ERM

PREPARED FOR

Edify

Brewongle Solar Farm and BESS

Bushfire Risk Assessment

DATE
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REFERENCE
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Brewongle Solar Farm and BESS

Bushfire Risk Assessment

0735137

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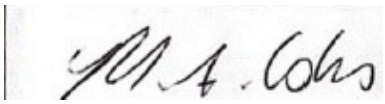

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
APZ	Asset Protection Zones
AFDRS	Australian Fire Danger Rating System
AS 3959-2018	*Australian Standard 3959 - 2018 Construction of Buildings in Bushfire-prone Areas*
BC Act	*Biodiversity Conservation Act 2016*
BESS	battery energy storage system
BOM	Bureau of Meteorology
EIS	Environmental Impact Statement
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia Pty Ltd
ha	hectare
m	metres
MNES	Matter of National Environmental Significance
NSW RFS	New South Wales Rural Fire Service
PBP 2019	Planning for Bushfire Protection 2019
RF Act	*NSW Rural Fires Act 1997*
SCADA	supervisory control and data acquisition
SEARs	Secretary's Environmental Assessment Requirements
SFAZ	Strategic Fire Advantage Zone
SSD	State Significant Development
TOBAN	Total Fire Ban

Important Note:
Despite the mitigation measures and treatments that are put in place, it is noted that some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact. The absence of any identified hazard or asset in the Project Area should not be interpreted as a guarantee that such hazards or impacts do not exist. It is also important that a Bushfire Emergency Management Plan is prepared prior to the commencement of any construction works in conjunction with relevant stakeholders, including local fire services, NSW RFS, NSW Fire and Rescue, landowners and adjoining property owners.

1. INTRODUCTION

This Bushfire Risk Assessment has been prepared on behalf of Edify Energy Pty Ltd ('Edify' or the 'Applicant') to consider bushfire risk in the vicinity of the proposed Brewongle Solar Farm and battery energy storage system (BESS) (the Project).

The need for a Bushfire Risk Assessment was identified within the Secretary's Environmental Assessment Requirements (SEARs), and the *Rural Fires Act 1997* imposes obligations on land occupiers to take all practicable steps to prevent the occurrence and spread of wildfire to adjoining lands from lands under their care and management.

This report identifies potential hazards and risks associated with the Project. It contains management and mitigation measures designed to address these obligations consistent with similar projects of this nature in other parts of New South Wales (NSW) and in accordance with NSW Rural Fire Service (RFS) guidelines including 'Planning for Bush Fire Protection 2019' (PBP 2019) inclusive of the PBP Addendum (2022).

It does not assess the individual design or engineering components of the solar farm (or other infrastructure as described in **Section 1.1** but does consider locations of the infrastructure relative to the identified hazards and the requirements for separation distances. Electrical hazards including battery fires, and transformer fires are addressed separately as part of the Preliminary Hazard Assessment and are not included here.

1.1 DESCRIPTION OF THE PROJECT

The Project is located at 315 Tarana Road, Brewongle, NSW, approximately 12 km from the Bathurst town centre. The Project area is located within the Bathurst Regional local government area (LGA) across three (3) separate lot parcels, which have been secured under an option agreement with Edify. The Project area is located on land predominately used for agricultural activities and covers a total area of 299 hectares (ha).

Figure 1.1 shows the Project locality in a regional setting. The Project layout is provided in Figure 1.2.

The Project involves the construction, operation, and where relevant decommissioning of:

- Photovoltaic (PV) solar facility with an estimated capacity of up to 90 MW alternating current (AC);
- A BESS with a capacity of up to 90 MW/180 MWh;
- Electrical reticulation; and
- Associated and ancillary infrastructure.

The BESS will be located either adjacent to the substation (centralised configuration) or dispersed in modular enclosures throughout the site (decentralised configuration). The final layout of the Project remains subject to refinement.

The internal roads will provide adequate access to the site, including the BESS units, for emergency vehicle access. A full description of the Project is provided in the Brewongle Solar Farm EIS (ERM, 2025).

1.2 AIMS AND OBJECTIVES

Bushfire presents a threat to both human life and assets and can adversely impact ecological values. Bushfire risk can be considered in terms of environmental factors that increase the risk of fire (fuel quantity and type, topography, and weather patterns), as well as specific activities (such as hot works and construction activities) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines and other electrical components).

This Bushfire Risk Assessment aims to address the requirements identified by the SEARs to identify potential hazards and risks associated with bushfires / use of bushfire prone land and demonstrate that the proposed solar farm can be designed, constructed and operated to minimize ignition risks and provide for asset protection consistent with relevant NSW RFS design guidelines PBP 2019 and Standards for Asset Protection (available on the NSW RFS website www.rfs.nsw.gov.au).

The objectives of this assessment are to identify, and where possible reduce, the likelihood of a bushfire impacting the Project Area or spreading from the Project Area to surrounding properties.

