



Report

Bushfire Risk Management Plan (Renewable Energy)

LOCATION: MID-WEST WIND FARM

CLIENT: SLR CONSULTING AUSTRALIA PTY LTD



DOCUMENT ISSUE APPROVAL

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Author:

Linden Wears

Senior Bushfire Engineer



BSc, GradDip (Fire Safety Eng.), GradDip
(Bushfire Protection)

BPAD Level 3 Accredited Bushfire
Practitioner

Abbreviations Used in Report

Abbreviation	Full Meaning
AS3959	AS 3959:2018 – Construction of Buildings in bushfire-prone areas
BAL	Bushfire Attack Level
BMP	Bushfire Management Plan
BRMP	Bushfire Risk Management Plan
FFDI	Forest Fire Danger Index
NCC	National Construction Code (Building Code of Australia)
PCS	Power Conversion System
RHF	Radiant Heat Flux
SPP	State Planning Policy
WAPC	Western Australia Planning Commission

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1 Introduction

1.1 Background

Mid-West Wind Farm Pty Ltd (the Proponent) is lodging a development application for the new Mid-West wind farm development, which is proposed to occur across a number of lots (the wind farm development site) within the City of Greater Geraldton.

The proposed wind farm development is expected to include the following infrastructure:

- Wind turbine generators
- Battery Energy Storage System (BESS) and associated infrastructure
- Substation
- Transmission lines
- Ancillary buildings (e.g. O&M building, workshop etc)
- Internal wind farm driveway networks
- Firewater tank/s

A plan of the proposed development is provided in Figures 1-1, 1-2, 1-3 and 1-4 of the project Bushfire Management Plan (BMP) that accompanies this report.

Once operational, onsite visitation is expected to be as follows:

- Occupant numbers are expected to be up to 15 on-site personnel (from Monday to Friday), including a Supervisor, technicians, planner and possibly an admin/stores person.
- In addition to onsite monitoring, the facility will have offsite monitoring 24 hours a day/7 day a week, by an offshore team that can remotely start/stop the wind turbines, if required.

As detailed in Section 1.4, this BRMP has been prepared to assess the proposed renewable infrastructure against the relevant the Country Fire Association (CFA) Design Guidelines and Model Requirements: Renewable Energy Facilities, to demonstrate the bushfire risk associated with this infrastructure has been appropriately managed. This differs to the purpose of the project BMP which is to demonstrate compliance for habitable buildings against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

1.2 Relevant Legislation and Guidance

- State Planning Policy 3.7: Bushfire (SPP 3.7) and the Planning for Bushfire Guidelines (the WA Guidelines).
- WAPC Position Statement: Renewable energy facilities, 2020
- CFA Design Guidelines and Model Requirements: Renewable Energy Facilities v4.4, 2025
- Building Code of Australia / National Construction Codes (BCA/NCC)
- AS 3959 Construction of Buildings in Bushfire Prone Areas
- Local Government Firebreak Notices
- AS 3745-2010 Planning for Emergencies in Facilities
- Dangerous Goods Safety Act 2004

- Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007 (the Regulations)
- Australian Dangerous Goods Code (ADG Code) for transport by Road and Rail.

1.3 Regulatory Context

As portions of the wind farm site are designated as bushfire prone as per the *Map of Bush Fire Prone Areas* (DFES 2026; see Figure 1-5 in BMP), should any permanent buildings be sited in these areas, the proposal would need to be assessed against *State Planning Policy 3.7: Bushfire* (SPP 3.7; WAPC 2024) and the *Planning for Bushfire Guidelines* (the WA Guidelines; WAPC 2024).

A Bushfire Management Plan (Covey 2026) has been prepared to accompany the development application, as per SPP 3.7 Policy Measure 7(ii), on the basis that while the proposed permanent buildings are sited outside a designated bushfire prone area, they would have a pre-development rating of BAL-40/FZ, thus the Proponent has elected to voluntarily respond to the bushfire risk through demonstrating compliance with SPP 3.7 and the WA Guidelines as much as practical.

As detailed in Section 1.3 of the project BMP, given the renewable energy infrastructure (e.g. wind turbines, BESS, substation) are not considered “habitable buildings” as defined in WA Planning Regulations, compliance with SPP 3.7 and the WA Guidelines isn’t triggered and the compliance pathway with respect to bushfire, is less defined. Current advice provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the Guidelines, however application of the CFA *Design Guidelines for Renewable Energy Facilities v4.4* (CFA; 2025; CFA Design Guidelines) from Victoria fire brigade, is the best publication to demonstrate compliance with at this stage, albeit rationalised for WA context.

Some high-level information from the following has been provided in the subsections below, regarding the following guidance documents with respect to renewable energy infrastructure bushfire risk management:

- CFA Design Guidelines for Renewable Energy Facilities
- WAPC Position Statement: Renewable Energy Facilities
- City of Greater Geraldton Firebreak Notice

Covey notes that a number of local councils have produced, or are drafting, Local Planning Policies (LPP) specifically for wind farms in their jurisdiction, however the City of Greater Geraldton doesn’t appear to have a wind farm LPP published or in draft.

1.3.1 [CFA Design Guidelines for Renewable Energy Facilities](#)

This guidance material developed by the CFA for renewable energy facilities, namely their publication *Design Guidelines and Model Requirements: Renewable Energy Facilities v4.4* (CFA 2025), requires that a Risk Management Plan is to be developed for renewable energy facilities which includes the following:

- Description of the risks and hazards at the facility to and from the facility and related infrastructure.
- Detail the following:
 - The location of the renewable energy infrastructure on-site and in the landscape.
 - Emergency vehicle access to and within the facility that:
 - Includes site access points of a number suitable to the size and hazard of the facility
 - Provides access to renewable energy infrastructure, substations and fire service infrastructure.
 - Firefighting water supply for the facility.

- Asset Protection Zone/s of 10m or greater, based on radiant heat flux (output) as an ignition source:
 - Around the perimeter of the facility.
 - Between any landscape buffer/vegetation screening and renewable energy infrastructure.
- The separation distance, based on radiant heat flux (output) as an ignition source, between:
 - Renewable energy infrastructure, buildings/structures, and vegetation.
 - All other controls for the management of on and off-site hazards and risks at the facility (including all proposed safety and protective systems).
- Provide risk controls to mitigate the identified hazards, including justification for the omission of any battery safety and protective system/s.
- Form the basis for the design of the facility

While the facility Risk Management Plan is to address both onsite fires within renewable energy infrastructure and bushfires, this BRMP provides this relevant information detailed above for the bushfire-related risk to (and from) the proposed development.

The CFA Guidelines is organised with a number of sections as follows, each section containing guidance and what it terms “Model Requirements” for all renewable energy facilities as well as specific measures for wind, solar, battery energy storage (BESS) and substation/electric line infrastructure:

- Fire Risk Management
- Facility Location
- Facility Design
- Facility Construction and Commissioning
- Facility Operation
- Emergency Planning

A summary of the CFA Guidelines sections (relevant to this project) is provided in the compliance assessment on Table 2 in Section 4.

1.3.2 [WAPC Position Statement: Renewable Energy Facilities](#)

WAPC have released a Position Statement on renewable energy facilities, in which they note the following with respect to bushfire risk management:

- Renewable energy facilities in Western Australia are principally wind turbine and solar array systems.
 - There is no specific mention of BESS facilities in this Position Statement.
- The objectives of this position statement include facilitate appropriate development of renewable energy facilities while minimising any potential impact upon the environment, natural landscape, and urban areas
- Wind turbines and solar arrays in bushfire prone areas should be designed and maintained so they are not a bushfire risk to surrounding bushland, and where possible should not be in bushfire prone areas with an ‘extreme’ bushfire hazard level or bushfire attack level (BAL) - 40 or BAL- Flame Zone.
- A minimum 10 metres clearance to combustible vegetation in the form of an Asset Protection Zone (APZ) is recommended.
 - The APZ should be managed in a low threat state, in accordance with the Guidelines.

This BRMP will aim to comply with the WAPC Position Statement as much as practical.

1.3.3 [City of Greater Geraldton Firebreak Notice](#)

The City issues a firebreak notice annually (see Appendix G in the project BMP), that include the following that may apply to this project:

- For broadacre or commercial farms (with area >50,000 m²)
 - Require a 20 m Asset Protection Zone around all buildings, structures (including private power poles) and assets
 - Fuel load to be reduced to 2 t/ha within APZ
 - Trees over 5 m high are to be underpruned to 2m above ground level
- All properties with an approved BMP in effect, must comply with the requirements of the firebreak notice and with all additional requirements outlined in the BMP.
- Additional guidance relating to perimeter firebreaks, restrictions on burning and harvesting (which is not expected to be applicable to this development).
- Firebreak notice applies from 4 October to 1 May

1.4 Purpose

The focus of this BRMP is to apply and demonstrate compliance of the proposed renewable energy infrastructure with the Model Requirements of the CFA Guidelines, with summary of the derived bushfire management measures derived from this BRMP included in the project BMP, to provide a complete summary of the Proponents bushfire risk management obligations for this project.

