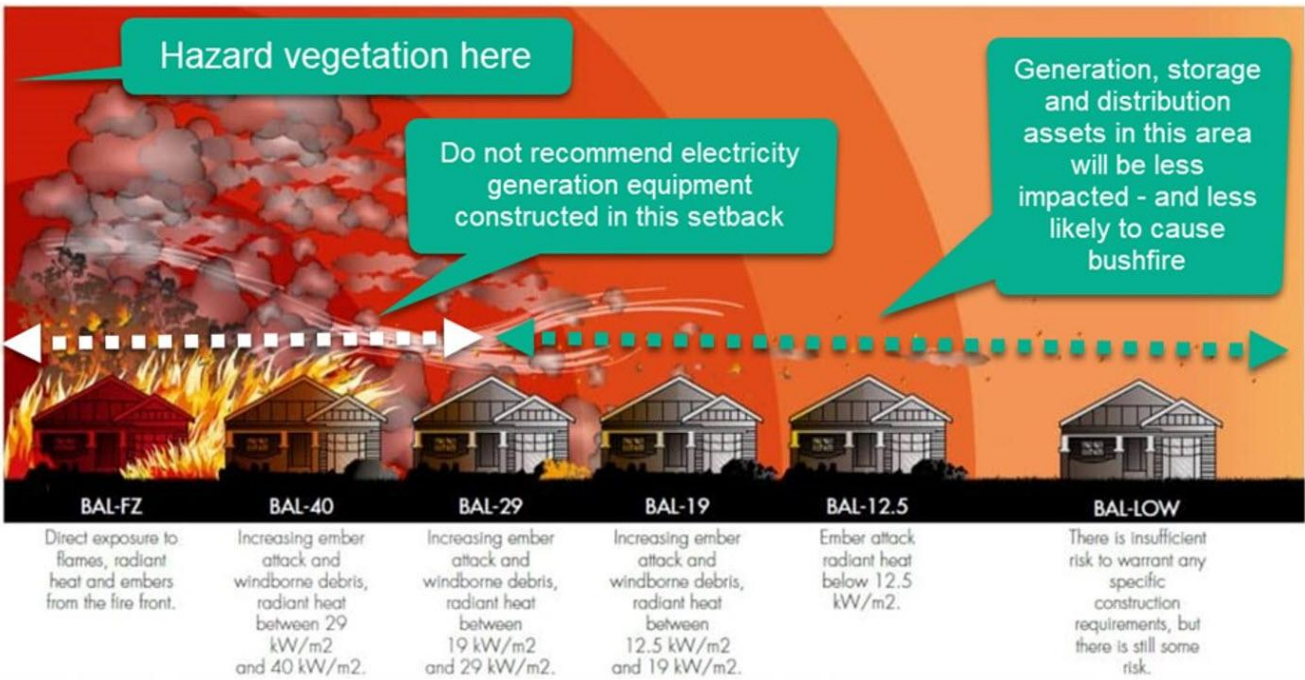
There appears to be little actual data on the impact of wildfires on solar farms at this stage, largely due to the recent nature of the industry and limited reporting or literature on the impact of bush and grass fires on existing solar farms. Grassland areas result in quicker fires with much shorter “dwell” or “residence” times compared to forest fires. The fires move fast and burn off most of the fuel immediately rather than forest fires that may burn much hotter and longer. Forest fires also give off considerably more embers which can also travel further. This supports the proposition that suitable APZ, a well developed Bushfire Emergency Management & Operations Plan (BEMOP), onsite first response firefighting capability, and access to water supplies will be able to manage bushfire risk to the Project and limit risk to acceptable levels.

Similarly, there is no data suggesting that solar farms have been a source of bushfire ignition in Australia to date. Any electrical equipment, including solar panels, can potentially pose a fire risk if they malfunction or if there are issues with maintenance or installation. Risk mitigation measures will significantly reduce any chance of bushfire ignition and include:

- ongoing management of Project Area to APZ standard (except in retained vegetation areas),

- the use of APZ that exceed the PBP standards (10m) and instead relate to modelled standards (BAL-29 standard – 10-25m),
- ongoing site staff presence for bushfire awareness and initial suppression,
- permanent firefighting water supplies,
- automatic fire detection and suppression systems to power generation industry standard as a minimum.

Fire intensity can be calculated and is typically measured in the radiant heat flux generated kW/m<sup>2</sup>. With respect to bushfires this provides a very good surrogate for the other bushfire attack mechanisms including direct flame contact, convective and conductive heat exposure, potential intense winds generated, impacts of windborne debris, impacts of burning debris and embers, and the impacts of smoke. Figures 14-15 are presented to provide greater clarity on bushfire attack mechanisms and the impacts of radiant heat. The Bushfire Attack Levels (BAL) introduced in the figures below will be discussed further within the report. The distances to meet the relevant BAL standard vary as function of the combination of design fire weather, vegetation and slope and are determined in accordance with PBP and the *Australian Standards for Construction of Buildings in Bushfire Prone Areas AS3959:2018 (AS3959)*.



**Figure 14: Bushfire attack mechanisms and relation to radiant heat levels and BAL construction standards (adapted from AS3959:2018)**

Radiant heat flux kW/m <sup>2</sup>	Observed effect
1	Maximum for indefinite skin exposure
3	Hazardous conditions, firefighters expected to operate for a short period (10 minutes)
4.7	Extreme conditions, firefighters in protective clothing will feel pain after 60 seconds of exposure
6.4	Pain after 8 seconds of skin exposure
7	Likely to be fatal to unprotected person after exposure for several minutes
10	Critical conditions, firefighters not expected to operate in these conditions although they may be encountered. Considered to be life threatening in less than 60 seconds in protective equipment. Fabrics inside a building could ignite spontaneously with long exposure.
12.5 (BAL-12.5)	Volatiles from wood may be ignited by pilot after prolonged exposure. Standard float glass could fail during the passage of a bushfire.
16	Blistering of skin after 5 seconds
19 (BAL-19)	Screened float glass could fail during the passage of a bushfire.
29 (BAL-29)	Ignition of most timbers without piloted ignition (3 minutes of exposure) during the passage of a bushfire. Toughened glass could fail.
40+	Flame zone – exposure to direct flame contact from fire front.

**Figure 15: Radiant heat effects (Drysdale 1999; RFS 2006; CFA 2012)**

Electrical engineering peak bodies (Figure 16) and network operators (Figure 17) have provided additional guidance regarding the tolerance of reliance levels of various components that may be exposed to bushfire radiant heat impacts.

Based on consideration of these relevant standards, and in discussion with the developers, it is considered that the BAL-29 standard APZ will provide an acceptable level of risk mitigation to assets, minimising damage and impact on operations and business continuity. This also recognises that as radiant heat flux reduces sharply with distance, assets further away from the bushfire vegetation will receive higher levels of protection from failure.

Minimum BAL-29 APZ standards will therefore be applied from the outer edge of all built Project components. This will also provide an increased standard of protection to the existing dwellings that are being repurposed onsite.

The provision of APZ wider than required by PBP will also provide a greater buffer to surrounding vegetation in the unlikely event of an ignition occurring onsite. The wider APZ will contain in part the trails required to install, maintain and replace solar farm components and will meet and/or exceed the standards for fire tanker access required in PBP.

Heat flux thresholds for electrical substations can be applied to all electrical infrastructure associated with the Project (Table 4-2). WTGs may be considered "unprotected metal" and incur damage with a heat flux of 30 kW/m<sup>2</sup>.

Table 4-2 Radiant heat flux level and damage

Impact of radiant heat flux	Heat flux (kW/m <sup>2</sup> )
Sufficient to cause damage to process equipment	37.5
Equipment failure	35
Damage to unprotected metal	30
Spontaneous ignition of wood	25
Cable insulation degrades	20
Pilot ignition of wood	12.5
Plastic melts	12.5
Pain threshold reached after 8 s	9.5
Second-degree burns after 20 s	
Possible failure of ceramic bushings	5
Skin burns	5

*Reproduced from IEEE Std 979-2012: IEEE Guide for Substation Fire Protection*

Figure 16: Radiant heat flux level and damage (IEE Std 979-2012)

A typical radiant heat / temperature duration curve applicable to bushfires would be as follows:

- Peak values are reached after 1 minute;
- Values remain at peak for up to 4 minutes; and
- Values recede to ambient linearly over a further 5 minutes.

Refer to Table 3 for limiting radiant heat flux levels for determining minimum safe separation distances. For bushfires, the **NSW RFS PBP** is the key reference document in establishing the maximum bushfire intensity at a given location. A flame front length equal to the approach boundary length is to be assumed and a flame height based on the PBP shall be used in calculations.

**Table 3 – Radiant Heat Exposure Limits for Bushfires**

Item	Maximum allowable radiant heat flux (kW/m <sup>2</sup> )	Comment
Cable	12.5	PVC Cables begin to distort and may ignite.
	20	Ignition of XLPE cables between 85 and 550 seconds.
Steel support structure	35	To 60% of yield strength after a maximum duration of 5 minutes. 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 2.
Polymeric bushing/insulators	>30	Damage may occur requiring replacement or in extreme case resulting in catastrophic failure. See Note 2.
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 1)	Refer to above regarding bushings and cables.
Combustibles	12.5	Piloted ignition may occur on timber.