WAMBUUL

MACQUARIE RIVER

MITCHELL HIGHWAY

VITTORIA STREET

BATHURST

STEWART STREET

SYDNEY ROAD

MID WESTERN HIGHWAY

BATHURST REGIONAL COUNCIL

WINBURNDALE NR

SUNNY CORNER SF

GREAT WESTERN HIGHWAY

WAMBOOL NR

EUSDALE NR

FISH RIVER

LITHGOW CITY COUNCIL

OBERON COUNCIL

CAMPBELLS RIVER

Brisbane

New South Wales

Sydney

Victoria

Melbourne

Legend

- Study Area
- Major Road
- Minor Road
- Railway
- Major Watercourse
- Nature Reserve
- State Forest
- Easement
- LGA

Existing Transmission Line

- 330kV
- 132kV
- 66kV
- 33kV

Source:
NSW DTDB and DCDB 2024
ESRI imagery service

Coordinate System:
GDA 1994 MGA Zone 55

Date: 31/01/2025

Created By: HD

Drawing Size: A3

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F1.1 Regional Context

Brewongle Solar Farm and BESS

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BREWONGLE LANE

O'CONNELL ROAD

SALT WATER CREEK

MACQUARIE PLAINS

WESTS LANE

FISH RIVER

TARANA ROAD

BREWONGLE

STATION STREET

BURKES LANE

Legend

- Study Area

Project Elements

- BESS
- Solar Panel
- Substation
- Access Road
- Setback Buffer
- Development Area
- Internal Road
- Fence

Existing Environment

- Major Road
- Minor Road
- Path/Track
- Railway
- Major Watercourse
- Minor Watercourse
- Cadastre
- Easement

Existing Transmission Line

- 132kV
- 66kV
- 33kV

Source:
NSW DTDB and DCDB 2024
ESRI imagery service

Coordinate System:
GDA 1994 MGA Zone 55

Date: 31/01/2025

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F1.2 Development Footprint and Project Layout

Brewongle Solar Farm and BESS

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2. PLANNING FRAMEWORK

2.1 RELEVANT LEGISLATION AND GUIDELINES

Table 2-1 outlines the relevant legislation and guidelines and how they have been considered in this Bushfire Risk Assessment.

TABLE 2-1 RELEVANT LEGISLATION AND GUIDELINES

Relevant Legislation/Guideline	Description
Environment Planning and Assessment Act 1979	The Project was declared a State Significant Development (SSD) and will be assessed under Part 4 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act). Section 4.41 of the EP&A Act excludes projects approved under Part 4 of the EP&A Act from requiring "a bush fire safety authority under section 100B of the *Rural Fires Act 1997*".
NSW Rural Fires Act 1997	The NSW Rural Fire Service (NSW RFS) administers the *Rural Fires Act 1997* (RF Act). The RF Act is supported by the *Rural Fire Regulation 2013*. Under Section 63 of the RF Act, owners and occupiers of land have a duty to take practicable steps to prevent the occurrence of bushfires on, and to minimise the danger of the spread of bushfires on or from, that land. This assessment considers the risk of spreading bushfires from the Project to the surrounds and provides measures to minimise the risk of bushfires. Additionally, as the occupier, in accordance with Section 64 of the RF Act, if a fire is burning on any land at any time during a bushfire danger period, the solar farm operators must: • Immediately on becoming aware of the fire and whether the occupier has lit or caused the fire to be lit or not, take all possible steps to extinguish the fire; and • If the occupier is unable without assistance to extinguish the fire and any practicable means of communication are available, ensure that the fire is reported immediately to the 000 emergency telephone number. The operators of the Project must also be aware of operations that can 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 Section 99 of the RF Act. <u>Bushfire Management Committee</u> Also set up under the RF Act, bushfire management committees (BFMCs) coordinate fire management planning, prevention and suppression in local areas. The relevant committee for the Project is the Chiefly BFMC. Each BFMC is required to prepare and submit to the Bush Fire Risk Management Plan (BFRMP). The relevant plan to the Project is the Chiefly (2021).
Planning for Bushfire Protection 2019	'Planning for Bushfire Protection 2019' (NSW RFS) is a planning document to link responsible planning and development control with the protection of life, property and the environment. PBP 2019 was legislatively adopted in the *Environmental Planning & Assessment Regulations* on 1 March 2020. The PBP Addendum (November 2022) is effective date from 1 May 2023 to coincide with adoption of the National Construction Code (NCC) 2022. Consideration has been given to the following overall aims and objectives of PBP 2019: • Afford buildings and their occupants protection from exposure to a bushfire; • Provide for a defendable space to be located around buildings;

