

Bushfire Threat Assessment

Deniliquin Solar Farm

Prepared for
Clean Peak Energy



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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

Planning for Bushfire Protection 2019 Classification	Other Development – solar farm and BESS
NCC Classification	Class 8 & 10
Location	39 Hogans Lane, Deniliquin (Lot 2 DP778062)
Local Government Area	Edward River Council
Can this proposal comply with AS3959:2018	Yes – based on NCC classifications
Does this development comply with the requirements of <i>Planning for Bushfire Protection 2019</i>?	Yes – based on the detailed design phase
Does this development comply with the Aims and objectives of <i>Planning for Bushfire Protection 2019</i>?	Yes – based on the detailed design phase
Is the proposal for a State Significant Development (SSD)	No
Is referral to the NSW RFS required?	No
Is a Bush Fire Safety Authority (BFSA) required?	No
Assessment Framework	☒ <i>Planning for Bushfire Protection 2019</i> : ☒ Meets the deemed to satisfy provisions ☐ Alternate solution/ performance-based assessment

2. Glossary

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

Table 2. Glossary

Term	Definition
Asset Protection Zone (APZ)	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.
Bushfire Emergency Management & Operations Plan (BEMOP)	A plan developed during the detailed design phases to clearly detail bushfire protection measures and risk mitigation strategies to be undertaken on an ongoing basis to prepare for the eventuality of bushfires.
Bushfire Emergency Response Plan (BERP)	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.
Battery Energy Storage System (BESS)	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.
Bushfire	A general term used to describe fire in vegetation, includes grass fire.
Bushfire attack mechanisms	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.
Bushfire Attack Level (BAL)	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.
Bushfire Design Requirements	A separate design document to assist the master planning with requirements and specifications to provide compliance with PBP.
Bushfire prone land (BPL)	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.

Bushfire Hazard	Any vegetation that has the potential to threaten lives, property, or the environment.
Bushfire Threat	Potential bushfire exposure of an asset due to the proximity and type of a hazard and the slope on which the hazard is situated.
Development Footprint	The indicative developable area whereby Project Infrastructure (including access tracks and temporary construction support areas) would occupy.
Forest Fire Danger Index (FFDI)	FFDI provides a measure of the potential danger of a bushfire on a given day and location https://research.csiro.au/bushfire/assessing-bushfire-hazards/hazard-identification/fire-danger-index/
Hazard	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.
Likelihood	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'.
Managed land	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.
Mitigation	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.
Planning for Bushfire Protection 2019 (PBP)	NSW Rural Fire Service publication effective from 1 March 2020 which is applicable to all new development on bushfire prone land in NSW.
Project (the)	Construction, operation and decommissioning of the Deniliquin Solar Farm and BESS. The Deniliquin Solar Farm would be a large scale solar photovoltaic (PV) generation facility and BESS with associated infrastructure.
Project Area	Overall site area covers approximately 20.8 hectares.

Resilience	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
Risk	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.
Risk assessment	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.
Risk-based land use planning	The strategic consideration of natural hazard risk and mitigation in informing strategic land use planning activities.

3. Introduction

CleanPeak Energy engaged Blackash Bushfire Consulting to complete a Bushfire Threat Assessment for the Project. This assessment forms part of the Council consent process to construct, operate, and decommission the Deniliquin Solar Farm in southern New South Wales (NSW). The solar farm comprises a 4.95 MW solar photovoltaic (PV) generation facility, a Battery Energy Storage System (BESS), and associated infrastructure required for its management and connection to the National Electricity Market. The Project Area is located at 39 Hogans Lane, Deniliquin (Lot 2 DP778062), approximately 6 km east of the Deniliquin township, close to the NSW–Victoria border (the Project Area).

3.1. Project overview

The Project would connect to the Deniliquin Energy Hub.

Key features of the Project would include:

- The solar farm capacity is 4.95 MW (AC)
- The Project Area is approximately 14.6 hectares
- The Project Area borders Lots 1 and 3 DP778062
- The Project Area does not border Flanagans Lane.

3.2. Project area

The Project Area is approximately 21.3 hectares (ha) in size within the local government area (LGA) of Edward River Council. The Project Area is bordered by the Hogans Lane to the west and residential farm allotments to all other aspects. The Project Area is zoned Primary Production (RU1) under the *Edward River Local Environmental Plan 2013*.

Land within the Project Area is characterised by flat cleared land used primarily for sheep and cattle grazing or dry land cropping. Rural land surrounds the Project Area with residential premises located at varying distances as shown in Figure 1.