2 Renewable Energy Assets and Hazard Analysis

2.1 Onsite Renewable Energy Assets

The proposed development is expected to include the following onsite renewable energy infrastructure:

- **Wind turbine generators**
 - Approximately 98 wind turbines with a generation capacity up to 700 MW
 - The proposed make/model of wind turbines is the EnVentus V172-7.2 model with the following anticipated specifications:
 - Hub height of 150 m
 - Blade width of 84 m
 - Rotor diameter of 172 m
 - Turbines are steel tower casings to ground level, with proprietary blades likely constructed with balsa wood or foam, and an outer shell of fibreglass or composite material
 - Located in a cabinet in the nacelle is an air-cooled transformer in the nacelle (transforms 690 vAC to 33 KV), complete with fire detection and suppression systems (as detailed Section 3.1.4.1)
 - A nominal hard stand area required at each turbine location for construction and major maintenance.
- **Battery Energy Storage System (BESS) and associated infrastructure**
 - The following BESS building/s and infrastructure is proposed within a BESS envelope (approximately 300m x 825m) on 2921 Nangetty-Walkaway Rd:
 - BESS Operations and Maintenance (O&M) Building (addressed in project BMP)
 - BESS modules (approximately 1120 modules)
 - Power Conversion System (PCS) containers (approximately 224 PCS)
 - Auxiliary Skids (approximately 32 skids)
 - Collector Switchgear (approximately 4)
 - Firewater tanks
- **Substation**
 - Assumed to contain transformers, switchroom/s, control room etc as per standard substation.
 - Contains an oil-cooled transformer in the substation (transforms 33 KV to the grid voltage of 220 kV, 330 kV, and 500 KV), and is located in a concrete-bunded tank.
 - Expected to be designed and constructed in accordance with relevant Australian Standards and Western Power specifications, by Western Power.
- **Transmission lines**
 - Below ground 33 kV distribution lines from turbines to substation
 - Above ground high voltage transmission lines to connect to existing Western Power transmission line

2.1.1 Wind Turbine Component Overview

A wind turbine (also known as a wind turbine generator), is a device that converts the kinetic energy of wind into electricity. In simple terms, the turbines blades use the aerodynamic force of the wind (much like an aeroplane) to turn a rotor, which spins a generator to produce electricity, which is typically fed into the mains power network as a source of renewable energy.

The horizontal axis wind turbine generators proposed at the wind farm consist of the following elements:

- Tower
 - The tower supports the structure of the turbine
 - Constructed of steel
- Nacelle
 - The nacelle sits on top the tower, and houses the key mechanical elements: the gear box, generator, shaft and brake.
 - Typically constructed of metal, fibreglass or composite materials
- Hub
 - The turbine blades fit into the hub that is connected to the turbine's main shaft.
 - Typically of metal construction.
- Blades
 - Three blades located on top of the turbine, which connect to the turbine hub.
 - When wind flows across the blade, the air pressure on one side of the blade decreases. The difference in air pressure across the two sides of the blade creates both lift and drag. The force of the lift is stronger than the drag and this causes the rotor to spin.
 - The blade construction is generally proprietary, however typically the blade core structure mostly balsa wood or foam, with the outer shell generally fibreglass or composite material.
- Drivetrain
 - The drivetrain is comprised of the:
 - Rotor
 - The blades and hub together form the turbine's rotor.
 - Main bearing
 - The main bearing supports the rotating low-speed shaft and reduces friction between moving parts so that the forces from the rotor don't damage the shaft.
 - Shafts (low-speed and high-speed)
 - The low-speed shaft connects the rotor and hub to the gearbox
 - The high-speed shaft connects from the gearbox to the generator
 - Gearbox
 - The gearbox connects the main (low-speed) shaft to the high-speed shaft, thereby converting the low-speed incoming rotation to high-speed rotation required by the generator to produce electricity.

- Generator
 - The generator, which is driven by the gearbox, houses copper windings that turn through a magnetic field to produce electricity.
 - The majority of the drive train components are metal, but there are a number of lubricants also contained in this system.
- Rotor Brake and Lock
 - A rotor brake keeps the rotor from turning after it's been shut down. Once the turbine blades are stopped by the controller, the brake keeps the turbine blades from moving.
 - The system typically consists of a friction disc brake that is often hydraulically activated.
 - In addition to the rotor brake, a rotor lock (or locking bolt) is required to manually fix the rotor in place for maintenance.
- Yaw System
 - The yaw drive rotates the nacelle on upwind turbines to keep them facing the wind when wind direction changes. The yaw motors power the yaw drive to make this happen.
 - Downwind turbines don't require a yaw drive because the wind manually blows the rotor away from it.
- Controller
 - The controller manages the starting and stopping of the turbine, usually based on wind speed (i.e. sufficient wind to start and shutting off at excessive wind speeds).
 - Contains a number of sensors and a control system, to continuously monitor wind speed, direction, turbine performance, and other vital parameters.
 - This system adjusts the blade pitch and other aspects to optimize power generation while ensuring safe operation within wind speed limits.

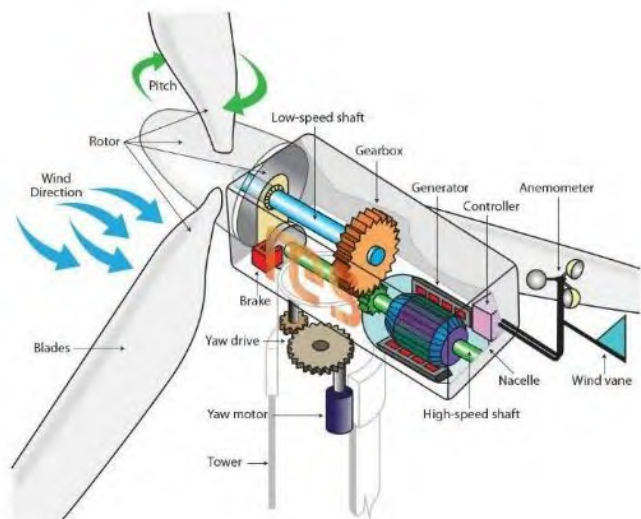
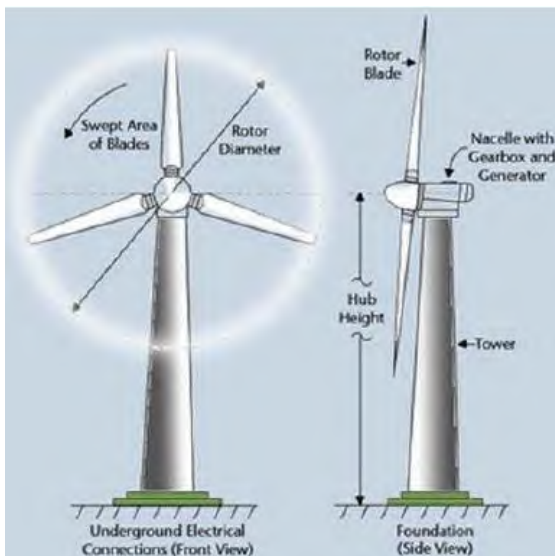


Plate 1: Wind Turbine Components

2.1.2 Additional BESS Information

The make/model of BESS and electrical infrastructure is still under review by the Proponent and is yet to be finalised, however the following general information has been provided regarding the anticipated BESS:

- Grid-scale, industrial strength energy storage system including:
 - Housed in purpose-made steel container with various compartments (see Plate 2) including:
 - Battery compartment (containing Li-ion batteries),
 - Thermal management compartment (chiller) and
 - Electronics compartment (battery management system, associated power and electronic infrastructure)
 - Internal fire/thermal compartment barriers (internal fire rated walls), in particular separating the battery compartment from all adjacent compartments.
 - Thermal management system consisting of a chiller unit (fire separated from battery compartment)
 - Battery management system to monitor and manage battery functionality, and provide early warning of faults especially thermal runaway.
 - Internal fire and gas monitoring/detection system, connected to the plant wide control system, providing early warning of internal fire or gas accumulation.
 - Internal fire suppression system/s including aerosol suppression system within the containers, with potential internal fire sprinkler system being reviewed.
 - Ventilation system including explosion proof fan system with low-level inlet and high-level outlet/exhaust
- Certified under UL9540A
- Will contain new rechargeable lithium-ion batteries (UN3480/ UN3481)
 - Class 9 Miscellaneous Dangerous Goods
 - HAZCHEM 4W
- Will be sited solely in the nominated BESS envelope