Relevant Legislation/Guideline	Description
	• Provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition; • Ensure that appropriate operational access and egress for emergency service personnel and residents 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. PBP 2019 provides specific requirements for solar farm development and notes that solar farms require special consideration and should be provided with adequate clearances to combustible vegetation as well as firefighting access and water. The following *minimum* standards should be provided for solar farms: • 10 m Asset Protection Zone (APZ) from the structures / associated buildings / infrastructure; and • The APZ will be maintained to the standard of an inner protection area for the life of the development to provide adequate access for firefighting purposes. Essential equipment should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies. It should also be designed and maintained so that it will not serve as a bush fire risk to surrounding bush.
Design Guidelines and Model Requirements for Renewable Energy Facilities 2023	The Victorian Country Fire Authority (CFA), in conjunction with industry and regulatory authorities, has developed the Design Guidelines and Model Requirements for Renewable Energy Facilities (CFA, 2023) to support designers and operators of facilities to consider and mitigate fire risk. This includes fires which originate within the facility itself as well as bush fire impact on the site from external factors. While these were developed in a Victorian context, the guidance represents the current leading practice and has been referred to in this assessment as it builds upon the principles and knowledge from recent fires at large-scale renewable energy facilities.
Commonwealth Environment Protection and Biodiversity Act 1999	*The Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary piece of Federal legislation relating to the environment. Under the EPBC Act any action that has, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES) requires approval from the Commonwealth Minister for the Environment. An action is defined as a project, development, undertaking, activity (or series of activities), or alteration to any of these. Significant impacts on MNES are not expected during Project construction and operation.
Biodiversity Conservation Act 2016	The *Biodiversity Conservation Act 2016* (BC Act) requires the consideration of threatened species and their habitats in the developmental planning process. Schedule 3 of the BC Act lists Key Threatening Processes for species, populations and ecological communities within NSW. 'Clearing of native vegetation', 'high frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' and 'removal of dead wood and dead trees', are listed as Key Threatening Processes.

Relevant Legislation/Guideline	Description
	No threatened species have been recorded although one small, isolated patch (0.48ha) of degraded Southern Tableland Grassy Box Woodland TEC has been reported within the Project Area (EcoResolve, 2025) and needs to be carefully considered when implementing fire management activities.

2.2 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The SEARs were issued for the proposed development on 22 December 2023 (SSD-64834490). The SEARS state the following about bush fire risk:

TABLE 2-2 SEARS RELEVANT TO BUSHFIRE

SEARs	Section where addressed
Identify potential hazards and risks associated with bushfires / use of bushfire prone land including the risks that a solar farm would cause bush fire and demonstrate compliance with Planning for Bush Fire Protection 2019	This report

Fire and Rescue NSW (FRNSW) also provided bushfire related advice on the SEARs, as reproduced in **Table 2-3** below.

TABLE 2-3 SEARS AGENCY ADVICE RELEVANT TO BUSHFIRE

Agency	Date	Advice	Where addressed
Fire and Rescue NSW	24 November 2023	BESS facilities present special problems of firefighting and special hazards exist that may require additional fire safety and management measures. There is currently insufficient information available regarding the fire safety and emergency response management aspects of the project. FRNSW requests to be consulted and given the opportunity to review the hazard and risk analysis and provide comment regarding the proposed fire and life safety systems at the preliminary and final design phases of the project.	Bushfire emergency management and response planning will be undertaken in consultation with NSW RFS and FRNSW following project approval and based on the final development design.

3. EXISTING SITE CONDITIONS

3.1 LAND USE CONTEXT

The study area falls within the Brewongle locality of the Bathurst Regional LGA in the Central Tablelands region of NSW and has been subject to a long history of vegetation clearing and sheep grazing. The Project Area is zoned in its entirety as RU1 – Primary Production. Solar farms and agricultural production can co-exist, and it is the intent of the Applicant that the majority Project area will remain available for grazing during operation.

Main Western Railway is adjacent to the northeast of the Project boundary and the closest dwelling is located adjacent to the southeast border of the Project area.

3.2 CLIMATE AND FIRE WEATHER

Weather conditions influence the size, intensity, speed, and predictability of bushfires and how dangerous they can be to the community. While bushfires can happen at any time of the year in Australia, the time of peak bushfire activity varies across the country with the changes in the seasonal weather patterns. Within the region, the prevailing weather conditions associated with the bush fire season are associated with the westerly wind patterns experienced during the months of November, December and January. Most serious bush fire events occur from this period until the cooler temperatures of autumn are experienced (Chiefly Zone BFMC, 2021).

Data from the Bureau of Meteorology (BoM) weather stations confirm that both low humidity and high temperature occur within the bushfire season and would contribute to the fire hazard within this region (refer **Figure 3-1**).

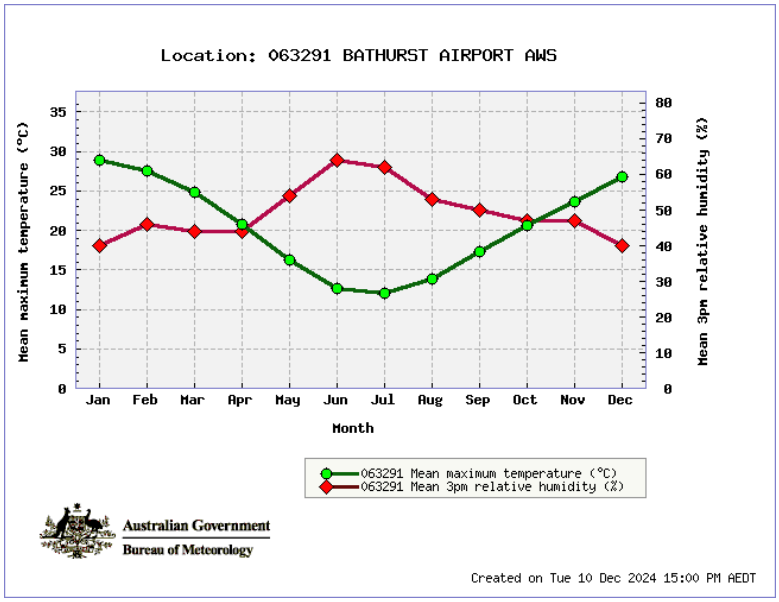

FIGURE 3-1 LOW HUMIDITY AND HIGH TEMPERATURE WITHIN THE BUSHFIRE SEASON (BOM 2024)