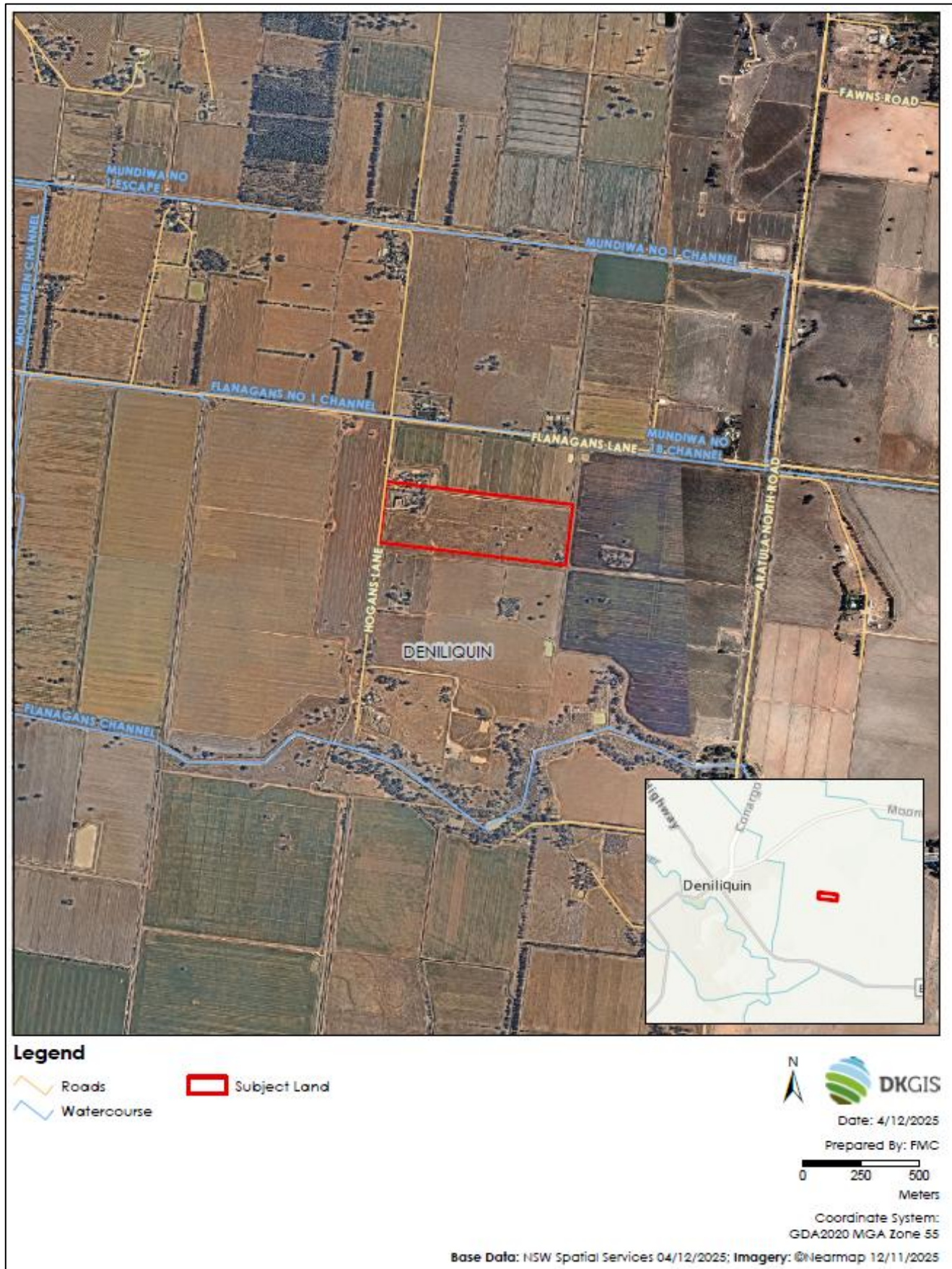


Figure 1: Location

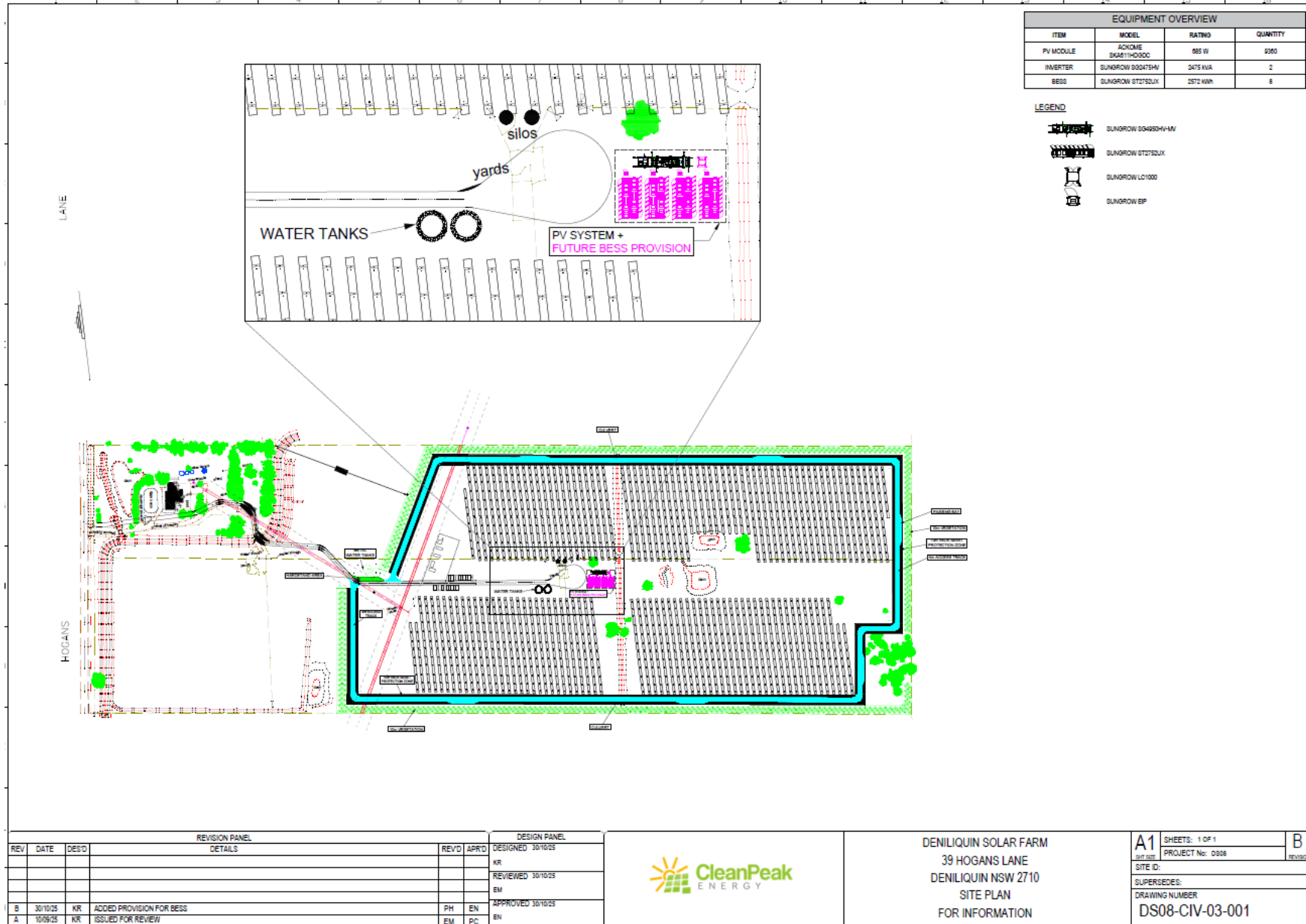


Figure 2 - Indicative Project Layout

4. Project Area Description

The Project Area is located approximately 6km east of Deniliquin in Southern NSW. The nearest national parks to the Project Area is Murray Valley Regional Park approximately 3.5kms to the south-west.

The detailed layout and overall developmental configuration is detailed in Figure 2.

Land surrounding the Project Area is characterised by flat cleared land used primarily for sheep and cattle grazing or dry land cropping. The Project Area is greenfield comprising large paddocks used exclusively for grazing sheep and cattle.

Road access to the Project Area is via Flanagans and Hogans Lane, of which Flanagans is a sealed all-weather public road and Hogans Lane is a gravel public road. This road carries minimal traffic, with its use being generally limited to access routes for rural properties. This road would remain open and available for public use during the construction and operation of the Project.

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 Development Application (DA) for the Project which must comply with the aim and objectives of PBP.

5. Legislative Framework

Statutory Requirements

This section outlines the relevant statutory and regulatory framework applicable to bushfire risk management for the proposed development and identifies how bushfire considerations have been addressed in the planning, design and operational approach for the Project.

Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) establishes the statutory framework for assessing development on land identified as bushfire prone land (BPL).

The proposed development is classified as "other development" for the purposes of Planning for Bushfire Protection 2019 (PBP). As such, the proposal is not subject to mandatory compliance with the deemed-to-satisfy provisions of PBP, nor is it required to obtain a Bush Fire Safety Authority (BFSa) under Section 100B of the Rural Fires Act 1997.