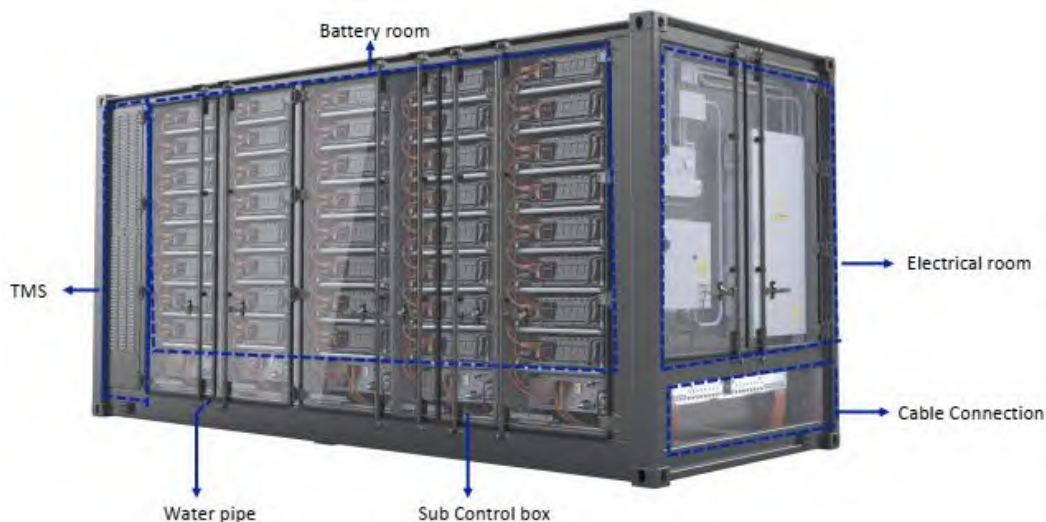


Plate 2: Indicative BESS compartmentation

2.2 Site Description

A detailed description of the wind farm site is provided in Section 1.2 of the project BMP, which is summarised below:

- The proposed wind farm is to be located across a number of existing rural land holdings
- Most land within, and surrounding, the wind farm site is grassland, with isolated plots of non-grassland vegetation.
- Burma Road Nature Reserve is the only significant plot non-grassland vegetation within, or near, the wind farm, and was observed to be mostly shrubland vegetation.
- Public road access to the wind farm site is largely via Walkaway-Nangetty Road, Burma Road and Allanooka Springs Road, with a number of other roads providing access within the site.
- Vehicular access within the wind farm lots, is currently via existing unsealed farm roads and tracks, which are of various levels of construction, but generally there are some significant internal driveways that are suitable for heavy vehicles, given the agricultural use of this land.
- There is no known reticulated town main water supply currently provided to any lots within the wind farm site, nor is there any existing street hydrants.

2.3 Bushfire Hazard Assessment

Given the renewable energy infrastructure (especially wind turbines and BESS) is not required to achieve target BAL ratings as per the CFA Guidelines, there is no specific requirement to have BAL contour mapping. Notwithstanding, it is noted that the CFA Guidelines do provide some high-level guidance on separation of turbines from unmanaged vegetation, so on that basis, vegetation and effective slope mapping using the AS 3959 site assessment methodology has been undertaken for the wind farm site to inform the discussion and compliance assessment with CFA Guidelines. Additionally, as detailed later in this BRMP, to address the thermal runaway risk, the BESS modules and other associated infrastructure have been allocated target BAL ratings which is depicted as part of BAL contour mapping within the project BMP.

2.3.1 [Vegetation classification and effective slope](#)

Covey assessed classified vegetation, exclusions and effective slope within 150 m of the wind farm site through on-ground verification on 7 February 2025 in accordance with AS 3959—2018 *Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix A and Table 1, and depicted on Figure 2-1 and Figure 2-2.

It is noted that some construction infrastructure (site office, concrete batching plant, laydown) is proposed within the wind farm site, however this is expected to be decommissioned shortly after operation commences, and it is assumed will be subject to regrowth which will return it to the original grassland state.

Effective slope results were cross-referenced with 2 m elevation contours (derived from ELVIS satellite digital elevation model data), and are summarised on Table 1, and depicted on Figure 2-1 and Figure 2-2.

The effective slope for the remainder of the classified vegetation further than 150 m from the building and substation envelopes is not technically required, however has been provided to give some guidance of the general slope in the areas around the turbine bases. Site observations were that almost all land is gently undulating, with some areas of slightly steeper land noted near local high points, but this was rare). Given the

elevation contour data and the site observations, a blanket effective slope of downslope 0°-5° was designated for all classified vegetation, despite the reality that some aspects would be flat/upslope (0°).

It is reiterated that the mapping has been conducted at a relatively broad scale, to provide some indication regarding the proximity of proposed renewable energy infrastructure, to continuous non-grassland vegetation.

2.3.2 Summary of inputs

Table 1 summarises the vegetation classifications and exclusions within 150 m of the proposed wind farm. The post-development vegetation classifications/exclusions and effective slope are illustrated on Figure 2-1 and Figure 2-2.

Table 1: Vegetation classifications/exclusions and effective slope (within 150 m of wind farm site)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Unmanaged grass >100 mm high
2	Class B Woodland	Downslope >0–5°	Mature trees which have limited understorey growth including areas where understorey has been grazed out or otherwise removed.
3	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Land at building and substation envelopes, to be modified to non-vegetated elements and low threat landscaping as part of the development works including Asset Protection Zones. It is acknowledged that land at each turbine will also be modified to establish the turbines footprint, associated NVZ/APZ and crane pads, however this has not been mapped given the scale of mapping.
4	Class D Scrub	Downslope >0–5°	Vegetation between 2 m -6 m high at maturity.
5	Class C Shrubland	Downslope >0–5°	Vegetation less than 2 m high at maturity.
6	Class A Forest	Downslope >0–5°	Mature trees (>6 m high) with multi-layered, shrubby understorey

2.3.3 Likelihood of Bushfire Impact

The likelihood of bushfire impact on renewable energy facilities is tied to the potential for bushfires to impact the site. To provide some guidance on this, historical bushfires have been depicted on Plates 1 and 2, using the following publicly available datasets:

- Firewatch which is a Landgate service that uses satellite remote sensing imagery to detect fire hotspots and burnt areas, to track live bushfires but also to review the broad extent of past fire events from 1989 to present day.
 - Several fires have occurred within Burma Nature Reserve, notably in 2021, 2023 and 2024.
 - The majority of other bushfires have occurring in the agricultural land within and surrounding the wind farm site in 2015, 2017, 2021, 2023 and 2024.
- DBCA Fire History dataset which contains a collection of records of fire events (prescribed burns and bushfire) which were captured on departmental-managed land, and where available non-department managed land in Western Australia. The earliest records available are from 1937.
 - The majority of fires have occurred in Burma Road Nature Reserve, and appear to be a combination of prescribed burns commencing in 2003, and several bushfires in 1992, 2005 and 2021.
 - The majority of actual bushfire events appear to have been contained to the reserve.

The historical data depicts that while bushfires have regularly occurred in the local area, a significant number occur in the larger reserves containing remnant vegetation. Where the fire ignite in agricultural land, or spread from the reserves, these fires appear to generally be contained to relatively small-scale fires, likely due to lack of fuel (if harvesting has occurred) or due to being predominantly grassfires with reduced fire behaviour, that are more easily suppressed by local fire brigades and pastoralists, who are generally adept at managing these types of fires.

While there appear to be few historical bushfires within the site, this BRMP assumes that bushfire impact could occur in the future, and addresses the risk accordingly.

2.3.4 [Bushfire Hazard Summary](#)

The greatest bushfire threat to the proposed development is likely from bushfire escaping from Burma Road Nature Reserve, and impacting proposed infrastructure around that area, however it is noted that while there are fire runs of between 5-10 km possible, the vegetation in this reserve appears to be mostly low shrubland vegetation (<2 m high), so fire behaviour would likely be more aligned with grassfire behaviour than from forest/woodland or scrub.

Outside of the nature reserve, fires could spread from any direction toward the proposed renewable energy infrastructure, and could theoretically be from fire runs tens of kilometres long, however the historical record shows that fires in the area tend to be limited to approximately 5 km long, likely due to the skill of local fire brigades and pastoralists in managing grassfires.

The fires outside of the nature reserve would spread through primarily grassland vegetation on undulating slopes, with small, isolated plots of scrub, woodland and forest vegetation scattered throughout the grassland. Given the predominant grassland vegetation, fire behaviour is expected to have a very quick residence time for peak radiant heat impact, and with little associated ember attack, with a minor escalation in radiant heat impact, residence time and ember attack as fire passes through the isolated non-grassland plots.

Vehicular access in the local area via public roads is relatively good, with internal farm tracks providing additional 2WD and 4WD access within lots, in addition to perimeter firebreaks.