3.3 TOPOGRAPHY

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the level of radiant heat flux. The effective slope of the land is categorised into one of the following classes, relative to the location of the hazard:

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

The effective slope over 100 m from the proposed development is relatively flat to gently undulating and has been calculated as:

- >0 to 5 degrees downslope to the north west, west and south west; and
- >0 to 5 degrees upslope to the north east, east and south east.

3.4 VEGETATION

Descriptions of the vegetation types including species composition and structural diversity are provided in the Streamlined Biodiversity Development Assessment Report (EcoResolve, 2025) The primary classified vegetation having the potential to affect the proposed infrastructure is exotic grassland. One small, isolated patch (0.48ha) of degraded Southern Tableland Grassy Box Woodland has also been mapped, although these would not influence fire behavior within the site.

PHOTOGRAPH 3-1 AERIAL VIEW OF THE SITE SHOWING A DOMINANCE OF CLEARED GRASSLAND

PHOTOGRAPH 3-2 DOMINANCE OF CLEARED GRASSLAND

PHOTOGRAPH 3-3 CLEARED GRASSLAND

Legend

- Study Area

Vegtation Mapping

- Man Made Dam
- Non-Native
- Planted Non-native Vegetation
- Southern Tableland Grassy Box Woodland
- Unsealed Access Track
- 2m Contours

Existing Environment

- Major Road
- Minor Road
- Path/Track
- Railway
- Major Watercourse
- Minor Watercourse
- Cadastre
- Easement

Existing Transmission Line

- 500kV
- 330kV
- 132kV
- 66kV
- 33kV

Source:
NSW DTDB and DCDB 2024
Vegetation Mapping: Ecoresolve
ESRI Imagery Service

WATER CREEK
WESTS LANE
TARANA ROAD
QUARIE PLAINS

Coordinate System:
GDA 1994 MGA Zone 55
Date: 31/01/2025
Created By: HD
Drawing Size: A3
0 200 400m
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F3.2 Vegetation and Slope (Contours) R1

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3.5 INDICATIVE FIRE BEHAVIOUR

Vegetation growth can be encouraged by periods of wet weather, which can increase the amount of fuel available (e.g., grass, leaf litter, twigs, bark). When the weather is hot, the humidity low and there's been little recent rain, this vegetation dries out and becomes more flammable. A fire is more likely to start, and continue to burn, in hot, dry and windy weather.

Most of the Project area and surrounding agricultural lands have some level of management by cropping, grazing and/or slashing. Fuel load is dependent on several factors including the amount of rainfall in the spring period leading to abundant growth of grasses in summer as well as the stock loading which will vary across years and seasons. It is intended that the vegetation fuel within the overhead transmission line easements, under the solar panels and within access tracks will continue be maintained in a low fuel state by mechanical or manual clearing methods. It is the intent of the Applicant that the majority Project area will remain available for grazing during operation.

The assessment of dominant fuel hazard has been determined for grassland.

Grassfires can travel up to 25 km per hour and pulse even faster over short distances. As described by Sullivan *et al*. (2012), grass is a fine, high surface area to volume ratio fuel with high thermal conductivity, low density and vertical orientation, which rapidly ignites (and rapidly burns out). Grassfires are also generally more open to wind than forest fuels (Cheney and Sullivan 2008) making them unpredictable. As described by AFAC (2022) grass fuel load has a strong influence on flame size, flaming duration, radiation output and suppression difficulty. Grass fuel types are divided into three main fuel conditions in the Australian Fire Danger Rating System (AFDRS) system:

1. Undisturbed or natural (i.e., uncut and/or ungrazed);
2. Grazed or cut; and
3. Eaten-out or very heavily grazed grasslands.

The Fire Behaviour Index (FBI) assists operational decision making and provides a scale of potential fire danger (should a fire start) based on the predicted rate of fire spread. Based on a dominance of grazed grassland, the Project area has a **moderate** bushfire danger rating.

TABLE 3-1 FIRE BEHAVIOUR INDEX, GRAZED PASTURE

Vegetation Formation[1]	Overall Fuel Load[2]	Fire Behaviour Index[3]	Fire Danger Rating[3]
Cleared exotic pasture (grazed)	6 t/ha	14	Moderate

4. Keith (2004) From ocean shores to desert dunes: the vegetation of New South Wales and the ACT.
5. Fuel loads are expressed in tonnes per hectare as per NSW RFS – Comprehensive Vegetation Fuel Loads (NSW RFS 2019)
6. CSIRO Grassland Fire Spread Model available online https://aurora.landgate.wa.gov.au/fbc/#!/csiro-grass. Input values: grass continuity: continuous; temperature 30 °c; relative humidity 40%; windspeed at 10m height 20 km/h; curing 60%; slope 5 degrees.