Notwithstanding this statutory position, the EP&A Act requires that bushfire risk be appropriately considered as part of the development assessment process. Accordingly, this Bushfire Threat Assessment has been prepared to assess bushfire hazard and risk in the context of the proposed development and to demonstrate that the Project has been planned and designed in a manner consistent with the aims and objectives of Planning for Bushfire Protection 2019.

Rural Fires Act, 1997

The Rural Fires Act 1997 (RF Act), establishes the functions and responsibilities of the RFS and sets out the obligations of landowners, occupiers and public authorities in relation to bushfire prevention, mitigation and suppression.

Section 63 of the RF Act places an ongoing duty on landowners and occupiers to take all practicable steps to prevent the occurrence and spread of bushfires on or from land under their control. This obligation applies throughout the construction, operation and decommissioning phases of the Project.

The Act also provides for the declaration of Bush Fire Danger Periods and Total Fire Ban days. All construction and operational activities associated with the Project will be required to comply with applicable restrictions during these periods, including controls on hot works and other ignition-prone

activities, as managed through site procedures and the Bushfire Emergency Management and Operations Plan.

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)

PBP is the primary NSW guidance document for managing bushfire risk in land-use planning and development assessment. While PBP is primarily structured around residential and Special Fire Protection Purpose (SFPP) development, it also provides guidance for “other development”, including solar farms and associated infrastructure, under Section 8.3.5.

As an “other development”, the Project is not required to comply with the prescriptive deemed-to-satisfy provisions of PBP. However, PBP requires that such development be assessed in a manner that addresses its aims and objectives, namely:

- protection of human life,
- minimisation of impacts on property and critical infrastructure,
- provision for safe access and emergency response,
- and ongoing management of bushfire protection measures.

This assessment has therefore been undertaken using a risk-based and performance-informed approach, drawing on the principles and intent of PBP to inform site planning, asset protection zones, access, water supply and emergency management arrangements appropriate to the nature and scale of the Project.

Standards for Asset Protection Zones NSW Rural Fire Service

This document provides standards for the establishment and maintenance of APZ. 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 proposed development has also been informed by the NSW Department of Planning, Housing and Infrastructure's Large-Scale Solar Energy Guideline (2022), which identifies bushfire risk as a key consideration for the planning, design and operation of large-scale solar energy projects.

Bushfire risk management measures identified in this assessment align with the Guideline's objectives by addressing ignition prevention, vegetation management, access, emergency response planning and operational controls throughout the life of the Project.

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 (BEMOP) 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. The Project is exempt from the requirement under the EP&A Act to comply with PBP and does not require a BFSa. 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.

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

This assessment has been prepared by Mark Hawkins, Senior Bushfire Specialist (BPAD Level 3 – 30419) and Lew Short, Principal Bushfire (FPAA BPAD Level 3 Certified Practitioner No. BPD-L3-16373) who are 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 rural 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.

8. Assessment Methodology

This project is subject to 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*.

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.

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 3) 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.

8.2. 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.