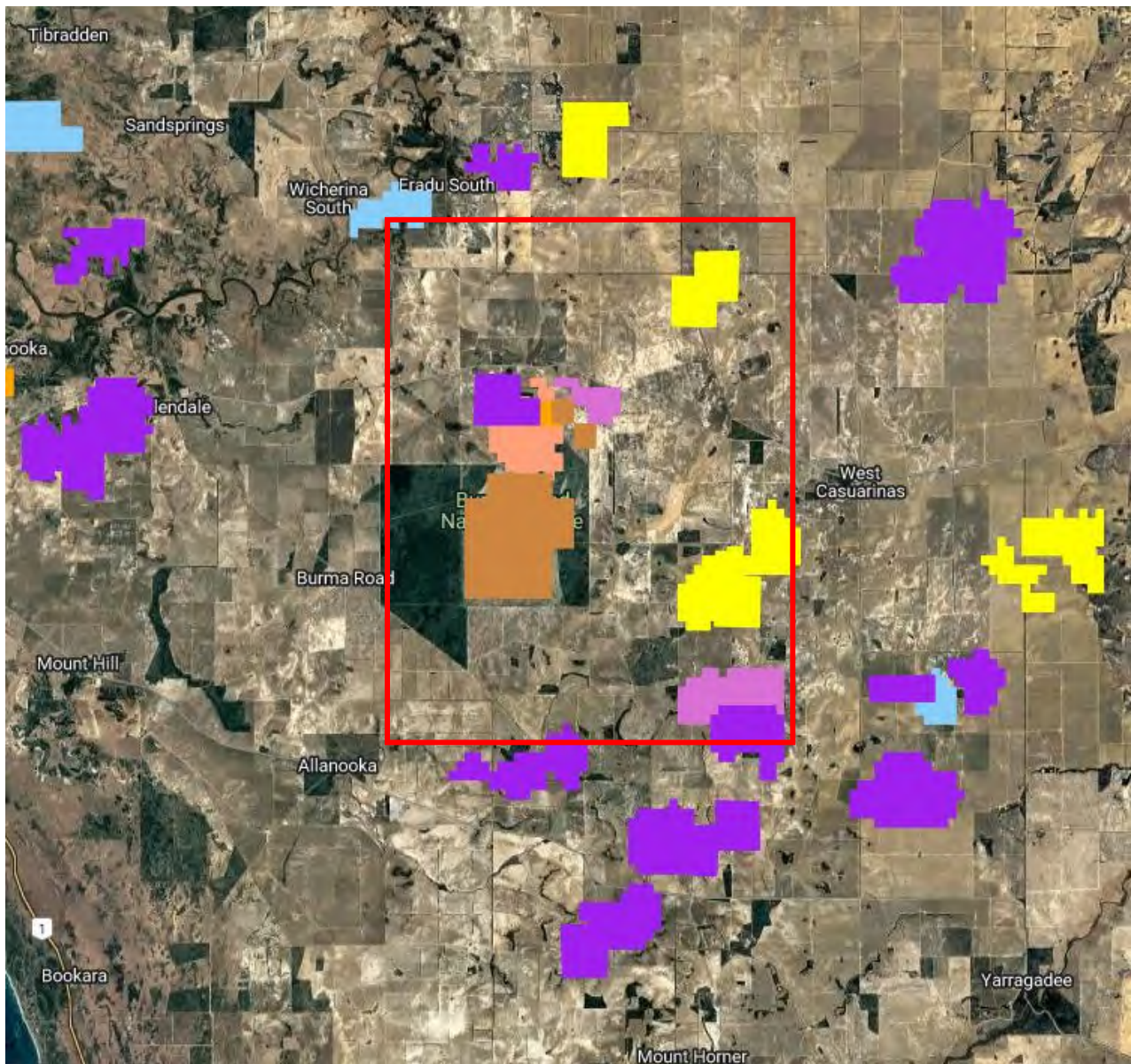


Plate 3: Bushfire History (Firewatch 2026)

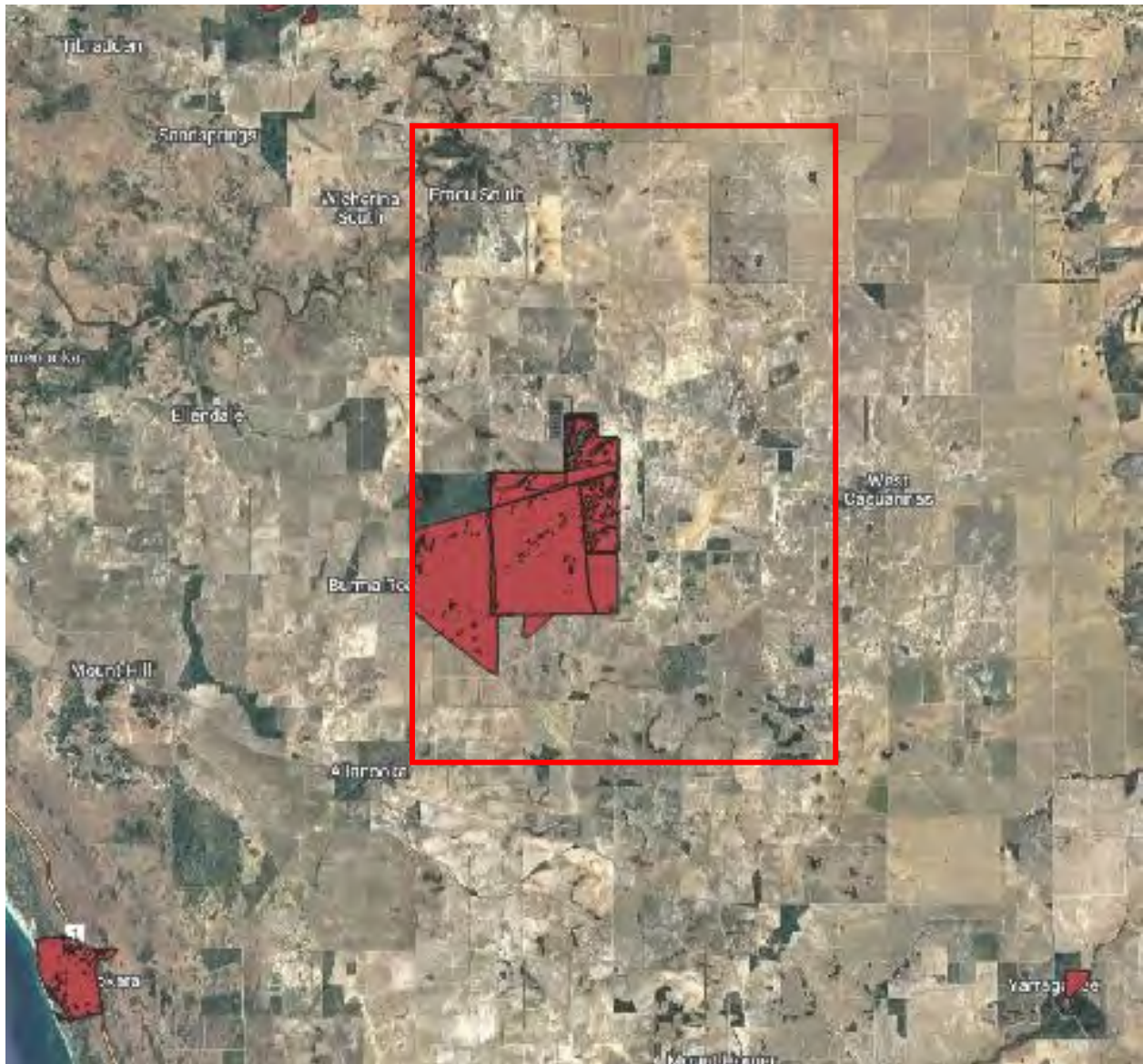
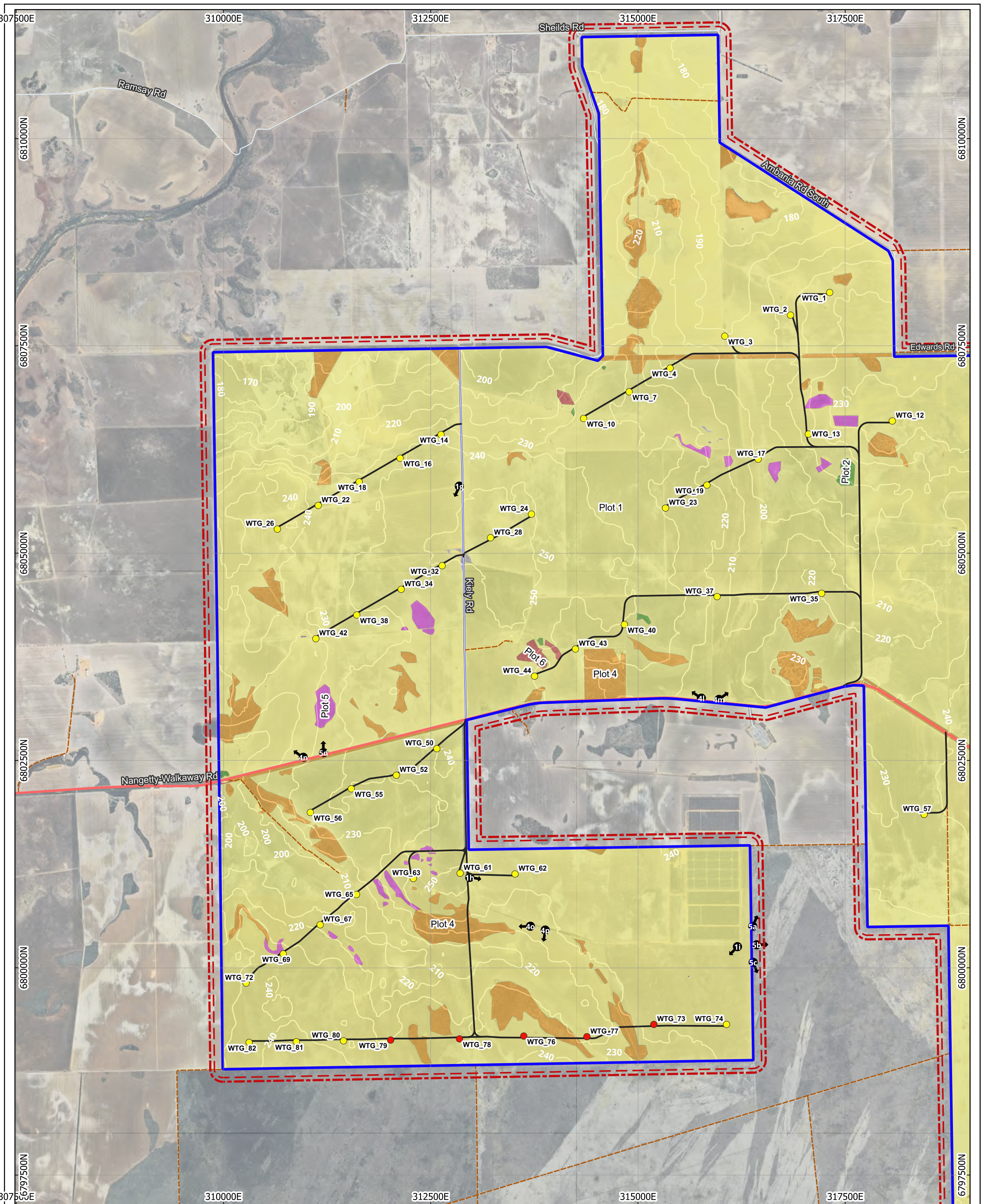