**Note 1.** Transformers always have some more vulnerable components such as bushings and cables etc. Refer to Clause 7.2.

**Note 2.** Detailed information on radiant heat exposure limits is not available. However in-service applications exposed to bushfire indicate a high radiant heat limit and a low risk of damage or failure.

The radiant heat limits provided in Table 3 are applicable to identified critical substation structures and HV components. Critical elements are those deemed to be essential for return to service following a bushfire event.

The location of critical substation elements, their sensitivity to radiant heat and their ease of replacement will all impact upon the potential Asset Protection Zone (APZ) required at a given substation.

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

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

**Figure 17: Extract from Ausgrid NS187 Passive Fire Mitigation Design of Major Substations**

The total prevention of bushfires is not possible, and neither is the protection of all assets. What is common when considering all these scenarios are the overarching common goals to prevent bushfire ignitions, design and prepare to facilitate effective bushfire suppression where possible, reduce the likelihood of bushfire spread on the property, and focus on protecting human life where suppression is no longer possible. It is likely that the risk of a solar farm or BESS igniting a bushfire is very small given the suite of risk mitigation measures.

Larger than required APZ proposed for the Project Area both protect the solar farm assets from bushfire and also reduce the chance of any ignition caused through electrical failure from spreading or developing into a bushfire. The presence of permanent trained staff and bushfire prevention protocols will significantly reduce the chance of any ignition spreading. The accommodation camp is surrounded by infrastructure, construction area and APZ as required. The proposed APZ are shown as Figures 19-22.

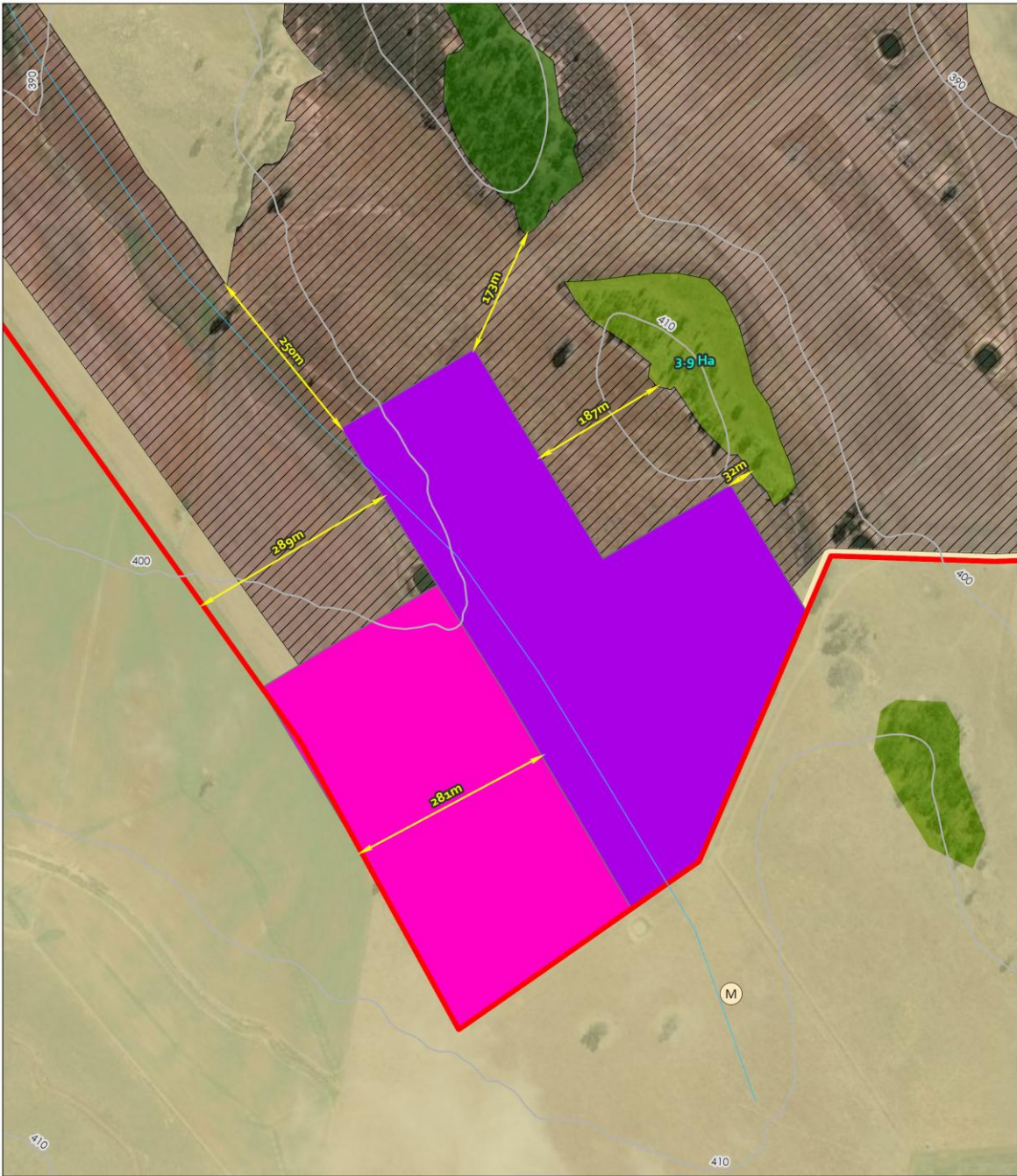
Permanent trained staff onsite will be an additional resource to see, report, and potentially provide an initial bushfire response to fires caused by lightning strikes and other typical ignitions in the local area, reducing the likelihood or impact of bushfires in the wider local area.

The single axis tracking frames are of heavy duty steel construction and are likely to be highly resistant to bushfire attack, with typical industry standard panels designed for extended operation in the field. The only vegetation underneath the arrays and generally within the development footprint overall will be grassland that is maintained to the required APZ standard, effectively 'managed land'. The APZ standards have some flexibility for practical purposes and are shown in Appendix 3. It is understood that key cabling for the system will be provided underground.

The substations will use well established setback distances (APZ) and are typically surrounded by gravel hardstand to aid construction and servicing. The BESS will similarly be surrounded by the substation to the west; the solar arrays to the west, north and east; and the Elong Elong Energy Hub to the east and south. This effectively provides setbacks of a minimum of **32m up to 250m+** that will be managed land maintained to APZ standards or higher (Figure 18). The nearest retained bushland to the BESS is 32m away from the edge of the BESS site. This is an isolated 3.9ha section of retained woodland.

This layout around the BESS and substation will provide very significant protection against any potential fire escape into the bushland should there be an ignition in the substation or BESS, and provide substantial areas to locate water supplies, for firefighting operations and for access. Additionally, the transmission lines extending from the substations to the high voltage grid connection point at the Elong Elong Energy will be maintained to APZ standards.

There is no cumulative impact on bushfire risk if other solar farms are developed to similar standards, other than a larger area of managed land in the wider landscape.



**Legend**

- contour - 10m
- Watercourse
- Project Area
- BESS 400MW
- Main substation
- Solar array area

**Vegetation Formation**

- Dry Sclerophyll Forests (Shrubby subformation)
- Grasslands
- Grassy Woodlands
- Managed Land



Date: 28/02/2025

0 0.1 0.2

Kilometers

Coordinates: GDA 1994 MGA Zone 55  
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**Figure 18: BESS setbacks - Elong Elong Energy Hub (managed land) to the south and east of BESS**