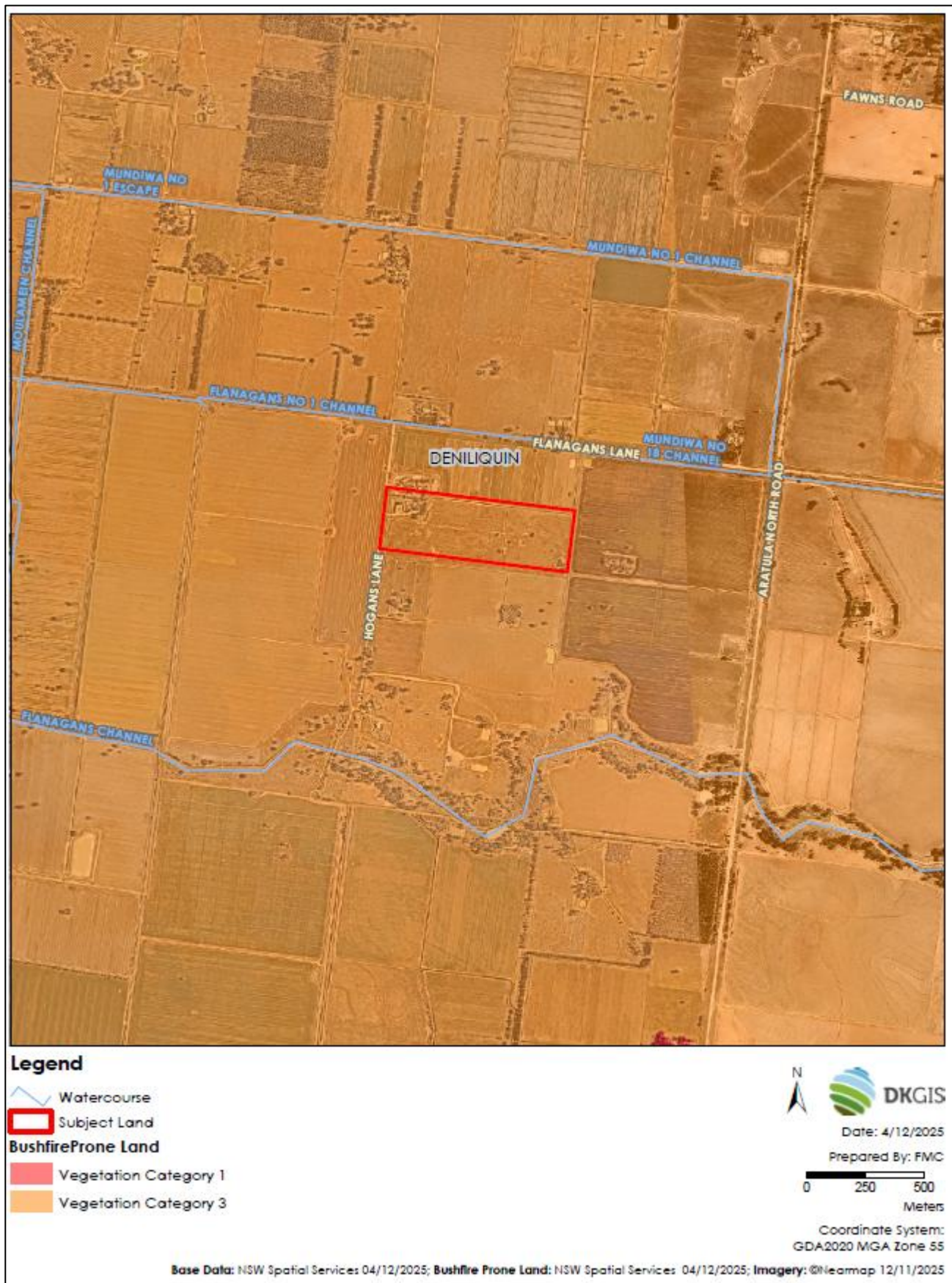


Figure 3: Bushfire Prone Land Map

8.3. 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.

8.4. 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 8.3 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 Figure 4. Inside the Project Area would be managed to Asset Protection Zones (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.

8.5. Slopes Influencing Bushfire Behavior

The slope assessment 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 relatively flat for the site as demonstrated in Figure 4.



Legend

-  Watercourse
-  Contour - 2m
-  Subject Land

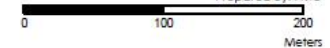
-  Cadastre
-  Vegetation Assessment Buffer

- ### Vegetation Formation
-  Grassland
 -  <all other values>



Date: 11/03/2024

Prepared By: FMC



Coordinate System:
GDA2020 MGA Zone 55

Base Data: NSW Spatial Services 04/12/2025; Vegetation: SVTM Extant edited based on imagery; Contours: NSW Elevation Data service in 1:100000 map files 04/12/2025; Imagery: @learnmap 12/11/2025

Figure 4: Slope and vegetation map

8.6. 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.

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.

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/m². 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. Figure 7 is 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)*.

Electrical engineering peak bodies and network operators 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 are 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.

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.

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 defendable space to be located around buildings*
- *Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings*

- Ensure that appropriate operational access and egress for emergency service personnel and occupants is available
- Provide for ongoing management and maintenance of Bushfire Protection Measures; 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 5. Appropriate combinations depend upon geographic location, development type and site circumstances.