Plate 4: Bushfire History (DBCA 2026)



Legend

- | | | | |
|---|-------------------------|-----------------------|-------------------------------------|
| ● Photo Points | Proposed infrastructure | Minor, Unsealed | C. Shrubland |
| Proposed Layout | Access Track - New | Others | D. Scrub |
| Project Assessment Area | Laydown | Track, Unsealed | G. Grassland |
| Project Boundary 100m Buffer | Roads | Other | Excluded Clause 2.2.3.2 (e) and (f) |
| Project Boundary 150m Buffer | Main Roads | Vegetation | Elevation and Slope |
| Project Boundary | Main, Sealed | Classified vegetation | 1 Second Dem Contours |
| ● Wind Turbine Generator (WTG) and number | Minor Roads | A. Forest | |
| | Minor, Sealed | B. Woodland | |

Figure 2-1. Vegetation and effective slope (West)

Mid-West Wind Farm

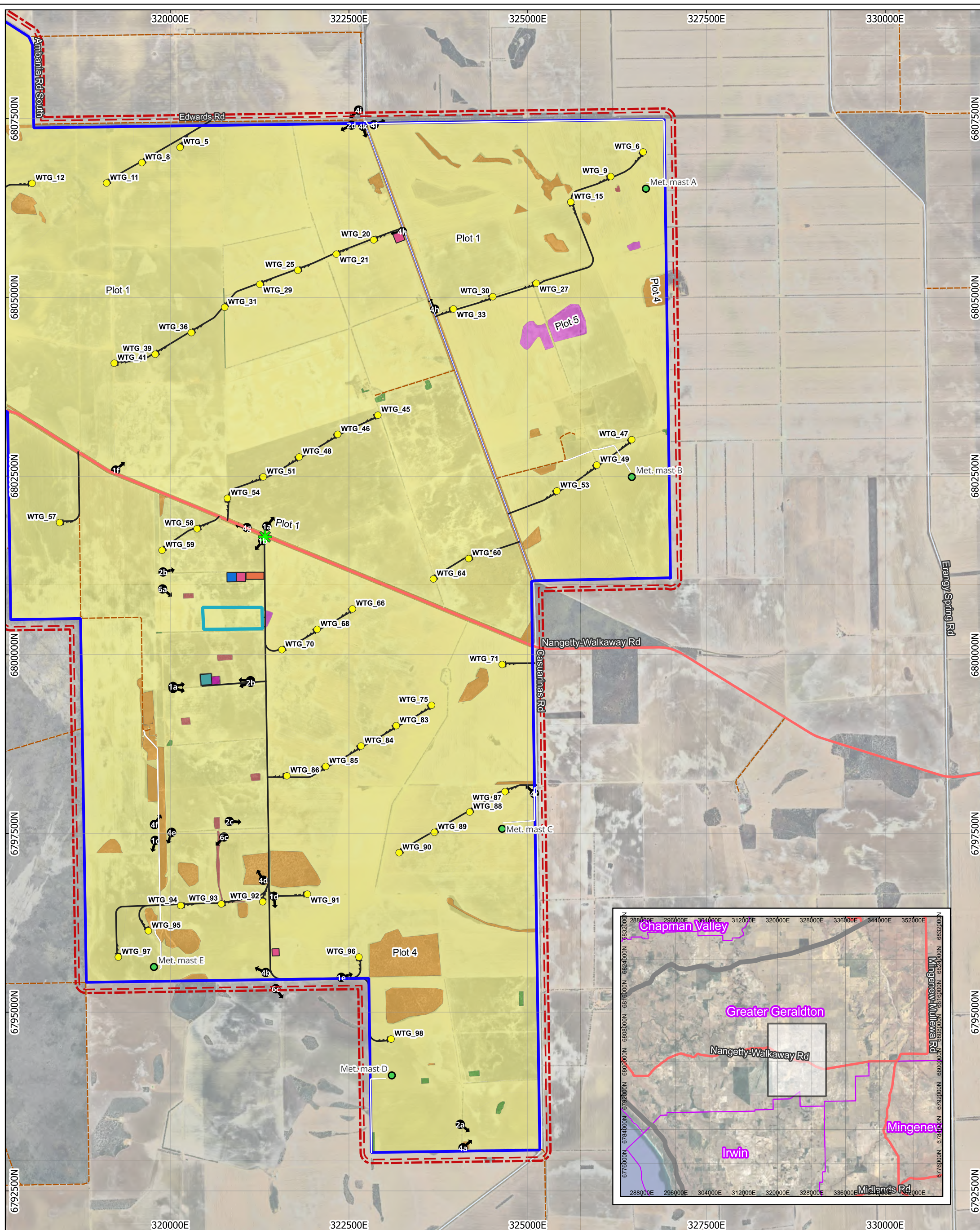
0 750 1,500 m



2.1_Vegetation and Effective Slope (West)_0001

CRS: GDA2020 / MGA zone 50
Date created: 16/09/2026
Author: Aaron Bulfin

Disclaimer: This map has been prepared for the use of the nominated client for the purposes of this project. The information shown is based on spatial data created by Covey Associates Pty Ltd, sourced from third-party datasets and mapping services, including client-provided information and publicly available government and commercial sources. Covey Associates Pty Ltd does not guarantee the accuracy, completeness, or currency of the underlying spatial data. Mapping information is indicative, not to be used for construction purposes and is subject to spatial limitations.
Data Source: Map data ©2015 Google, © ESRI



Legend

-
- The map displays the proposed infrastructure and layout for a wind farm. The legend is organized into several categories:
- Photo Points:** Indicated by a black circle with a white dot.
 - Proposed Layout:**
 - Project Boundary 100m Buffer:** Red dashed line.
 - Project Boundary 150m Buffer:** Red dashed line.
 - Project Boundary:** Blue solid line.
 - Main Site Access:** Green star symbol.
 - Wind Turbine Generator (WTG) and number:** Represented by a black circle with a white dot and a number.
 - Proposed infrastructure:**
 - Access Track - New:** Brown rectangle.
 - Concrete Batch Plant:** Blue rectangle.
 - Crane Pad:** Red rectangle.
 - Laydown:** Pink rectangle.
 - Wind Farm Substation:** Teal rectangle.
 - Wind Farm Building:** Purple rectangle.
 - Site Compound:** Orange rectangle.
 - BESS Envelope:** Light blue rectangle.
 - Met Mast:** Green circle.
 - Met Mast Access Road:** Grey line.
 - Roads:**
 - Main Roads:** Red line.
 - Minor Roads:** Blue line.
 - Main, Sealed:** Red line.
 - Minor, Unsealed:** Blue line.
 - Others:**
 - Track, Unsealed:** Orange dashed line.
 - Other:** Orange dashed line.
 - Vegetation:**
 - Classified vegetation:**
 - A. Forest:** Red rectangle.
 - B. Woodland:** Green rectangle.
 - C. Shrubland:** Pink rectangle.
 - D. Scrub:** Orange rectangle.
 - G. Grassland:** Yellow rectangle.
 - Excluded Clause 2.2.3.2 (e) and (f):** Blue rectangle.