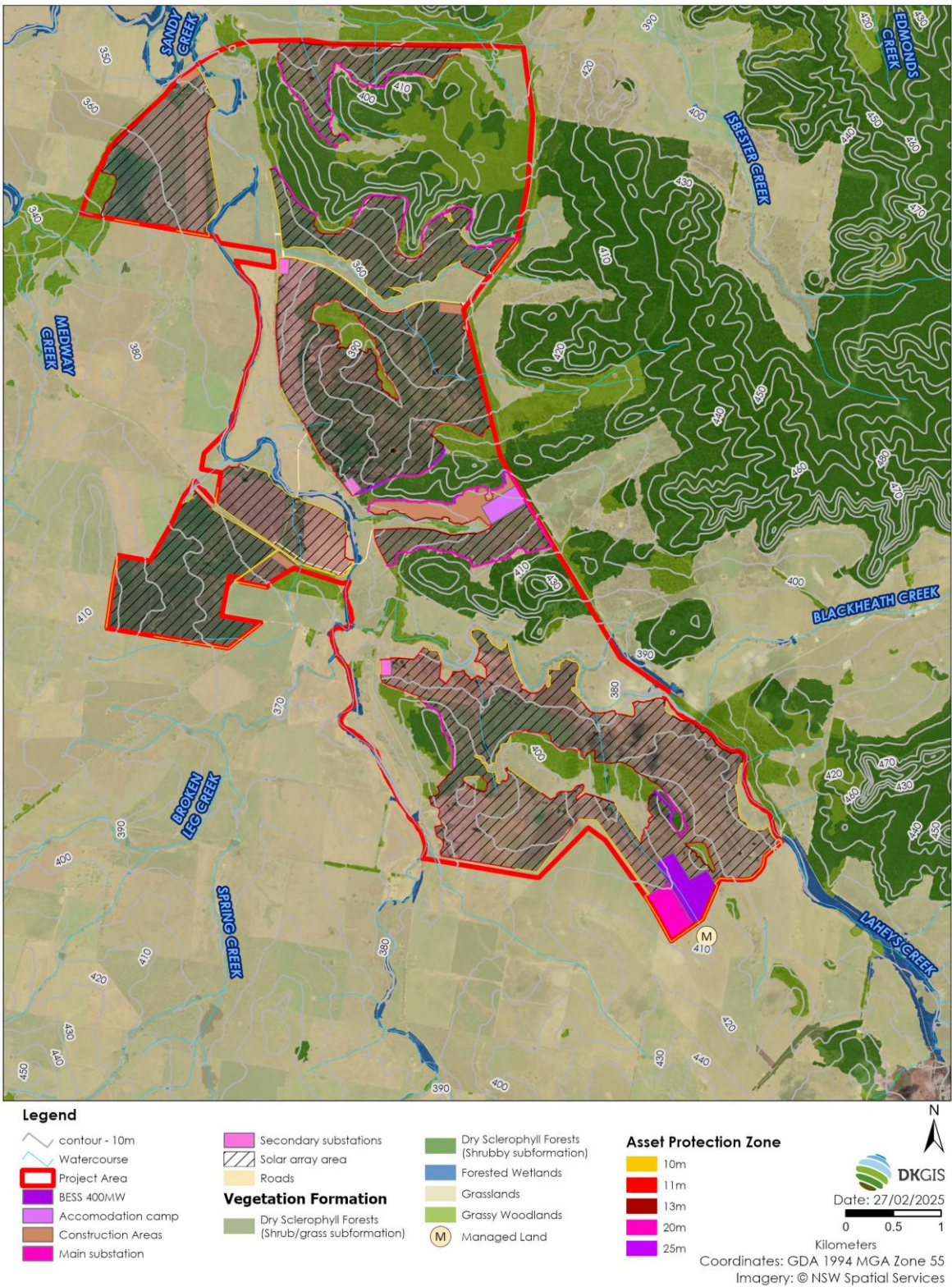
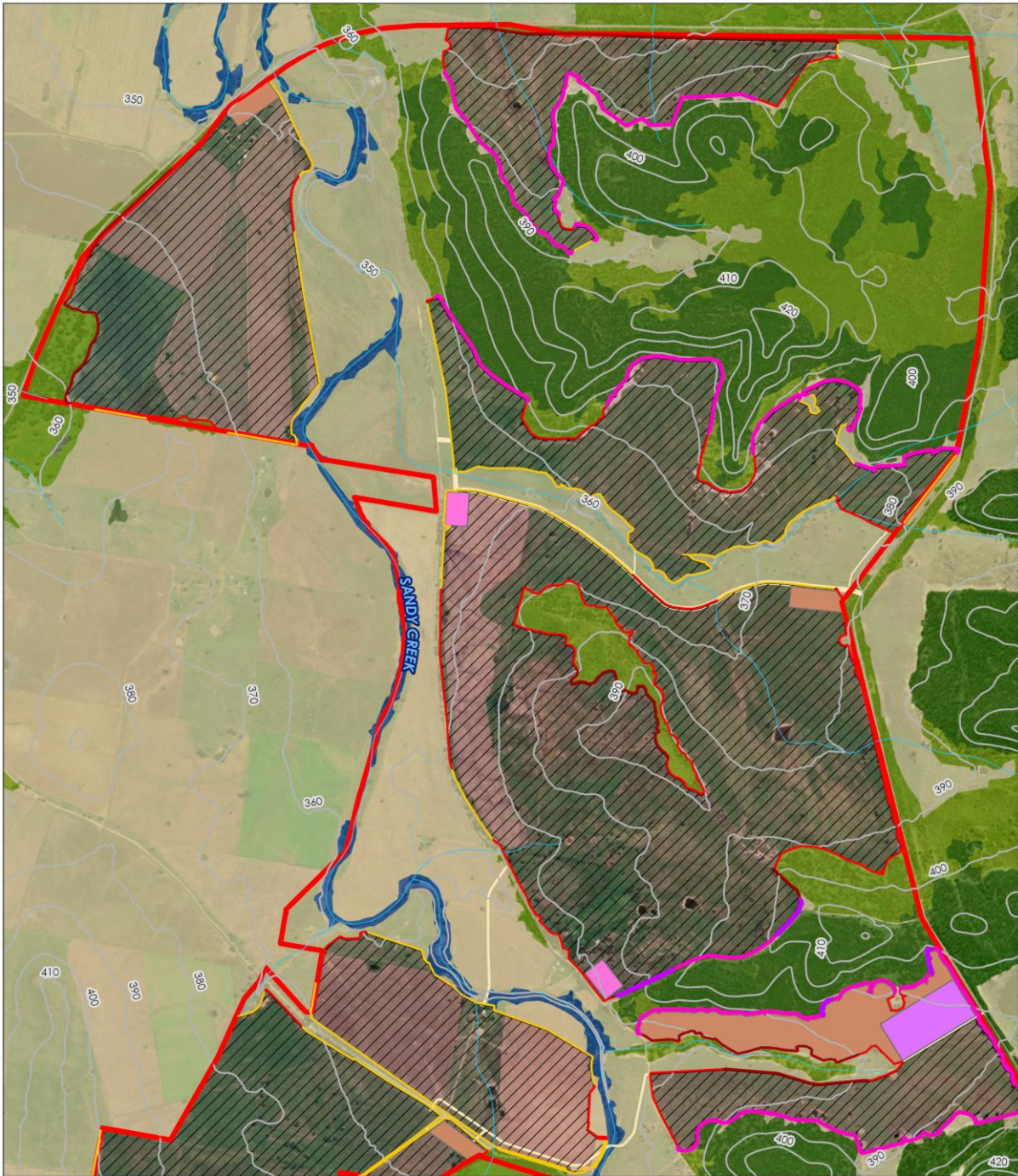


Figure 19: Asset Protection Zones – overall Project Area



**Legend**

- contour - 10m
- Watercourse
- Project Area
- BESS 400MW
- Accomodation camp
- Construction Areas
- Main substation
- Secondary substations
- Solar array area

- Roads**
- Roads
- Vegetation Formation**
- Dry Sclerophyll Forests (Shrub/grass subformation)
  - Dry Sclerophyll Forests (Shrubby subformation)
  - Forested Wetlands
  - Grasslands
  - Grassy Woodlands