TABLE 3-2 GRASSLAND, FIRE BEHAVIOUR INDEX

Fire Behaviour Index	Fire Danger Rating[3]	Fire Suppression and Containment	Potential for Impact
12-23	Moderate	Typically wind driven and rapidly spreading fires with the potential to gain size quickly. Fires typically controlled within established road networks and fuel breaks together with using direct, indirect or parallel attack suppression strategies.	Possible agricultural/ pasture/crop/stock losses together with loss of rural assets such as fencing, machinery and buildings. Unattended infrastructure may be at risk.

Source: https://www.afac.com.au/docs/default-source/afdrs/afdrs-quick-guide---grassland.pdf

4. BUSHFIRE RISK FACTORS

4.1 BUSHFIRE PRONE LAND

Bushfire prone land mapping is intended to designate areas of the state that are considered to be higher bush fire risk for development control purposes. A review of the NSW Rural Fire Service (RFS) bushfire prone land mapping dataset does not map the site as being bushfire prone although it is noted that the Project area is consistent with Vegetation Category 3 as described by the NSW RFS Guide For Bush Fire Prone Land Mapping (Version 5b, November 2015):

> **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. This category consists of grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands.

4.2 CLIMATE CHANGE AND BUSHFIRES

Eastern Australia is described as one of the most bushfire-prone areas in the world. BoM (2023), states that human induced climate change is influencing the frequency and severity of dangerous bushfire conditions in Australia and other regions of the world, influencing temperature, environmental moisture, weather patterns and fuel conditions. While climate change might not ignite the fire, it is giving fires the chance to turn into catastrophic fires by creating warmer temperatures, increasing the amount of fuel (dried vegetation) available, and reducing water availability due to higher evaporation. In relation to fire ignition, there is some indication that human induced climate change could also influence the risk of ignitions from dry-lightning (i.e., lightning that occurs without significant rainfall).

Bushfire weather conditions in future years are projected to increase in severity for many regions. This will result in:

- An earlier start to the bushfire season;
- Reduced opportunities for fuel reduction burning;
- Management of fire risk to property, people and biodiversity will become increasingly challenging; and
- An increase in the number of extreme fire danger days.

4.3 FIRE HISTORY

The Chiefly BFRMP (Chiefly Zone BFMC, 2021) has reported that the region has on average 150 bush/grass fires per year, of which 9 on average are major fires (>20ha). The main sources of ignition of bushfires in the Chiefly region are:

- Lightning activity (mainly associated with late spring and early summer);
- Illegal / careless burning activities by private land owners/occupiers;
- Most commonly in grasslands and forested areas adjacent to villages;
- Escaped fires from legal burning activities by private land owners/occupiers;
- Campfires; and
- Farm Machinery.

Recent Fire Extent and Severity Mapping (FESM) and NPWS Fire History Mapping (accessed via NSW Seed) prepared by NSW RFS and DPE revealed there were no fire events within proximity to the Project area. The closest fire was over 6 km to the south east and burnt over 21 ha in the 2007-2008 fire season.

Earth moving equipment, power tools (e.g., welders, grinders), mowers and slashers are well known for starting bushfires under conditions of high temperature, low humidity and high wind. Therefore, construction and ongoing maintenance of the solar farm and BESS will be a potential source of ignitions.

4.4 SUMMARY OF BUSHFIRE RISK FACTORS

The Project area does not have a history of bushfire and has a moderate bushfire danger rating. The risk that the Project will cause a fire is considered low provided that appropriate protection measures are applied (refer Section 5).

If a fire does breach any containment lines and threatens the Project assets, it is possible that the infrastructure will sustain direct flame contact and that firefighting will require external support. It is important that key assets have adequate defendable space on all sides.

5. MITIGATION STRATEGIES

Consideration is given to whether the proposed development will result in people congregating in large numbers. The operation of the Project is considered a low intensity use in terms of the number of people on site at any one time, with only 5 permanent staff during the operational phase. However, there could be up to 200 full time equivalent staff on site at any one time during construction over a period of up to 12-18 months. Although the construction period does not pertain to the expected end use of the Project area, the number of people who could be within the Project area at one time warrants consideration in terms of providing adequate defendable space and access / egress as the first stage of construction.

As identified within Section 8.3.5 of PBP 2019, wind and solar farms require special consideration and should be provided with adequate clearances to combustible vegetation as well as firefighting access and water. Mitigation will be a combination of complementary strategies, all of which are required to provide the best possible protection outcome for the solar farm and the community.

In terms of design principles to minimise risk, the solar farm layout will be designed to:

- Provide a defendable space around infrastructure; and
- Ensure that appropriate access, egress and maneuverability within the solar farm is provided for first responders.

5.1 ASSET PROTECTION ZONE

Understanding the value and limitations of an APZ is important, as is the understanding that bushfires attack-built assets by either flame contact, radiant heat or burning debris. An APZ can be used to lower or eliminate the bushfire attack from flame contact and radiant heat around the perimeter of the solar farm and all built assets, but under strong winds or during a major fire event burning debris can result in a fire breaching an APZ.