Figure 2-2. Vegetation and effective slope (East)

Mid-West Wind Farm



2.2_Vegetation and Effective Slope (East)_0001

CRS: GDA2020 / MGA zone 50
Date created: 16/09/2026
Author: Aaron Bulfin

Disclaimer: This map has been prepared for the use of the nominated client for the purposes of this project. The information shown is based on spatial data created by Covey Associates Pty Ltd, sourced from third-party datasets and mapping services, including client-provided information and publicly available government and commercial sources. Covey Associates Pty Ltd does not guarantee the accuracy, completeness, or currency of the underlying spatial data. Mapping information is indicative, not to be used for construction purposes and is subject to spatial limitations.

Data Source: Map data ©2015 Google, ©ESRI

2.4 Renewable Energy Infrastructure Hazard and Risk Analysis

The CFA Guidelines notes that fire hazards could be as follows for these renewable energy infrastructure types:

- Wind Energy Facilities
 - Electrical hazards, such as wind turbine electrical faults; power surges; hot surfaces; lightning strike
 - Chemical hazards, such as the leakage of oils and lubricants within the turbine/ancillary equipment
 - Potential fire spread, due to air flow impact or falling debris from fire-impacted turbines
 - Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers or radiant heat
 - Falling blades
 - Wind turbines as a potential obstruction for aerial firefighting
- BESS Facilities
 - Electrical hazards, such as battery faults; overcharging; rapid discharge; loss of remote monitoring systems; internal short circuits; overheating; water ingress; lightning strike (leading to thermal events/runaway).
 - Chemical hazards, such as the inherent hazards of the stored dangerous goods; spills and leaks of transformer oil/diesel, refrigerant gas/coolant; chemical reactions.
 - Explosions, from ignition of venting gases. Potential fire spread due to proximity of batteries (and containers/enclosures) to each other, on-site infrastructure and vegetation (including screening vegetation).
 - Mechanical damage to battery containers/enclosures due to vehicular impact. Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers, radiant heat and flame contact.

From a bushfire risk assessment and management perspective, much of the above can be distilled into the potential impact of bushfire on the proposed turbines, and the ability for significant turbine fires to ignite a bushfire.

2.4.1 Wind Farm Fires in Australia

While there haven't been many significant fire events at wind farms in Australia (either ignited by wind turbines, or impacted by bushfire), or at least not many publicly reported, review of those reported fires do provide a useful tool to review potential risks, as well as the relevant learnings from such events. Below is a summary of several that have occurred and reported upon in the past 10 years.

2.4.1.1 Bulgana Green Power Hub, Victoria (May 2025)

- Bulgana Green Power Hub is a 204 MW wind and BESS facility located near Stawell to the north-west of Melbourne, that was constructed in 2021.
- It is comprised of 56 No. Siemens Gamesa SG 3.4-132 turbines, (initially produced in 2017 and each with 3.47 MW power rating), in addition to a 20 MW Tesla BESS system to store excess wind energy.
- On 28 May 2025, a fire ignited in one of the turbines around 9.30 pm, resulting in turnout of seven CFA units. The attending crews arranged for the operator to shut the turbine down and established safety zones around the structure, before leaving the site for the operator to monitor.

- After 3 am, the fire reignited in the turbine and crews were called back to the site, as a blade caught fire, dislodged and fell to the ground.
- The fire destroyed the nacelle of the turbine, however the CFA noted that the cause of the fire remains undetermined at the time.

2.4.1.2 Cape Nelson Wind Farm, Victoria (June 2024)

- Cape Nelson is a 195 megawatt (MW) wind farm in the Portland area of Victoria, that was constructed in 2009 and is owned by Pacific Blue.
- The wind farm site is home to native coastal Mallee scrub.
- The wind turbine fire occurred at the top of the turbine at approximately 8pm, and occurred in a Senvion MM82 turbine, which has a hub height of 69 metres and a maximum blade tip height of 110 metres.
- The fire destroyed the turbine and resulted in a blade falling off the turbine, and others expected to follow. Firefighters were called to the scene and allowed the turbine to burn out as there was nothing the firefighters could do to suppress the turbine fire.
- The Fire Rescue Victoria commander noted that:
 - This fire is the first in the Portland area since wind farms started to be built around 20 years ago
 - The rarity of wind turbine blazes mean they aren't a big fire risk.
- There were no reported injuries from the fire.

2.4.1.3 Clements Gap Wind Farm, South Australia (February 2024)

- Clements Gap Wind Farm was one of the first in South Australia, being constructed in 2010, and had 27 of the Suzlon S88 turbines.
- Smoke from the turbine was spotted by a maintenance crew at 8:30am, and emergency services were alerted at about 8.50am.
- The fire destroyed the wind turbine and ignited a grassfire underneath it due to debris from the turbine. The resultant fire turbine burnt about 30 hectares of grassland, with no one injured in the incident.
 - The Country Fire Service (CFS) created an exclusion zone around the wind turbine to enable firefighters are staying on top of spot fires created by falling debris, while remaining clear from the turbine collapse zones.
- The CFS noted that:
 - Wind turbine fires were uncommon but could occur including in South Australia the previous year.

2.4.1.4 Waterloo Wind Farm, South Australia (January 2017)

- A bushfire started on a paddock near the Waterloo Wind Farm in South Australia. The fire quickly spread through the area due to gusty westerly and north-westerly winds, and including into area the wind farm was located.
 - The exact cause of the fire was never reported, but is not believed to be ignited by the Vestas wind turbines or any wind farm operations.
 - The fire burned approximately 50 hectares before it was controlled (around 2.45p the next day), including land beneath turbines as the northern end of the wind farm.

- There had been no reported loss of structures but it was not clear what, if any, damage had been caused to turbines at the wind farm.
- There were no reported injuries to any people.
- The bushfire was reported by a local farmer to the CFS just prior to 2pm, with the firefighting and wind turbine actions including the following:
 - CFS deployed water bombers to fire and requested that a number of turbines be shut down.
 - By 2.17pm, the wind farm operations had paused 18 wind turbines.
 - CFS also made contact with the wind farm General Manager to obtain approval for decisions relating to wind farm operations as much as required, including requesting that the turbines be paused and shut down remotely by applying their brakes.
 - CFS also requested that where safe to do so, all access gates within the wind farm site be opened to enable the CFS quick access to respond and manage the incident, without restrictions.
 - CFS worked to halt the fire advance with multiple runs of water bombing and ground-based firefighting, with fixed-wing water bombers able to manoeuvre through the turbines to target the grass fire and were followed by ground crew.
 - At 3.15 pm, CFS deemed it safe enough for the onsite crew to attend six of the paused wind turbines, to apply the brakes and set the blades in 'rabbit ear position', further assisting aircraft to pass through the turbines to continue water bombing.
 - The wind farm's access tracks worked as a fire break and without these the CFS believes the fire would have likely spread further, creating a much bigger incident.
 - The turbine's footings, with their clear line of site, were used by crews to coordinate air and ground crew actions.
 - Firefighting continued through the afternoon and, by 6 pm, the CFS approved the re-start of the turbines located outside of the fire ground area.

2.4.2 Wind Farm Fire Risk

The Australasian Fire and Emergency Services Authorities Council (AFAC) released a position paper titled *Wind Farms and Bushfire Operations* (AFAC, 2018) with the expressed intent to “provide guidance relating to planning for bushfire prevention, preparedness, response and recovery operations in and around existing and planned wind farm facilities”. This publication rightly stated that wind power is a rapidly expanding form of renewable energy production, and noted that “...wind farms are not expected to adversely affect fire behaviour, nor create major ignitions risks”. More specifically AFAC noted the following:

- **Ignition caused by wind farm infrastructure or operations**
 - It is possible that turbines can malfunction and start fires within the unit.
 - The above is generally considered a low risk given appropriate protection measures, with automatic shutdown and isolation procedures are generally installed within the turbine system.
 - Operation of winches and machinery during monitoring and maintenance tasks may also lead to ignitions.
- **Lightning risks**
 - Wind turbines can attract lightning during thunderstorms.