- Asset Protection Zone**
- 10m
  - 11m
  - 13m
  - 20m
  - 25m

N

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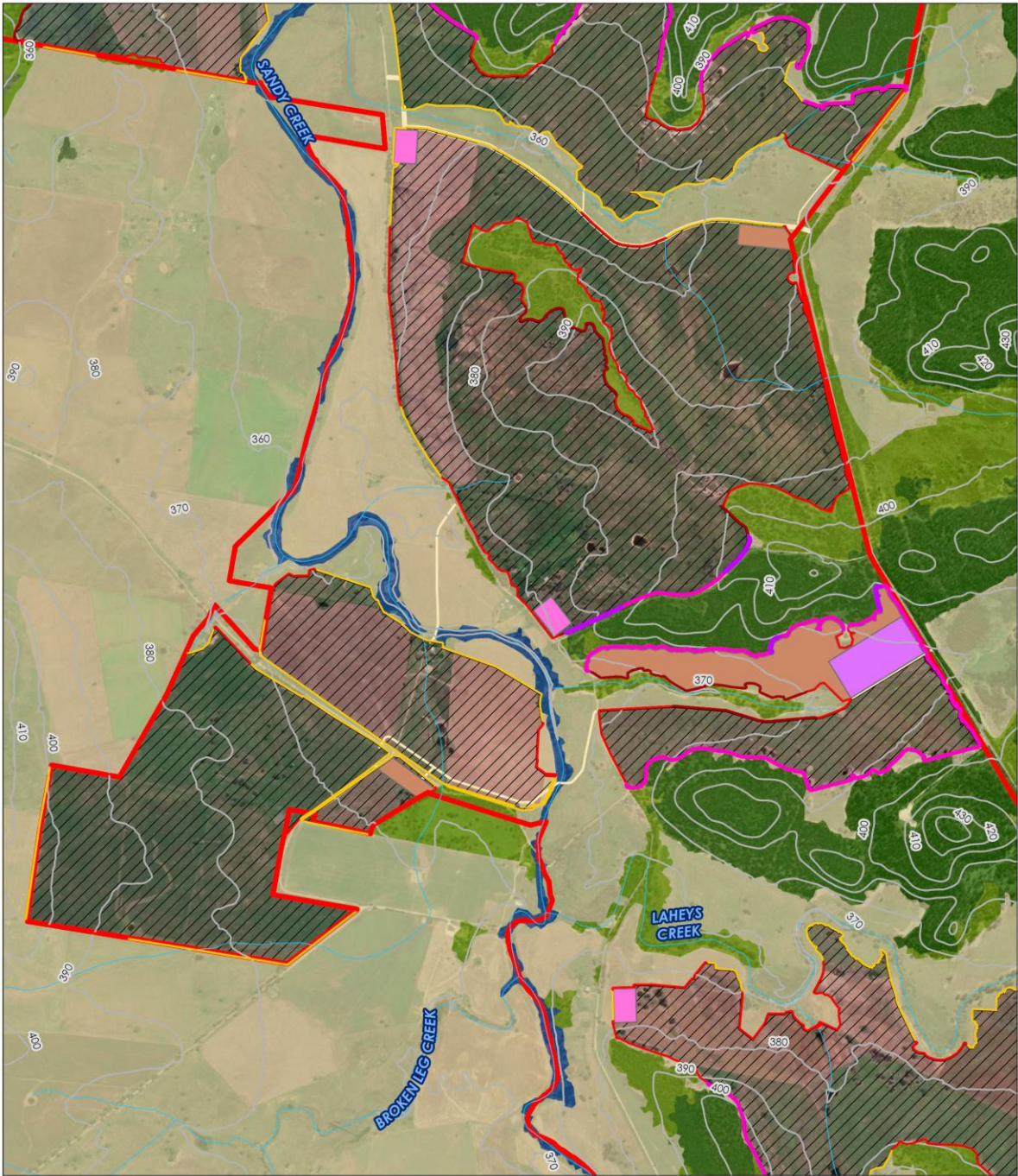
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Kilometers

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**Figure 20: Asset Protection Zones - northern area**



**Legend**

- contour - 10m
- Watercourse
- Project Area
- BESS 400MW
- Accommodation camp
- Construction Areas
- Main substation
- Secondary substations
- Solar array area

- Roads**
- Roads
- Vegetation Formation**
- Dry Sclerophyll Forests (Shrub/grass subformation)
  - Dry Sclerophyll Forests (Shrubby subformation)
  - Forested Wetlands
  - Grasslands
  - Grassy Woodlands

- Asset Protection Zone**
- 10m
  - 11m
  - 13m
  - 20m
  - 25m

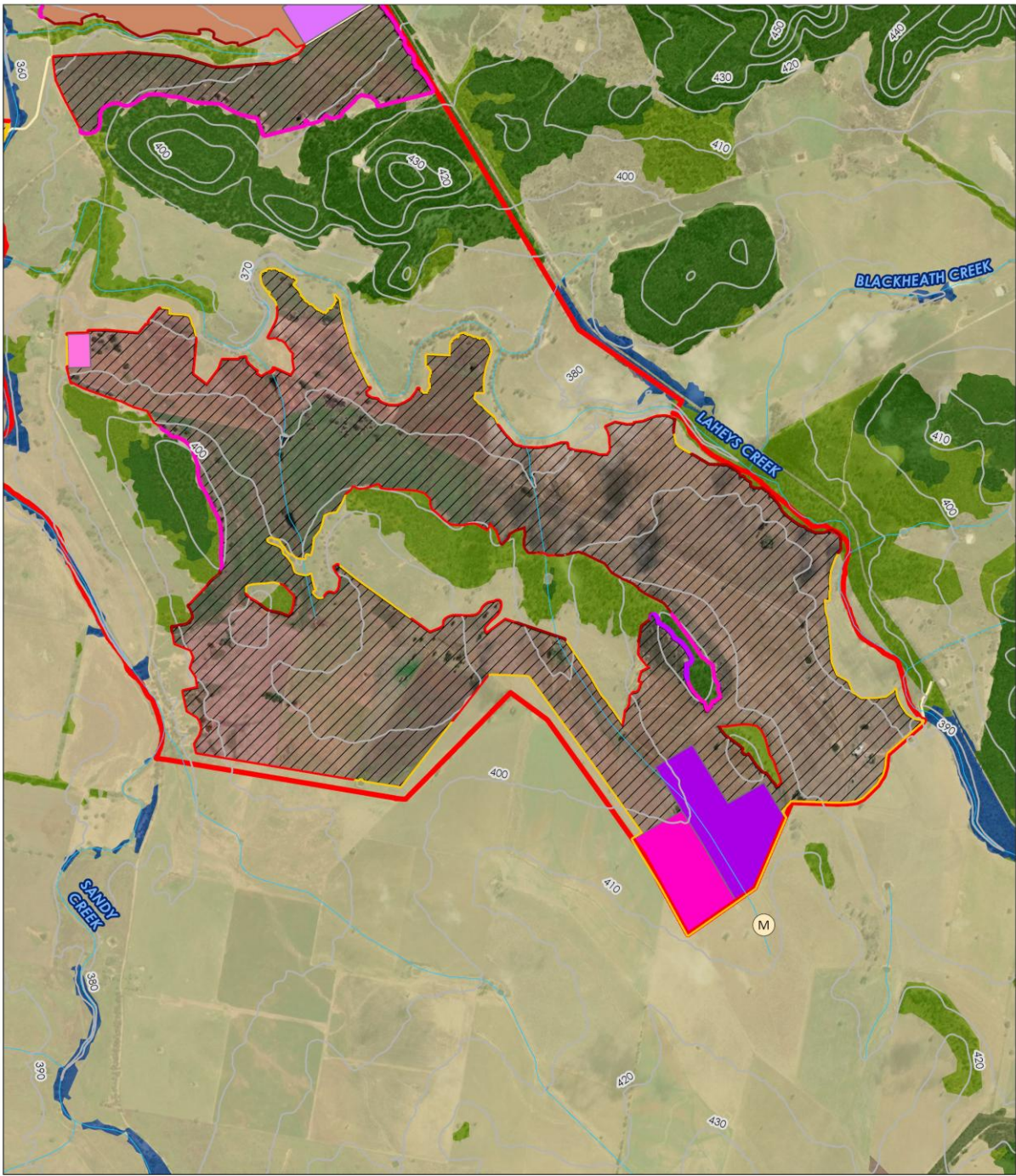


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Kilometers  
Coordinates: GDA 1994 MGA Zone 55  
Imagery: © NSW Spatial Services

**Figure 21: Asset Protection Zones - central area**



**Legend**

- contour - 10m
- Watercourse
- Project Area
- BESS 400MW
- Accommodation camp
- Construction Areas
- Main substation

- Secondary substations
- Solar array area
- Roads

**Vegetation Formation**

- Dry Sclerophyll Forests (Shrub/grass subformation)
- Forested Wetlands
- Grasslands
- Grassy Woodlands
- Managed Land

**Asset Protection Zone**

- 10m
- 11m
- 13m
- 20m
- 25m

N

Date: 27/02/2025

Kilometers  
Coordinates: GDA 1994 MGA Zone 55  
Imagery: © NSW Spatial Services

**Figure 22: Asset Protection Zones - southern area**

## 9. Compliance with Planning for Bushfire Protection 2019 (PBP)

The **aim** of PBP (p. 10) is:

- *to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.*

The **objectives** (PBP p. 10) are to:

- *Afford buildings and their occupants protection from exposure to a bushfire*
- *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 Bushfire Protection Measures; and*
- *Ensure that utility services are adequate to meet the needs of firefighters*

The current planning and building systems are primarily based around the protection of assets/buildings through a combination of bushfire protection measures (BPM) to achieve an acceptable risk mitigation outcome, remembering it is rarely possible to reduce risk entirely in the Australian landscape.

Combinations of BPM are used to achieve acceptable outcomes for different types of development at different sites and provide some flexibility to satisfying the aim and objectives of *Planning for Bushfire Protection 2019* (PBP) which is the key NSW document managing bushfire risk mitigation in new development. The BPM are shown in Figure 23. Appropriate combinations depend upon geographic location, development type and site circumstances.