A minimum 10 m APZ is required to comply with Section 8.3.5 of PBP 2019 and must be established around the perimeter of the solar arrays, and on all sides of the impact area which will encompass the substations, switching station, BESS and O&M Buildings.

A minimum 10 m fire break around the perimeter of the facility and around infrastructure is also supported by CFA (CFA, 2023). The specifications recommended for the APZ are as follows:

- All APZs are to be managed as an inner protection zone (IPA) for the life of the development as outlined within Appendix 4 of PBP 2019, and NSW RFS ‘Standards for Asset Protection Zones’;
- APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners; and
- No trees and shrubs are to be planted within the APZ.

5.2 ACCESS ROADS AND ROAD NETWORK

Access to the Project area during construction and operations is expected via the regional council road network, with access points off Tarana Road to the south.

This single access point will be constructed as the first stage of development and the final design of access road will enable access and egress for personnel attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations. The internal roads will provide adequate access to the site, including the BESS units, for emergency vehicle access.

Site access points and internal roads will be maintained for the life of the Project and include appropriate signs throughout the solar farm. All access roads will be upgraded to provide sufficient width and other dimensions to ensure safe unobstructed access and allow firefighting crews to operate equipment around the vehicle. As a minimum, and to enable access for RFS all roads will be maintained to the minimum standards as outlined within the NSW RFS Fire Trail Standards.

This includes:

- The trafficable surface has a width of four (4) metres;
- Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of nine (9) tonnes;
- A minimum vertical clearance of four (4) metres is provided above the surface of the trafficable surface clear of obstructions;
- Capacity for passing is provided every 250 m; and
- A turning area is provided at the termination of a trail and every 500 m.

Where practicable site vehicles during the construction phase will have diesel engines and/or will use the site access roads (if available) to minimise the likelihood of igniting dry grass.

5.3 WATER STORAGE

Water is essential for firefighting. The amount and reliability of water is critical when considering development during both the construction and operation of the facility. Appropriate fire-fighting equipment will be held on site to respond to any fires that may occur. This equipment will include:

- All buildings and site vehicles will be fitted with portable fire extinguishers; and
- All areas where Hot Works are being conducted will have the number and type of fire extinguishers, water sources and or fire blankets in accordance with the Hot Work Permit issued for the work.

A dedicated water supply with appropriate access is required at the site to assist in the event of a fire and at least one tank will be located near the substation, with the aim of supporting the centralised battery configuration (if this option is determined in detailed design). In accordance with the requirement of PBP (NSW RFS 2019) the designated water supply points allow for the following measures:

- 65 mm Storz outlet with a ball valve is fitted to the outlet;
- A hardened ground surface for truck access is supplied within 4 m;
- Unobstructed access can be provided at all times;

- A vehicle turning circle with a radius of 12.5 m;
- Water access points are to be marked by appropriate signage; and
- Any static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.

Note: The final list of fire suppression equipment and water storage requirements will be confirmed in consultation with NSW RFS and FRNSW following project approval and detailed design. The most appropriate locations and number of tanks required will need to be identified in response to the final BESS design (centralized or decentralized options).

5.4 SOLAR FARM AND BESS CONSTRUCTION

Human induced climate change is influencing the frequency and severity of dangerous bushfire conditions in Australia including an earlier start to the bushfire season with dangerous weather conditions occurring significantly earlier in spring than they used to. With this in mind, the following measures are recommended to be implement during the entire period of construction:

- The APZ and access roads will be constructed prior to the installation of any solar panels or related infrastructure;
- Fire detection and suppression systems should be installed at the earliest stage of construction for BESS infrastructure;
- Ensure appropriate bunding in areas where there is potential for flammable fuels and oils to leak and create bushfires or other environmental risks;
- Install appropriate signs to assist emergency response crews determine the location of infrastructure;
- Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to;
- Adhere to restrictions on Total Fire Ban or days of high fire danger;
- Suitable firefighting equipment (specific requirements to be confirmed in consultation with NSW RFS) is present onsite;
- Carry fire extinguishers or firefighting equipment in vehicles;
- Carry emergency communications equipment;
- Where practicable, site vehicles during the construction phase will have diesel engines and/or will use the site access roads (if available) to minimise the likelihood of igniting dry grass;
- Restrict smoking to prescribed areas, and provide suitable ash and butt disposal facilities;
- All plant, vehicles and earth moving machinery are cleaned of any accumulated flammable material (e.g., vegetation);
- On days when High fire danger or worse is forecast, the “fires near me’ app is to be checked regularly for the occurrence of any fires likely to threaten the Project Area; and
- On days of Extreme or Catastrophic fire danger, access to the site should be limited to essential works only.

5.5 SOLAR FARM AND BESS OPERATION

Fuel Reduction

It is recommended that vegetation fuels throughout the solar farm, including under the panels, are maintained in a minimal condition by grazing, or with additional slashing or mowing if required. This will minimise the radiant heat exposure to solar farm components and reduce the risk of a fire spreading beyond the solar farm. If grazing or slashing is not possible other lower risk ground cover should be considered e.g., gravel or a non-curing ground cover and/or a very low above ground biomass.