- If struck by lightning, turbine towers are generally not expected to start fires as they have built-in protection mechanisms.
- On this basis, it is possible that wind turbines may reduce the risk of bushfires caused by lightning, particularly if turbines are located on a ridge or local high point.
- **Hazards and firefighting limitations in and around the wind farm facilities**
 - Wind farms may result in aerial firefighting limitations due to aerial obstacles created by wind turbines and meteorological monitoring towers.
 - The bushfire at the Waterloo wind farm demonstrated that if conditions are clear and wind turbines are turned off, wind turbines are clearly visible from aircraft and are not likely to constrain aerial firefighting operations (Clean Energy Council 2017).
 - If wind turbines were not shut down, moving blades and wake turbulence would create significant hazards for low flying aircraft, thus the shutting down of wind turbines, in an emergency situation, is defined in wind farm emergency procedures.
 - However, transmission infrastructure, meteorological towers and guy-ropes were difficult to see (Clean Energy Council 2017) and this infrastructure does have potential to limit the effectiveness of aerial firefighting operations.
 - This can be addressed through appropriate marking of this infrastructure.
 - Access and egress challenges on the ground as well as water supply issues can also create firefighting limitations, if not planned for appropriately.
- **Bushfire spread within wind farm facilities and impacts on wind farms as critical infrastructure**
 - Wind farms are not expected to adversely affect fire behaviour in their vicinity.
 - Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings.
 - Any potential for wake turbulence from wind turbines influencing fire behaviour is expected to be controlled through the shutting down of wind turbines in a bushfire event.
 - Sufficient planning for access roads and fuel modified buffer zones will reduce the risk of wind farm ignitions spreading beyond the property and reduce the risk of external fire impacting wind farm infrastructure.

2.4.2.1 Learnings from Past Wind Farm Fires

There are number of learning opportunities from the past wind farm fires, which can be used to inform the bushfire risk management strategy.

With respect to bushfires impacting the wind farm site (such as the Waterloo Wind Farm fire), AFAC noted the following:

- *The wind farm's access roads were beneficial in helping fight the bushfire on the ground and provided an effective firebreak.*
- *The wind farm's turbines did not present a hazard to aerial firefighting and the turbines were clearly visible to the pilots involved in operations. However, transmission infrastructure, transmission lines and meteorological masts were difficult to see by pilots and did pose a safety risk.*
- *To maximise air space for firefighting between the turbines, turbines should be locked in the 'Y' position.*

- *Improved communication protocols need to be in place between wind farm operators and fire and land management agencies to direct turbine shut-down procedures in an emergency situation and initiate emergency response plans.*
- *Wind farm operators should ensure that they have the capacity to respond to emergency events.*
- *Wind farm operators should ideally select turbines that can be rapidly shut down to the preferred position.*
- *Additional precautionary measures should be considered to allow for aerial identification of meteorological masts (measurement towers), guy wires and other infrastructure such as transmission lines that are not easily visible from air.*

Additionally, the Clean Energy Council also added the following comments:

- *Ensure aerial-friendly identification and markings for meteorological (“met”) masts and guy wires is provided at wind farm locations.*
- *Review and update emergency management plans and protocols with a focus on:*
 - *Communications practices including advising state air-desk (who control aerial firefighting assets)*
 - *On site asset management/operations centre control procedures to pause, brake and ‘lock’ individual turbines*
 - *Best practice approaches to support aerial and ground-based responses*
 - *Water storage point signage, access track markings and site mapping.*
- *Ensure ongoing and regular engagement with local volunteer organisations and services.*

In addition to the comments above, the following is also noted:

- The considerable cleared areas at the base of turbines (footings and crane pads) provide useful areas for firefighting operations.
- While locking the turbines in the “Y” position is ideal, the CFS reported that the aerial operations were able to occur with the turbines “paused” which is understood to be with the turbines shutdown, but the blades not locked (i.e. turning very slowly).

With respect to turbine fires, the following is noted:

- Both the Victorian and South Australian fire services have noted that turbine fires are a low likelihood event, with very few having occurred.
- Most turbine fires have occurred in old turbines that are likely 20 years old, and which:
 - Have older technology without the more advanced fault monitoring, detection, etc currently installed in most modern-day turbines in wind farms.
 - Likely lack nacelle suppression systems to control the fire and prevent escalation to an uncontrolled turbine failure event.
- Prevention of an uncontrolled turbine fire or failure event should be seen as the primary objective to prevent potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.
- Early notification of local fire brigade, nearby farmers/landowners and the wind farm personnel is critical to ensure a rapid and coordinated response.

2.4.3 Likelihood of Wind Farm Fire

As noted by AFAC, the likelihood of turbine fires is considered to be relatively low, and while it is accepted the statistics around fire losses are based on historical estimates and incomplete datasets, the likelihood wind turbine fire per year is generally accepted to be around 1-in-2000, but potentially lower than that (Krcmar, 2020). There are varying levels of resultant damage associated with these fires, which can range from small fire events through to complete burnout of the turbine nacelle, with uncontrolled nacelle fires resulting in significant damage or total turbine loss much of the time.

Risk management measures to address the hazards above are explored in further detail in Section 2.4.6.

2.4.4 Battery Energy Storage System (BESS) Hazard

BESS units are typically comprised of Lithium-ion (Li-ion) battery cells that are wired together to form modules, which have a battery management system (BMS) that prevents electrical imbalances in the battery cells, including with voltage, current and temperature. The BMS' main function is to shut down operations of the module (or system) if any of the voltage, current, or temperature changes are out of limit.

2.4.4.1 Thermal runaway in Li-ion batteries

The significant hazard posed by BESS units is primarily associated with thermal runaway occurring in the Li-ion batteries, and the fire and explosion risk that can accompany the release of flammable gases. Thermal runaway describes a process that is accelerated by increasing internal temperature, in turn releasing more energy that further increases temperature.

In Li-ion batteries thermal runaway is a condition where voltage, current or temperature instability, causes the battery cell temperature to rise which in turn increases the current with a further rise in temperature. The battery can begin to emit gases due to thermal decomposition of the electrolyte solvents, which could potentially result in fire ignition or explosion (of the flammable gas release).

Battery cells can fail at different rates under different modes of off-gassing (flammable gas release), which can be with or without flaming. Because thermal runaway can occur without flame, gases may not be consumed by an ignition source immediately after they are emitted, this can create a scenario where high heat and combustible gases can coexist without igniting, and accumulation of these gases can result in an explosive event should an ignition source be subsequently introduced.

There are differences between thermal runaway and conventional fires that are important to understand. A conventional fire (e.g. campfire) is sustained by a combination of fuel, heat, and oxygen, where if any one of them is removed, the fire may be extinguished (e.g. suffocating the fire to remove oxygen, applying water to cool it, or dispersing the wood to remove fuel).

Thermal runaway in a Li-ion battery differs from the conventional fire, as a Li-ion battery is consumed in thermal runaway is fuelled by an internal chemical reaction that releases heat and can continue without oxygen or a visible flame. As such, the management of thermal runaway differs from that of a conventional fire because starving a thermal runaway event of oxygen, may have little effect until the fuel is consumed. On this basis, stopping a thermal runaway event is more difficult and is generally addressed by either cooling to remove heat, or removing/dispersing the fuel.

While thermal runaway and fire are two different processes in a Li-ion battery failure, one can lead to the other including:

- an external fire can send a battery into thermal runaway, or

- thermal runaway can create a secondary fire as it begins to burn plastic and remaining battery materials.

2.4.4.2 Historical failure events (Li-ion battery and BESS)

The hazard of Li-ion battery thermal runaway and off-gassing has been identified in research and public literature since the early 2000s, including extensive safety testing. Additionally, a number of failure events have created further awareness to the dangers of thermal runaway in Li-ion batteries, including the following (DNV-GL, 2020; ESV, 2021):

- **2017-2018** - BESS fires in a large facility in South Korea, however there is limited reporting and there appears to be some conflict regarding the causes of the failures.
- **2019** – McMicken BESS Failure Event, Arizona
 - This involved thermal runaway of a BESS container, that resulted in off-gassing and subsequent explosion of the BESS when the container door was opened by attending firefighters.
 - It is noted that the BESS technology and standards has progressed significantly since this event, which represents an example of BESS failure prior to many of the recent improvements in fire and explosion safety measures.
- **2021** – Victorian Big Battery fire
 - A Tesla Megapack at a facility in Geelong caught fire and spread to a neighbouring Megapack during the initial installation and commissioning, which didn't spread any further and burned out over the course of approximately six hours.
- **2023** – Bouldercombe Battery Project, Queensland
 - A Tesla Megapack ignited at a facility in Bouldercombe, and was allowed to burn out but attending firefighters, without firewater, as a low intensity fire. Firefighters monitored temperatures to ensure fire didn't spread to adjacent BESS units, and monitored gas levels and conducted air sampling to manage risk to nearby residents.

There have not been many historical BESS failure events that have occurred in Australia, with the Victorian Big Battery and Bouldercome Battery Project fires being the most notable to date. Additionally, it is worth noting that there doesn't appear to be reported instances of bushfires destroying or producing a thermal runaway event within a BESS, however this could also be due to lack of opportunity given the relatively short amount of time this infrastructure has been commercially available.