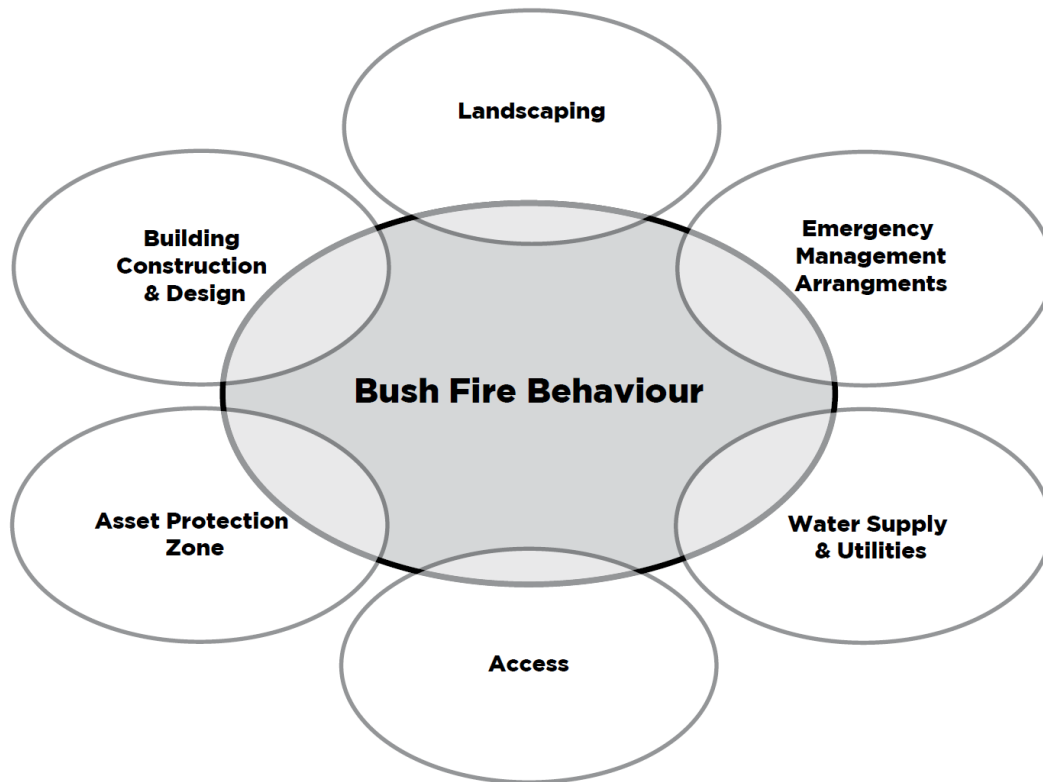


Figure 23: Bushfire protection measures in combination (PBP p.26)

PBP addresses the specific considerations and requirements for solar farms in Section 8.3.5 (p. 77):

*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:*

- A minimum **10m APZ** for the structures and associated buildings/infrastructure; and
- The APZ must be maintained to the standard of an IPA for the life of the development.

*Infrastructure for the purposes of requiring APZ excludes:*

- road access to the site; and
- 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 bushfires on the capabilities of the infrastructure during bushfire emergencies. It should also be designed and maintained so that it will not serve as a bushfire risk to surrounding bush.*

A Bush Fire Emergency Management and Operations Plan (BEMOP) should be prepared for the development that identifies all relevant risks and mitigation measures associated with the construction and operation of the 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; and
- Appropriate bushfire 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 RF Act s.99.

The 10 metre APZ as prescribed by PBP is a general requirement and does not factor in the criticality of infrastructure and the associated tolerable risk of radiant heat at those assets. The tolerable level of radiant heat exposure to the critical infrastructure and assets will need to be determined by the Proponent during the detailed design phase. The proponent understands that this BTA uses a Bushfire Attack Level of  $<29\text{kW/m}^2$  (BAL-29) as the basis of assessment for this Project. The Project design currently works on meeting and mapping BAL-29 standard APZ, however APZ will not be finalised until detailed design stage. Should the ultimate project APZ not meet BAL-29, however meet the requirements of PBP, the Proponent has formally accepted the higher risk tolerance to their assets.

A much higher standard of radiant heat reduction has been applied to the Project, with the BESS having an effective APZ of **32-250+m** and all other infrastructure having a maximum level of BAL-29 which provides a varying width of **11-25m APZ** around the remaining Project infrastructure. The methodology used is consistent with PBP and AS 3959 and is detailed in Section 8.9 above.

With the significantly larger APZ recommended and the size of the Project that will be 'managed land', approximately 85% of the solar farm infrastructure is more than 100m from BPL.

The BEMOP will be informed by the forthcoming Fire Safety Study, any specific consent conditions, RFS doctrine and the RFS *Guide to developing a Bushfire Emergency Management and Evacuation Plan* (2014). Table 4 provides a summary of PBP Section 8.3.5 compliance.

**Table 4: Summary of compliance with PBP Section 8.3.5 (p77)**

PBP 8.3.5 requirement	Comment	Complies?
<p><b>A minimum 10m APZ for the structures and associated buildings / infrastructure;</b></p>	<p>The Project is provided with APZ well in excess of 10m, with the majority of Project Area maintained to APZ standards, with the exception of native vegetation areas retained onsite. and remaining areas of outside developed footprint are maintained to typical rural standard through slashing and grazing, or as small areas of retained vegetation. Modelled APZ to meet or exceed BAL-29 standards:</p> <ul style="list-style-type: none"> <li>• BESS – <b>32-250+m</b></li> <li>• Substation – minimum <b>25m</b></li> <li>• Solar arrays &amp; related infrastructure – <b>11m – 25m</b></li> </ul>	<p>Yes</p>
<p><b>The APZ must be maintained to the standard of an Inner Protection Area (IPA) for the life of the development</b></p>	<p>The Project will be continually maintained to IPA standard as part of normal operations. This can be conditioned and will be part of the Bushfire Emergency Management &amp; Operations Plan (BEMOP).</p>	<p>Yes</p>
<p><b>Essential equipment designed and housed to minimise impact of bushfires, and to not serve as a bushfire risk.</b></p>	<p>All infrastructure designed and sited to reduce impact of bushfires, and to prevent bushfire risk. Larger than required APZ, hardstand areas around critical components, numerous access roads internally, initial attack firefighting capability and water supplies provided on Project Area.</p>	<p>Yes</p>
<p><b>Detailed BEMOP to be produced</b></p>	<p>This will be developed as part of the next Project stage and will be key tool for use during construction and ongoing operations. A Bushfire Emergency Response Plan (BERP) will be a sub-plan of the BEMOP.</p>	<p>Yes</p>
<p><b>Comply with Total Fire Ban Day (TOBAN) requirements under RF Act s.99</b></p>	<p>All construction and operations will be conditioned to comply with TOBAN requirements.</p>	<p>Yes</p>
<p><b>Comply with PBP Aim &amp; Objectives (p.10)</b></p>	<p>Project has been developed to incorporate a suite of bushfire risk mitigation measures that are designed into the layout and include consideration for ongoing maintenance of all bushfire protection measures and incorporation into local bushfire planning.</p>	<p>Yes</p>

## 10. Assessment and mitigation of potential impacts

This section provides consideration of the potential impacts that may occur throughout the development, operation and decommissioning of the site and relevant mitigation measures. Impacts are mitigated through Project design where possible. The key potential impacts relating to bushfire for the Project include:

- On-site ignitions which may result in a fire escaping to the surrounding land causing damage to assets associated with the Project or external to the Project Area;
- Occupational fire risk being the risk of workers being caught by out-of-control bushfire impacting the Project Area or while using the access and egress routes;
- Access is impacted by bushfire preventing firefighting resources reaching the site or preventing evacuation of workers;
- Access to firefighting water supplies are impacted by bushfire;
- Disruption to power supply; and
- Loss of critical infrastructure.

### 10.1. On site ignitions

Project activities at each stage may pose risks for on-site ignitions which may result in a fire escaping to the surrounding land. These mainly arise from hot work, fire risk work, vegetation clearing and management and use of vehicles on site. All electricity infrastructure (including generation and distribution) also has the potential to generate ignition where equipment failures occur.

Hot work (activities involving high temperatures) and fire risk work (activities involving heat or with the potential to generate sparks) from maintenance activities may cause fire ignition. These works will be managed under a Hot Work and Fire Risk Work procedure, with measures including suspension of activities on days of elevated fire danger. Certain maintenance activities, including hot works, are prohibited by law on any day declared to be a Total Fire Ban (TOBAN). Essential work during operations may be completed on a TOBAN providing it complies with the Hot Work and Fire Risk Work procedure and any exemption provided by the NSW RFS. Maintenance and operation of the electrical generation and transmission infrastructure must take into account any potential for ignition of surrounding vegetation and take measures to remove the risk or mitigate it by modifying practice, avoiding certain work on TOBAN days and providing suitable firefighting resources (e.g. extinguishers on all vehicles).

All land managers have responsibilities to prevent the occurrence and spread of fire on or from their land. Escaped fire may result in legal action and punitive damages. Reputational risk is an issue to be

managed to ensure that Project operators do not initiate an out-of-control fire that impacts surrounding assets and values.

## 10.2. Disruption to power supply if the site is impacted by fire

Uncontrolled bushfire has the potential to impact the Project and damage or destroy critical infrastructure to an extent that may result in the disruption of power transmission from the Project and cause power outages. Electricity operation measures to limit damage in one area affecting overall operations will be considered in the detailed design phase. This is supported by more detailed bushfire mitigation measures including final APZ, water supply capacity and locations, first attack firefighting capability onsite and other details to be included in the BEMOP.