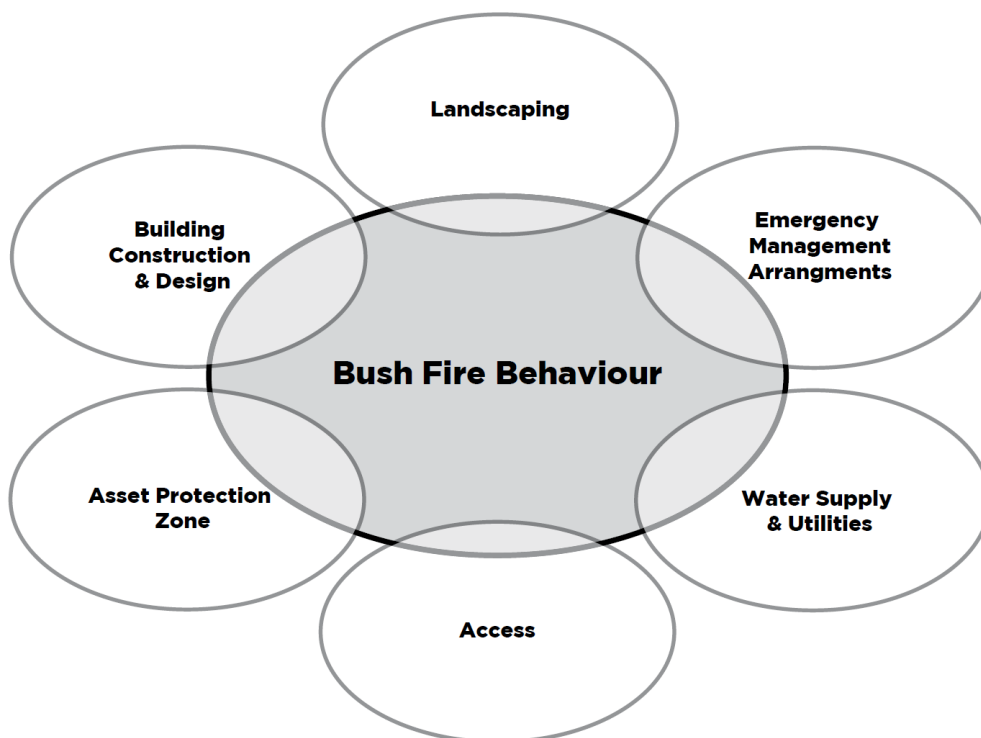
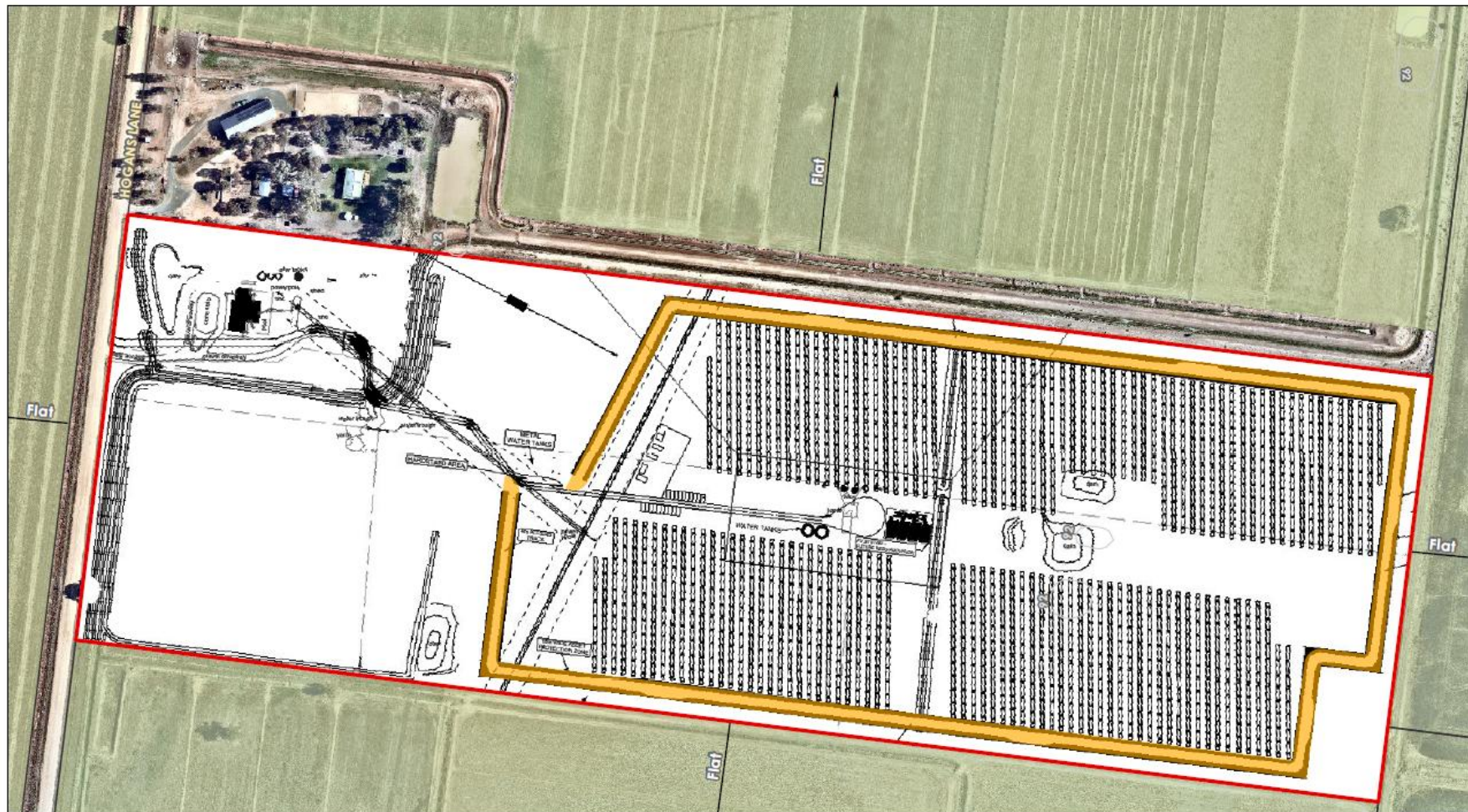