Days of High or Worse Fire Danger

Fire Danger Ratings give you an indication of the consequences of a fire if one was to start. The higher the fire danger, the more dangerous the conditions. These forecasts are updated daily during the fire danger season and are available on the NSW RFS website (http://www.rfs.nsw.gov.au/fire-information/fdr-and-tobans) and the BOM website (http://www.bom.gov.au/nsw/forecasts/fire-danger-ratings.shtml).

To reduce the risk of fires damaging or destroying life, property and the environment the NSW RFS Commissioner may also declare a Total Fire Ban (TOBAN). In a Total Fire Ban no fire may be lit in the open and all fire permits are suspended. No general-purpose welding, grinding, soldering or gas cutting can be done in the open. Fire permits are also suspended on days of total fire ban. Permits may resume after the Total Fire Ban is lifted, as long as the permit has not expired. The NSW RFS Commissioner is responsible for exemptions to Total Fire Bans. These exemptions are detailed in the NSW Government Gazette each time a Total Fire Ban is declared under the RF Act section 99.

Emergency Management and Operations Plan

An Emergency Management and Operations Plan should be prepared for the solar farm that provides the following:

- A site plan showing infrastructure, site access from Tarana Road and the internal road layout;
- Control and coordination arrangements for emergency response (e.g., triggers, evacuation procedures, emergency assembly areas and procedures for response to hazards);
- Construction of asset protection zones and their continued maintenance;
- Location of all fire control advantages within the Project Area (e.g., access road, gates, water points);
- Agreed roles and responsibilities of onsite personnel (e.g., equipment isolation, liaison, evacuation management);
- Up-to-date contact details including alternative telephone of site personnel and any relevant offsite personnel who could provide technical support during an emergency, including a 24/7 contact;
- A manifest (and safety data sheets) for any battery, diesel or other dangerous goods storage/handling, including the class identification, quantity, type (bulk or packaged) and location. Appropriate material (including absorbent, neutralisers, equipment and personal protective equipment) for the clean-up of spills is to be provided and available onsite;
- Fire reporting and response to formal emergency alerts;

- Activation of water spray/foam systems and any other response/protection measures; and
- Any other risk control measures required to be followed by firefighters.

The Emergency Management and Operations Plan will be prepared with consideration of Australian Standard/ISO 31000 Risk management principles and guidelines and Australian Standard 3745: Planning for emergencies in facilities.

5.6 CUMULATIVE IMPACTS

The proximity of multiple construction and/or operational projects provides an opportunity for potential cumulative impacts. The cumulative impacts related to bushfire mitigation are as follows:

- Volunteer fire-fighter workload – Response call outs should not significantly increase because the ignition risk will be very low. There will, however, be an ongoing requirement for briefing on the Emergency Management and Operations Plan; and
- Construction stage transport and road use – The bushfire mitigation will add a small percentage to the total construction traffic and road use.

  Ongoing operations – there would not be any cumulative operational impacts although it is noted that the proximity of multiple construction and/or operational projects may exceed the current capacity of local fire fighting resources. This will need to be addressed in consultation with NSW RFS.

The proximity of multiple projects actively managing fire risk could assist in management responses and may create a positive cumulative impact, in comparison with existing conditions. In consultation with key stakeholders, the preparation of the Emergency Management and Operations Plan will consider the most current information available regarding fire risk from and to surrounding land uses.

6. CONCLUSION

Detailed mitigation measures have been developed to meet the relevant provisions outlined in Section 8.3.5 of Planning for Bush Fire Protection 2019 and to ensure that the solar farm development does not present any increased risk of widespread fire across the landscape. These mitigation measures will be applied for the life of the Project and have been summarised in **Table 6-1**.

TABLE 6-1 SUMMARY OF RECOMMENDED MITIGATION STRATEGIES AND ACTIONS

Mitigation Strategy	Action	Timing
Asset Protection Zone (APZ)	A minimum 10 m APZ is to be established around the perimeter of the Impact Area (including solar array and BESS), and on all sides of the substations, switching station, and O&M Buildings. Essential equipment should be designed and maintained so that it will not serve as a bush fire risk to surrounding property. All APZ are to be managed as an inner protection zone (IPA) as outlined within Appendix 4 of PBP 2019, and NSW RFS 'Standards for Asset Protection Zones'. APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners.	The APZ will be constructed as the first stage of development and maintained for the life of the Project.
Access Roads	Access to the Project rea during construction and operations is expected via the regional council road network, with a single access point off Tarana Road to the south. All roads will be maintained to the minimum standards as outlined within the NSW RFS Fire Trail Standards (RFS, 2023). All access roads must be maintained and kept free of parked vehicles or other obstructions.	Constructed as the first stage of development and maintained for the life of the Project.
Water storage	A dedicated water supply with appropriate access is required at the site to assist in the event of a fire. The final list of fire suppression equipment and water storage requirements will be confirmed in consultation with NSW RFS and FRNSW following project approval and detailed design. The most appropriate locations and number of tanks required will need to be identified in response to the final BESS design (centralized or decentralized options).	During Construction and maintained for life of the Project
Transmission lines	For the safe operation of the transmission line, certain activities will be restricted within the easement such as planting and growing trees, construction of buildings, or erection of antennae or masts. While it has not be confirmed how the easement will be formally registered, for the purposes of this bushfire risk assessment, key responsibilities and management measures will be applied and are the responsibility of the asset owner (TransGrid).	Maintained for life of the Project.
Construction Phase	• The APZ and access roads will be constructed prior to the installation of any solar panels or related infrastructure;	During Construction and maintained for life of the Project