## 10.3. Occupational bushfire risk management

The key risk management activity to avoid occupational risk during all phases of the Project would be to not expose people to unreasonable risk if that can be avoided. The most effective way to reduce the risk for loss of life is to not occupy the Project Area on above established thresholds for FFDI (such as TOBAN) and/or with fires within the surrounding landscape. This would need to occur with an understanding of the evacuation time from the Project Area and potential for fire to burn through the evacuation roads. This forms part of the BEMOP.

Due to the relatively remote location of the Project Area, it is recommended that non-essential works be postponed on days with FFDI of Extreme or greater. This will reduce the risk to personnel by out-of-control bushfire impacting the site or access and egress routes.

The Project initially involves clearing and construction of the Project Area, and then ongoing operation and maintenance works. Throughout these stages, the Project will consider the safety of staff and contractors, and any attending emergency service workers in the event that a bushfire impacts the Project Area.

A Bushfire Emergency Response Plan is a sub-plan of the BEMOP and should provide the following based on final designs and consent conditions:

- Addresses foreseeable on-site and off-site fire events
- Confirmation of acceptable access and emergency access provisions
- Evacuation triggers and protocols (evacuate or shelter in place)
- Confirmation of water supplies and accessibility and any other response/protection measures
- Suppression response strategies and tactics, including aerial suppression options/management
- Clearly state work health safety risks and procedures to be followed by fire-fighters, including

- Personal protective clothing
- Minimum level of respiratory protection
- Minimum evacuation zone distances
- Any other risk control measures required to be followed by fire-fighters
- Identify stakeholders (emergency response agencies, contractors, neighbours)

Contact should be made by the Project Area operator with the Local BFMC to establish emergency management procedures with relevant authorities for the safety hazards presented by the Project. The development of the BEMOP and The operator of the Project should brief the local volunteer fire brigades and neighbouring farmers at appropriate intervals on safety issues and procedures.

## 10.4. Construction standards

All new building construction onsite will be required to meet contemporary PBP and AS3959 standards. This will be assessed as required at the detailed design stage of the Project.

## 10.5. Access standards

The nature of the project requires road and track construction and upgrades to allow access by heavy rigid and articulated vehicles. These roads are suitable for operation of RFS tankers which are typically medium rigid vehicles. All internal tracks and trails are to be maintained to a minimum standard suitable for Category 1 Tanker operation per the RFS NSW *Fire Trail Standards (2023)*.

## 10.6. APZ Maintenance and land management

Ongoing vegetation management would be in accordance with Operational Vegetation Monitoring and Management Procedures which would include routine inspections of the Project. Ongoing management would fall under an inspection and maintenance program, which would include identification, recording, prioritisation and rectification of shortfalls. These vegetation management standards are essential to maintain the safe and effective functioning of the transmission connections, and to minimise the risk of fire ignition from vegetation coming into close proximity to the Project.

APZ are shown on Figures 19-22 and Project infrastructure areas within the perimeter APZ will also be maintained to a minimum APZ standard, therefore approximately 1,600 ha will be maintained to the APZ standard on the Project Area. APZ will be managed in accordance with Appendix 4 of PBP RFS *Standards for Asset Protection Zones* to provide minimal ground fuel to support a fully developed

bushfire. Vegetation maintenance will be undertaken with regard to potential ignitions on days of elevated FFDI.

APZ will be permanently delineated using signage and fences or marker posts to ensure future staff and contractors manage the required areas. Areas on site that will not be developed for Project infrastructure and are not retained native vegetation will be maintained as typical rural area grasslands through slashing and/or grazing.

## 10.7. Firefighting water supply

The size, scale and type of development will require multiple onsite locations for suitable firefighting water supply to be maintained. These details will be finalised as part of the BEMOP process and may include multiple 20,000 l water supply tanks at each access and key infrastructure locations. Water carts required during construction and operations shall be required to have fittings capable of providing supply to emergency services.

Firefighting tactics and effectiveness are limited in large part by the availability of water supply. This is of particular importance in isolated rural areas as RFS Category 1 tankers carry only 3500 litres, and smaller units considerably less. The ability to quickly refill is critical, particularly when undertaking first response attack before a fire develops or during property protection. The Project will be required to maintain multiple water supplies onsite in compliance with RFS requirements. As part of the overall community benefit these water supplies could also be available in the event there is a house fire or shed fire in the local area not associated with a bushfire. Details to be determined at detailed design stage and integrated with forthcoming Fire Safety Study required by NSW Fire & Rescue.

## 10.8. Emergency management

A comprehensive Bushfire Emergency Management and Operations Plan (BEMOP) will be completed for the construction and operational phase of the Project incorporating schedules for maintenance. A Bushfire Emergency Response Plan (BERP) will also be developed to provide guidance and triggers for actions should an incident occur on or near the Project Area. This is a sub-plan of the BEMOP. These will be developed in cooperation with the builders and operators of the Project with input from local emergency management agencies.

The intent is to provide a well thought through response to a range of scenarios and provide clear actions for staff and contractors. These will be completed in alignment with NSW Rural Fire Service *Guide to Developing A Bushfire Emergency Management Plan*. On site and off-site evacuation procedures

would be included. The focus of the BEMOP is to put in place strategies that do not expose the workers to the effects of bushfire attack and focus on eliminating exposure to bushfire threat. This includes suitable procedures to minimise any ignition related to works conducted onsite and the first attack response to limit the risk of an ignition occurring onsite spreading to surrounding areas.

The secondary intent is to provide a clear understanding of emergency response procedures and a pre-incident plan to the local BFMCS, RFS Districts and local brigades such as Cobbora, Dapper, or Elong Elong RFS who are likely to be the initial response crews to fires in the area. As shown in Figure 24, there are approximately 20 RFS brigades within one hour of Project Area, including Dapper RFS at the southern access.

NSW Planning Portal Spatial Viewer

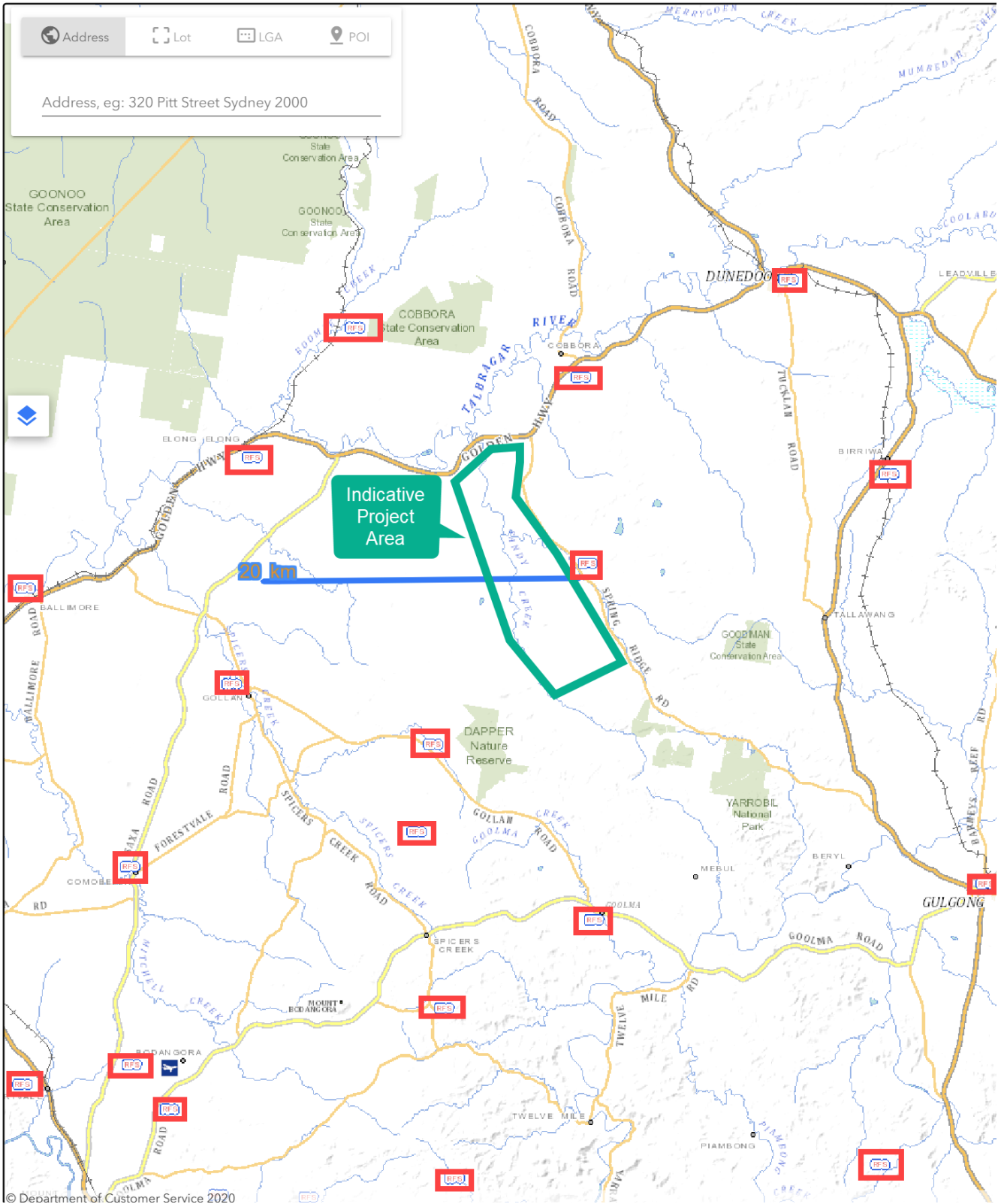


Figure 24: Location of RFS stations within approximate 60 minute response time

Figure 24 shows the location of the various RFS stations within an approximate 60 minute response time. It is acknowledged that RFS resources may be unavailable due to high levels of bushfire activity, however this demonstrates there are significant RFS resources potentially able to be deployed, and likely to be available for local scale fires. There are additional NSW Fire and Rescue resources in Dubbo. Dubbo airport is also a strategic location for aerial firefighting appliances.