Figure 5: Bushfire protection measures in combination (PBP p.26)

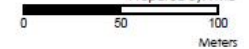


Legend



Date: 9/04/2026

Prepared By: FMC



Coordinate System:
GDA2020 MGA Zone 55

Base Data: NSW Spatial Services 04/12/2025; Vegetation: SVTM Extant edited based on imagery; Contours: NSW Elevation Data service in 1:100000 map files 04/12/2025; Imagery: ©Nearmap 12/11/2025

Figure 6: Asset Protection Zones

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 Bush Fire Emergency Management and Operations Plan should identify all relevant risks and mitigation measures associated with the construction and operation of the wind or solar farm;*
- *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.*

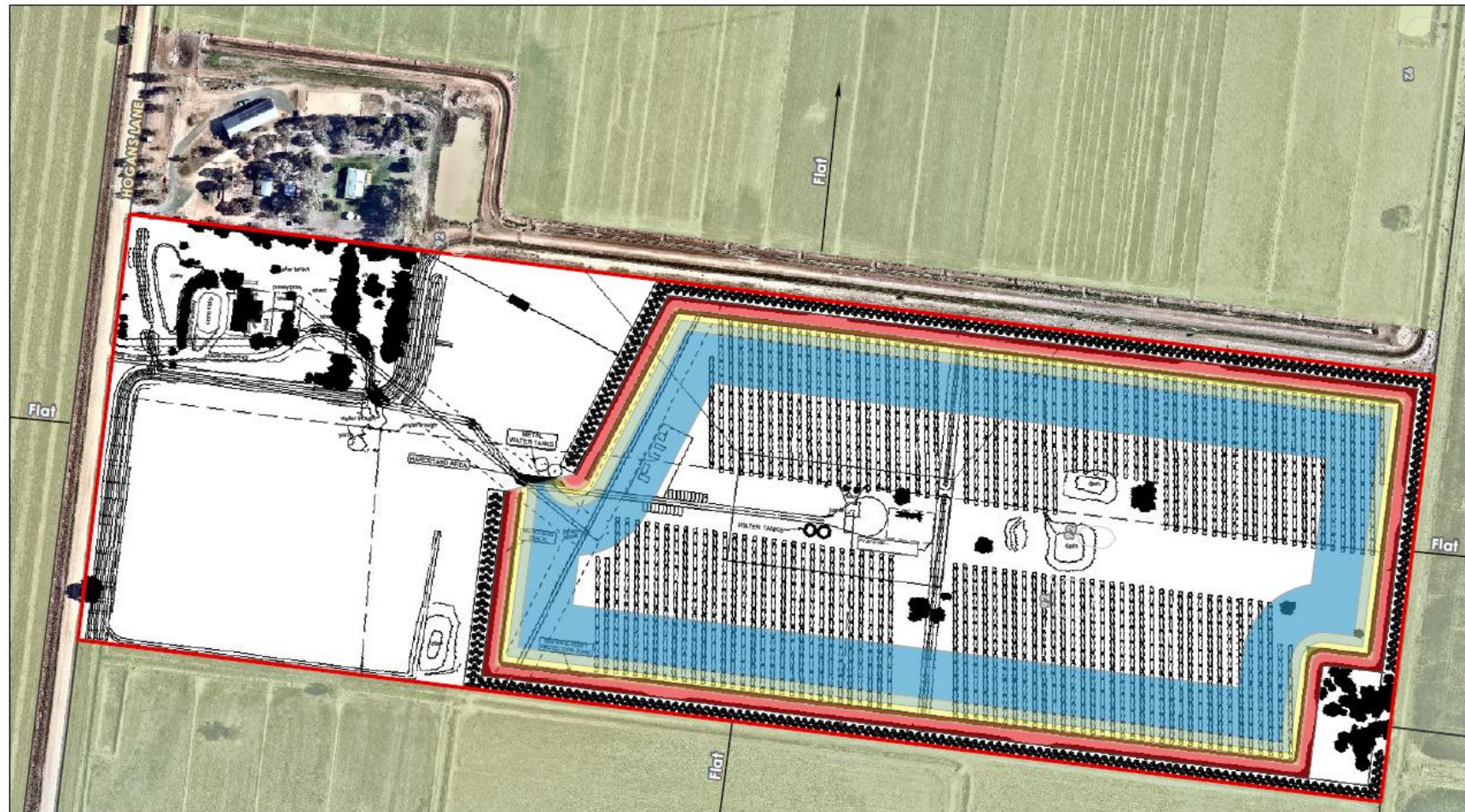
Infrastructure for the purposes of requiring APZ excludes:

- *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.

The minimum 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 Project design currently works on meeting and mapping BAL-29 standard APZ.

Table 3 provides a summary of PBP Section 8.3.5 compliance.



Legend

Watercourse	Cadastre	Bushfire Attack Level (BAL)	BAL - 29
Contour - 2m	Vegetation Formation	BAL - Flame Zone	BAL - 19
Subject Land	Grassland	BAL - 40	BAL - 12.5



Base Data: NSW Spatial Services 04/12/2025; Vegetation: SVTM Extant edited based on imagery; Contours: NSW Elevation Data service in 1:100000 map tiles 04/12/2025; Imagery: ©Nearmap 12/11/2025

Figure 7: Bushfire Attack Levels

Table 3: Summary of compliance with PBP Section 8.3.5 (p77)

PBP 8.3.5 requirement	Comment	Complies?
A minimum 10m APZ for the structures and associated buildings / infrastructure;	The Project is provided with APZ of 10m, with the majority of Project Area maintained to APZ standards. Remaining areas of outside developed footprint are maintained to typical rural standard through slashing and grazing.	Yes
The APZ must be maintained to the standard of an Inner Protection Area (IPA) for the life of the development	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 & Operations Plan (BEMOP).	Yes
Essential equipment designed and housed to minimise impact of bushfires, and to not serve as a bushfire risk.	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.	Yes
Detailed BEMOP to be produced	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.	Yes
Comply with Total Fire Ban Day (TOBAN) requirements under RF Act s.99	All construction and operations will be conditioned to comply with TOBAN requirements.	Yes
Comply with PBP Aim & Objectives (p.10)	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.	Yes

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.

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 site allows 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 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 Figure 6 and Project infrastructure areas within the perimeter APZ will also be maintained to a minimum APZ standard. 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 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 this 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.

10.8. Emergency management

A comprehensive Bushfire Emergency Management and Operations Plan (BEMOP) should be completed for the construction and operational phase of the Project incorporating schedules for maintenance.

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.

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.

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

Table 4 provides a summary of recommendations to mitigate the risks of bushfire for the Project across the construction, operation and decommissioning phases.

Table 4: Recommended Bushfire Risk Mitigation Measures

ITEM	Mitigation Measure
Asset Protection Zones / Landscaping	> 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'. > APZ will generally provide a maximum radiant heat flux to assets of $\leq 29 \text{ kW/m}^2$ 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. > 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.
Building Construction Standards	> Buildings would be constructed to appropriate BAL levels in accordance with PBP and AS3959. This will be refined during the detailed design phase.
Firefighting Water Supply	The following recommendations regarding water are provided: > Due to the large expanse of the Project Area, a 20,000 litre tank should be strategically located. Tanks shall be of non-combustible construction or suitably protected from bushfire attack. Consideration for location should include: • Entry and exit points that are easily accessible in all weather conditions by heavy vehicles and clearly visible (sign posted); and • Nearby to critical infrastructure. e.g. BESS and substations. > Provision of firefighting water supplies (including heavy vehicle access to within 4.0m of the fittings) will be in accordance with PBP. > Water carts used onsite shall have fittings capable of efficient resupply to firefighting vehicles. > 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.

ITEM	Mitigation Measure
Access	> 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</i> (2023).
Emergency Management	> A comprehensive Bushfire Emergency Management and Operations Plan (BEMOP) is to be developed with input from local emergency services. > The bushfire evacuation procedures would be completed in alignment with RFS <i>Guide to Developing A Bushfire Emergency Management and Evacuation Plan</i> (2014).

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. The Project is within Bushfire Prone Land and bushfire risk is a key consideration for the Project. The report has undertaken a site-specific risk assessment.

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 these measures provide very significant mitigation against any fire occurring onsite spreading to surrounding areas.

The project also complies with DA condition 17.

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.



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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*

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

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Appendix 2 – 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.

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.