Mitigation Strategy	Action	Timing
	• Fire detection and suppression systems should be installed at the earliest stage of construction for BESS infrastructure. • Ensure appropriate bunding in areas where there is potential for flammable fuels and oils to leak and create bushfires or other environmental risks; • Install appropriate signs to assist emergency response crews determine the location of infrastructure; • Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to; • Adhere to restrictions on Total Fire Ban or days of high fire danger; • Carry emergency communications equipment; • Restrict smoking to prescribed areas, and provide suitable ash and butt disposal facilities; • All plant, vehicles and earth moving machinery are cleaned of any accumulated flammable material (e.g., vegetation); • On days of Extreme or Catastrophic fire danger, access to the site should be limited to essential works only.	
Operation Phase	Vegetation fuels throughout the solar farm are to be maintained in a minimal condition by grazing, or with additional slashing or mowing if required. A Bushfire Emergency Management and Operations Plan will be prepared with consideration of Australian Standard/ISO 31000 Risk management principles and guidelines and Australian Standard 3745: Planning for emergencies in facilities.	For the life of the Project

IMPORTANT DISCLAIMER:

Any representation, statement of opinion, or advice expressed or implied in the bushfire assessment will be made in good faith on the basis that ERM employees and / or agents are not liable (whether by reason of negligence, lack of care or any other reason) to any person, company or their agents for any damage or loss whatsoever which has occurred or may occur in relation to that person taking (or not taking) action in respect of any representation, statement or advice provided within the bushfire assessment.

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APPENDIX A COMPLIANCE WITH THE OBJECTIVES OF PLANNING FOR BUSHFIRE PROECTION GUIDELINES

COMPLIANCE WITH THE OBJECTIVES OF PBP 2019

Objective	Comment	Can comply
Objectives of Chapter 1 (Part 1.1)		
Afford buildings and their occupants protection from exposure to a bush fire;	A *minimum* separation distance of 10m is recommended in accordance with Section 8.3.5 of PBP 2019 noting that some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact.	☒ Yes ☐ No
Provide for a defendable space to be located around buildings;	A *minimum* separation distance of 10m is recommended in accordance with Section 8.3.5 of PBP 2019 and must be established around the perimeter of the solar arrays, and on all sides of the substations, switching station, BESS and O&M Buildings.	☒ Yes ☐ No
Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;	A *minimum* separation distance of 10m is recommended in accordance with Section 8.3.5 of PBP 2019 and must be established around the perimeter of the solar arrays, and on all sides of the substations, switching station, BESS and O&M Buildings. This will include the internal perimeter road and carparking areas.	☒ Yes ☐ No
Ensure that appropriate operational access and egress for emergency service personnel and occupants is available;	A single access point will be constructed as the first stage of development and will be maintained for the life of the Project All roads will be maintained to the minimum standards as outlined within PBP 2019.	☒ Yes ☐ No
Provide for ongoing management and maintenance of BPMs; and	Normal property maintenance and ongoing grazing will ensure that bush fire protection measures are maintained. A Bush Fire Emergency Management and Operations Plan will be developed prior construction.	☒ Yes ☐ No
Ensure that utility services are adequate to meet the needs of firefighters	Normal property maintenance will ensure that bush fire protection measures including the provision of adequate water supply are maintained. The final water storage requirements will be confirmed in consultation with NSW RFS and FRNSW following project approval and detailed design.	☒ Yes ☐ No
Objectives of Chapter 8 (Part 8.3.5)		
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	A *minimum* separation distance of 10m is recommended in accordance with Section 8.3.5 of PBP 2019 and must be established around the perimeter of the solar arrays, and on all sides of the substations, switching station, BESS and O&M Buildings.	☒ Yes ☐ No

Objective	Comment	Can comply
	This will include the internal perimeter road and carparking areas.	
The APZ must be maintained to the standard of an IPA for the life of the development.	All APZs are to be managed as an inner protection zone (IPA) for the life of the development as outlined within Appendix 4 of PBP 2019, and NSW RFS 'Standards for Asset Protection Zones'	☒ Yes ☐ No
Essential equipment should be designed and housed in such a way as to minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies.	Detailed design will minimise the impact of bush fires on the capabilities of the infrastructure during bush fire emergencies.	☒ Yes ☐ No
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.	Bushfire emergency management and response planning, including the preparation of a Bush Fire Emergency Management and Operations Plan, will be undertaken in consultation with NSW RFS and FRNSW following project approval and based on the final development design.	☒ Yes ☐ No

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