As a significant landholder and employer, the Proponent would be part of the team developing and updating the BEMOP as the Project develops, including developing a suitable pre-incident plan with local emergency services. This should include clear signage, access arrangements, arrangements for emergency use of plant and equipment, vegetation management arrangements, improved bushfire surveillance, provision of firefighting water supplies and first attack response capability onsite, and communication arrangements during an incident.

As a major community partner, the Proponent also has the potential to explore telecommunication improvements locally related to the Project, and the use of technology such as automated remote bushfire sensing cameras to further protect the Project and the local community.

As discussed above, there is a very strong role for business fire planning, emergency management planning, specific bushfire planning, evacuation planning and links to various operational and development consent plans. All plans and administrative controls generally should be well understood by the workforce and communicated to both the district RFS office and to local brigades.

With a significant permanent number of staff and contractors working onsite there is a very strong opportunity to cross train these people for firefighting roles. Many of the skills are transferable and practical and they will know and understand the site better than most over time. Given the scale of the investment proposed it appears to be of significant direct benefit to purchase and maintain a minimum firefighting capability to be based out of the Project. In addition, there is value in discussing integration and interoperability arrangements with RFS, Forestry Corporation NSW and National Parks & Wildlife Service for improved overall fire management. There is a significant opportunity to embed staff into the local BFMC and future Incident Management Teams to ensure the most effective responses and understanding around new critical infrastructure.

During both construction and ongoing operations there is value in exploring shared use of additional earthmoving equipment, water carts and other plant should bushfires occur in the local areas.

There is a significant opportunity to develop a program to take advantage of the improved telecommunication infrastructure that comes with the cabling and telemetry required to manage the Project. This may include co-location of radio network infrastructure, new mobile telephony

opportunities and updated mapping for both forest management and fire management. Discussions regarding live streamed weather data from monitoring stations is a quick win, as is any ability to share new technology such as drones and remote sensing cameras able to identify and locate ignitions quickly and inform duty staff and combat agencies.

The Project may contribute to improving overall bushfire management of the surrounding forests.

The location of such a large area of continuously actively managed land also presents opportunities to provide the equivalent of an RFS "Neighbourhood Safer Place" (NSP) within the Project Area, using a suitable building onsite as a community bushfire refuge for staff and local residents if available. Given the likelihood that a refuge building will need to be provided for staff who may have to shelter onsite, it may be possible to work collaboratively to establish an NSP concurrently.

## 10.9. Bushfire risk created by the project

As with any major infrastructure development, the Project introduces potential bushfire ignition sources into the landscape. These may include:

- Heavy plant including bulldozers, excavators and vegetation removal machinery using slashers and mulching machines may 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 significant risk of ignition for cured vegetation.
- Electrical equipment faults may result in some risk of ignition of vegetation. These specific risks are managed through electrical design, operation and maintenance in accordance with relevant Australian Standards and best practice.
- Inappropriate storage of chemicals has the potential to cause a chemical fire or explosion. Failure to clean up a spill may also lead to fire. These specific risks are managed through storage and use of chemicals in accordance with relevant procedures and standards.
- Management of BESS is critical throughout the project to prevent or contain any fire risk from thermal runaway. These specific risks are managed through adherence with relevant design, operation and maintenance standards for the particular equipment. This is specifically considered by a separate Fire Safety Study for NSW Fire & Rescue to be completed at the next stage of Project design.

General risks associated with infrastructure construction, operation and decommissioning can be managed by limiting work on days of Extreme fire risk, maintenance of plant and equipment, good practice in accordance with the BEMOP, training and presence of first attack firefighting equipment can successfully mitigate risks.

Project and site specific bushfire risk can be managed through collaborative development of the BEMOP and implementing good emergency management procedures including an annual pre-season exercise of procedures. The BEMOP should be reviewed regularly and after any bushfire incident affecting the Project or wider local area.

## 11. Recommended Bushfire Risk Mitigation Measures

Environmental management for construction of the project would be carried out in accordance with a Construction Environmental Management Plan (CEMP). This would seek to avoid, to the greatest extent possible, risks to public safety and be developed to integrate with the BEMOP and sub-plans.

Table 5 provides a summary of recommendations to mitigate the risks of bushfire for the Project across the construction, operation and decommissioning phases.

**Table 5: Recommended Bushfire Risk Mitigation Measures**

ITEM	Mitigation Measure
Asset Protection Zones / Landscaping	<ul style="list-style-type: none"> <li>&gt; The Project Area would be managed as an APZ. At the commencement of construction the Project Area would be progressively managed as an APZ as outlined within Appendix 4 of 'Planning for Bushfire Protection 2019' and the NSW Rural Fire Service's document 'Standards for Asset Protection zones'.</li> <li>&gt; APZ will generally provide a maximum radiant heat flux to assets of &lt;math&gt;&lt;29\text{kW/m}^2&lt;/math&gt; however final APZ design will be determined during later project stages. Project boundary and /or perimeter fencing do <u>not</u> need to meet this standard.</li> <li>&gt; Non-developable areas maintained as native vegetation will be managed in accordance with any Vegetation Management Plan, and remaining non-developable areas will be managed to typical rural standards using slashing/grazing.</li> </ul>
Building Construction Standards	<ul style="list-style-type: none"> <li>&gt; Buildings would be constructed to appropriate BAL levels in accordance with PBP and AS3959. This will be refined during the detailed design phase.</li> </ul>
Firefighting Water Supply	<p>The following recommendations regarding water are provided:</p> <ul style="list-style-type: none"> <li>&gt; Due to the large expanse of the Project Area, a number of 20,000 litre tanks should be strategically located around the Project Area. Tanks shall be of non-combustible construction or suitably protected from bushfire attack. Consideration for location should include: <ul style="list-style-type: none"> <li>• Entry and exit points that are easily accessible in all weather conditions by heavy vehicles and clearly visible (sign posted); and</li> <li>• Nearby to critical infrastructure .e.g. BESS and substations.</li> </ul> </li> <li>&gt; Provision of firefighting water supplies (including heavy vehicle access to within 4.0m of the fittings) will be in accordance with PBP.</li> <li>&gt; Water carts used onsite shall have fittings capable of efficient resupply to firefighting vehicles.</li> </ul>

ITEM	Mitigation Measure
	<ul style="list-style-type: none"> <li data-bbox="357 264 1417 331">&gt; Consideration should be given to the installation of permanent drafting points (hydrant points with attached float device) at dams and creek crossings.</li> <li data-bbox="357 383 1417 483">&gt; Firefighting equipment will be provided, maintained and accessible to all site workers during the declared bushfire danger season, and permanent site personnel trained in its use.</li> <li data-bbox="357 535 1417 763">&gt; Equipment should be appropriate to the activities being conducted and the fire danger at the time of works, but as a minimum must include:               <ul style="list-style-type: none"> <li data-bbox="405 613 951 647">– Minimum 2 x Category 9 Light Tankers</li> <li data-bbox="405 658 1203 692">– Extinguishers, knap sacks and hand tools (e.g. rake hoes).</li> <li data-bbox="405 703 1286 763">– Radio communications suitable for both normal operations and communication with emergency services</li> </ul> </li> </ul>
Access	<ul style="list-style-type: none"> <li data-bbox="357 786 1398 887">&gt; All internal tracks and trails are to be maintained to a minimum standard suitable for Category 1 Tanker operation per the RFS <i>NSW Fire Trail Standards (2023)</i>.</li> </ul>
Emergency Management	<ul style="list-style-type: none"> <li data-bbox="357 907 1433 1043">&gt; A comprehensive Bushfire Emergency Management and Operations Plan (BEMOP) is to be developed with input from local emergency services. This is to include a Bushfire Emergency Response Plan (BERP) sub-plan and a Project Area specific pre-incident plan (PIP).</li> <li data-bbox="357 1095 1442 1196">&gt; The bushfire evacuation procedures would be completed in alignment with RFS <i>Guide to Developing A Bushfire Emergency Management and Evacuation Plan (2014)</i>.</li> </ul>

## 12. Conclusion

This Bushfire Threat Assessment has been completed for the proposed solar farm development taking into account the requirements of PBP and the Bushfire Emergency Management and Operations Plan to be developed, and in accordance with the SEARs issued for the Project. The Project is within Bushfire Prone Land and bushfire risk is a key consideration for the Project. The report has undertaken a landscape scale bushfire risk assessment and site-specific risk assessment. There is no cumulative impact on bushfire risk if other solar farms are developed to similar standards, other than a larger area of managed land.

The report demonstrates that the Project design approach has taken a substantially higher standard than is required with respect to the key considerations around BAL and provision of APZ. The Project meets and/or exceeds the NSW APZ requirements under PBP and has considered electricity transmission industry standards to demonstrate how impacts from bushfire can be mitigated, and conversely these measures provide very significant mitigation against any fire occurring onsite spreading to surrounding areas.

Key to the sustainable operation of the Project Area as a solar farm and BESS is developing a collaborative relationship with the local Bush Fire Management Committees and local RFS staff and brigades.

Appropriate measures can be developed to mitigate the bushfire risks from and to the Project Area and will be further refined during the detailed design phases to come. The Project Area is suitable for the development and operation of a solar farm and BESS.



David Lemcke | Senior Planner & Bushfire Specialist

**Blackash Bushfire Consulting**

B.A., Grad. Dip. Urban & Regional Planning; Master of Environmental Planning; Grad. Dip. Bushfire Protection; Adv. Dip. Of Public Safety (Emergency Management); Dip. Management



Lew Short | Principal

**Blackash Bushfire Consulting**

B.A., Grad. Dip. (Design for Bushfires); Grad. Cert. of Management (Macq); Grad. Cert. (Applied Management); Fire Protection Association of Australia BPAD Level 3 BPD-PA 16373



## Appendix 1 References

Ausgrid (2020) *NS187 Passive Fire Mitigation Design of Major Substations – NW000-S0007*

Councils of Standards Australia AS3959 (2018) *Australian Standard Construction of buildings in bushfire-prone areas*

Castlereagh BFMC (2013) *Castlereagh Bush Fire Management Committee Bush Fire Risk Management Plan.*

Department of Planning, Housing and Infrastructure (2022) *Large-Scale Solar Energy Guideline - <https://www.planning.nsw.gov.au/sites/default/files/2024-11/large-scale-solar-energy-guideline.pdf>*

EMM (2021) *Cobbora Solar Farm Scoping Report - <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-29491142%2120211110T024629.392%20GMT>*

Institute of Electrical and Electronics Engineers (2012) – *Guide for Substation Fire Protection 979-2012*

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

McAneney, J, Chen, K, (2004) 'Quantifying Bushfire Penetration into Urban Areas in Australia', *Geophysical Research Letters* <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2004GL020244>

NSW Rural Fire Service (2023) *NSW Fire Trail Standards*

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

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

NSW Department of Justice Office of Emergency Management (2018) *NSW Critical Infrastructure Resilience Strategy*

Orana BFMC (2020) *Orana Bush Fire Management Committee Bush Fire Risk Management Plan.*

## Appendix 2 Curriculum Vitae



# Curriculum Vitae

Lew Short

**Director BlackAsh Bushfire Consulting**

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### Summary

Lew is an experienced leader in the government and emergency sector. He has an intimate knowledge of the workings of government and how emergency service organisations operate. He is not only a technical expert but a practitioner who has deep industry knowledge.

Lew has extensive experience providing national leadership in building community resilience representing AFAC and the FPAA. Lew's technical expertise is in bushfire consequence management, risk assessment and mitigation, specifically the planning and design of new developments in high bushfire risk areas to comply with legislative and planning requirements.

Lew has worked with some of Australia's leading organisations including NSW Rural Fire Service, Country Fire Authority, Emergency Management Victoria, Lend Lease, Mirvac, Victorian State and Local Governments, Sydney Water Corporation, Great Lakes and Warringah Councils. Lew has a deep operational understanding of how fire works in the Australian landscape. He has multifaceted insight into how governments respond to this threat. Lew provides unique strategies to comply with regulatory requirements and safety outcomes.

Lew established and led the Community Resilience Group for the New South Wales Rural Fire Service (RFS). His areas of responsibility included land use planning, community engagement, education, vulnerable communities, bunkers, Neighbourhood Safer Places, business systems and projects, social media, integrated risk management and environmental management. He was responsible for the establishment, management and leadership of the development assessment function for the RFS at a State level where he was responsible for the assessment of over 80,000 development applications in Bush Fire Prone Areas.

### Areas of Expertise

- Landuse planning & consequence management
- Legal strategy, Land & Environment Court and Expert Witness
- Bushfire planning, design & construction requirements in accordance with National Standards
- Insurance threat, vulnerability and constraints assessments
- Bushfire Prone Mapping, hazard mapping and risk assessments
- Australian Standard AS3959 Construction of Buildings in Bushfire Prone Areas
- Bushfire Management Plans
- Alternative & performance based solutions
- Evacuation planning and implementation
- Technical and Strategic advice



### Qualifications / Accreditation

**BPAD Level 3** Accredited Practitioner  
Fire Protection Association of Australia

**Graduate Diploma of Bush Fire Design**  
University of Western Sydney, 2006

**Graduate Certificate of Applied Management**  
Australian Institute of Police Management, 2005

**Graduate Certificate of Management Macquarie**  
Graduate School of Management Macquarie University, 2001

**Bachelor of Arts, Resource and Environmental Management**  
Macquarie University, 1994

## Curriculum Vitae

David Lemcke

**Senior Planner & Bushfire Specialist**

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### Summary

David is an experienced bushfire, planning and land management professional with over 20 years in local government and 4 years as a private sector bushfire consultant. He has undertaken a wide range of development assessments and strategic planning projects in both regulatory and proponent roles. He was Central Coast Council's bushfire subject matter expert for over 15 years, including representation in the Land & Environment Court and numerous working groups. He has a deep understanding of contemporary, practical bushfire management from a range of perspectives due to decades of experience as a public land manager and a Rural Fire Service (RFS) volunteer, and now applies this expertise with a range of clients across the private and public sectors.

David has served as Council's staff representative on the Wyong and Central Coast Bushfire Management Committees since 2007 and was instrumental in developing and contributing to emergency management planning including preparation of Bush Fire Risk Management Plans, Fire Access & Fire Trail Plan, developing local policy and pre-incident planning, and delivering community engagement.

From 2010 he was the program manager for the Wyong Shire Council and then Central Coast Council (CCC) bushfire program. These programs won several awards, sponsored research and were renowned for innovation and improvement of local government bushfire management. The CCC program included management of over 220 fire trails, management of 275 mechanical Asset Protection Zones, Hazard Reduction burning, access management, environmental protection and community engagement using both contractors and internal staff teams.

David has been active in policy development at State level, being the Local Government NSW representative on numerous RFS policy committees including the Review of the Bushfire Environmental Assessment Code and delivering numerous conference presentations.

David is an active senior RFS volunteer, with over 21 years in the service, having been a field officer for 15 years.

### Areas of Expertise

- Rezoning and strategic bushfire studies
- Residential, commercial and industrial development assessment
- Infrastructure vulnerability and consequence management
- Bushfire planning, design & construction requirements in accordance with National Standards
- Bushfire Management Plans for large and small scale holdings
- Evacuation planning and implementation
- Technical and strategic advice
- Innovative policy development

### Qualifications

#### Graduate Diploma of Bushfire Protection

Western Sydney University, 2024.

#### Advanced Diploma of Public Safety (Emergency Management)

Australian Emergency Management Institute, 2015

#### Diploma of Management

Management Consultancy International, 2012

#### Master of Environmental Planning

Macquarie University, 2005

#### Graduate Diploma Urban & Regional Planning

University of New England, 2000

#### Certificate 2 Bush Regeneration

Blue Mountains TAFE, 2000

#### Bachelor of Arts (Geography)

University of New England, 1998

#### Rural Fire Service

Various foundational, technical, specialist and incident management qualifications  
2002 - current

## Appendix 3 – Asset Protection Zone Standards (PBP Appendix 4)

# APPENDIX 4

## ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

### A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website [www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au).

An APZ provides:

- › a buffer zone between a bush fire hazard and an asset;
- › an area of reduced bush fire fuel that allows for suppression of fire;
- › an area from which backburning or hazard reduction can be conducted; and
- › an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- › direct flame contact on the building;
- › damage to the building asset from intense radiant heat; and
- › ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

## A4.1.1 Inner Protection Areas (IPAs)

The 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 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

### Trees

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

### Shrubs

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

### Grass

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

## A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

### Trees

- › tree canopy cover should be less than 30%; and
- › canopies should be separated by 2 to 5m.

### Shrubs

- › shrubs should not form a continuous canopy; and
- › shrubs should form no more than 20% of ground cover.

### Grass

- › grass should be kept mown to a height of less than 100mm; and
- › leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

**Figure A4.1**

Typical Inner and Outer Protection Areas.