2.4.4.3 BESS Standards

The main standards for BESS testing, construction and installation, include:

- UL 9540 (2023): Energy Storage Systems (ESS) and Equipment
- UL 9540A (2019): Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
 - supplementary document to UL 9540 that defines test methods for thermal runaway.
- NFPA 855 (2023): Standard for the Installation of Stationary Energy Storage Systems
- International Fire Code (2021): Chapter 12 Energy Systems

2.4.4.4 Likelihood of BESS Facility Fire

As noted on Section 2.4.4.2, there appears to be a relatively low likelihood of BESS fires based on historical occurrences in Australia, however it is noted that grid scale BESS facilities are relatively new with the

opportunity for failure and fire also limited. There is also varying levels of resultant damage associated with these fires, which can range from small ignition events that have minor damage, through to complete destruction of at least one BESS unit or potentially multiple units.

2.4.4.5 BESS hazard summary for bushfire

The overall hazard with the BESS units, is largely associated with the potential for thermal runaway in the Li-ion batteries to produce a fire or explosion failure event.

The rise of the BESS industry has been very quick, and this has resulted in rapid advances in the design, construction, commissioning, operation and maintenance of this technology. Notwithstanding, there hasn't been many reported historical BESS fires or explosions, and certainly not in Australia, however when they have occurred, it is clear that they result in significant firefighting challenges, primarily due to the inability to easily extinguish the fires and manage flammable gases.

The Arizona BESS failure in particular has highlighted historical issues with this for attending firefighters, as well as the potential for catastrophic failure to ignite vegetation some distance from the BESS (UL, 2020).

From a bushfire risk management perspective, the hazard related to the BESS units can be distilled to the following:

- Exacerbation of a bushfire from fire and/or explosion of the BESS's as follows:
 - A bushfire impressing significant radiant heat, or producing direct flame impingement, onto the BESS container, that could increase battery temperatures and send into thermal runaway. This could also include the damage or destruction of supporting systems (e.g. BMS, thermal management) which might affect the ability of the BESS to maintain temperatures at required levels.
 - Ember attack from a bushfire, igniting a fire within the BESS unit, that could send a battery into thermal runaway, or damage or destroy supporting systems.
 - Ember attack from a bushfire igniting flammable gases from BESS with thermal runaway condition, either within the BESS or flammable gases being ventilated.
- Ignition of a bushfire as a result of a fire or explosion within the BESS, likely to be associated with thermal runaway igniting an internal fire and/or emitting flammable gases, which could result in an explosion.

The bushfire risk management principles expected to address the hazards above are explored in further detail in Section 2.4.6.

2.4.5 [Transformer Hazard](#)

The causes of fire hazards relating to transformers within the electrical transmission infrastructure are typically categorised as one of the following:

- Electrical equipment containing combustible insulating liquids may rupture due to internal failure, and there may be fire ignition or an explosion.
- Electrical equipment without combustible insulating liquids may rupture due to internal failure; there still be an explosion with a modest fire risk.
- Other plant and equipment such as cables, batteries, and drainage pipes may catch fire and spread the fire.

The risk associated with transformers, relates primarily to the oil used in transformers (where oil-filled) for insulation and cooling, which could potentially leak and be ignited. The ground mounted transformers are oil-

filled and contains a hermetically sealed steel tank that contains the transformer core surrounded with windings and connecting leads which are separated, insulated and cooled by mineral oil (oil impregnated upgraded wood pulp insulation) or ester oils.

Potential failure of the transformer can occur if the ambient temperature is raised above the rating of the transformer (typically 105°C-140°C) for an extended time, with short-term heating able to be addressed through power supply reduction or shutdown. While overheating can result in degradation of the transformer, the main risk is the potential for cracking of the tank and resultant oil loss and potential pool fire of the flammable mineral or ester oil.

Previous correspondence from power supply providers has been there are historically very few transformer fires, with most associated with lightning strikes on pole-top transformers in non-built-up areas. They have assessed the likelihood of a transformer fire occurring as being approximately 0.1%, or with accumulated probability of 4% per transformer over its typical service life.

While there is not a high probability of transformer fires, it could result in transformer loss and/or damage to adjacent infrastructure or combustible items. As such, fire protection measures are considered a critical part of the design of transformers which include the following:

- Transformers are designed in accordance with various standards, including AS 2067 (Substations and High Voltage Installations) and AS/NZS 60079.14 (Explosive atmospheres – Electrical installations design, selection and erection) to reduce risk of fire, with a variety of measures incorporated to minimise potential for fire ignition.
- Cable clamps and support to limit leaking bushings.
- Managing limits for transformers to prevent overloading.
- Providing sufficient clearances to transformers based on oil volume, incorporation of oil containment and/or flame trap, or provision of a fire screening wall
 - The incorporation of an oil bund and/or flame trap enables a reduction in minimum separation distance as it contains the spread of any leaked oil and reduces the size of the oil pool exposed to oxygen, which limits combustion.
 - Provision of a fire screen wall (2 hr FRL) also enables reduced minimum separation distances as it shields the transformer from adjacent buildings and combustible items and ignition risks.

2.4.6 [Bushfire Risk Management Requirements](#)

Based on the analysis of the bushfire hazards and risk associated with wind farm facilities, including review of historical fire events, the following are considered key bushfire risk management requirements to be incorporated into the proposed development to manage bushfire risk, both to protect the renewable energy infrastructure from bushfire, and also to manage the risk of bushfire ignition from infrastructure fire.

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of renewable energy facilities is based on a number of factors.
- Ensure suitable separation from nearby unmanaged vegetation to ensure bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit bushfire escape.
- Provision of appropriate vehicular access to each turbine for emergency services and wind farm operations vehicles, including permitting fire appliance turnaround.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response without extended turnaround times for appliance refills.

- Appropriate renewable energy infrastructure design and construction including (but not limited to):
 - For wind turbines
 - Ensure that the risk of uncontrolled turbine fire or failure events is mitigated, to avoid potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.
 - Monitoring of the operational status of the turbines, both locally onsite and remotely offsite, including any faults, with ability to remotely shutdown and de-energisation of turbine/s.
 - Provision of fire detection, alarm and suppression system to provide early warning of internal fire and automatic response.
 - For BESS facility
 - Limit potential for thermal runaway and associated off-gassing.
 - Incorporates a combined strategy of fire detection (and gas monitoring) and suppression followed by ventilation (and gas ventilation) and cooling, including all required infrastructure to achieve this.
 - Incorporate remote monitoring and communications, so the status of BESS BMS and fire/gas detection systems can be monitored and any information conveyed to relevant parties including fire brigade.
- Ensure all infrastructure that could potentially present a risk to pilots and aerial operations (e.g. turbines, meteorological monitoring towers etc) are recorded with relevant aviation authorities and provided with any required markers/lights etc to minimise risk during aerial firefighting operations,
- Provision of mobile firefighting equipment and training for wind farm personnel to manage risk of onsite hot works, and potentially intervene any small ignitions until fire brigade arrive.
- Ensure sufficient information regarding the facility, its hazards and emergency management procedures is available to assist any attending firefighters.
- Engage with local fire brigade during project development and commissioning process, to ensure they understand the system and be aware of its specific hazards.
- Develop an emergency management plan which comprehensively details:
 - The hazards associated with renewable energy infrastructure
 - Housekeeping and routine maintenance actions (including ongoing compliance with project obligations), including limiting any onsite ignition sources or fuel loads
 - Ensure communication protocols are established for contacting DFES, nearby farmers/landowners, and relevant agencies (e.g. Western Power, AEMO etc) to enable management of emergencies, access to land and shutdown of turbines and/or BESS.
 - Pre-emptive actions on days with forecast of elevated Fire Danger Rating or Total Fire Ban days
 - Response actions for in the event of bushfire in the local area
 - Evacuation of staff offsite
 - Ensuring all onsite wind farm access routes are unlocked and available for attending firefighters.
 - Remote shutdown and de-energisation of turbine/s (in liaison with DFES, Western Power, AEMO) and facility closure, if safe to do so.

- Remote shutdown and de-energisation of BESS (in liaison with DFES if possible)
- Response actions for onsite renewable energy infrastructure fire including
 - Rapid notification of wind farm personnel (including on-call technician), DFES and nearby landowners/ farmers
 - Remote shutdown and de-energisation of relevant turbine/s or BESS
 - If safe to do so, conduct first attack response on spot fires until DFES arrival etc.
- Staff training and exercises of emergency management procedures
- Ongoing review of emergency management plans (and any information relied upon by emergency services) on regular basis, including following changes to the wind farm or any fire events.

2.5 CFA Guideline Requirements

As detailed in Sections 1.3 and 1.4, the CFA *Design Guidelines and Model Requirements: Renewable Energy Facilities v4.4* (CFA, 2025) are currently seen as the best guidance for renewable energy facilities currently available. The CFA Guidelines provide a comprehensive suite of design, construction, operation and emergency planning measures recommended for renewable energy facilities, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

The CFA Guidelines note that any planning applications for all renewable energy facilities proposed in bushfire prone areas, strengthened or additional risk mitigation measures will be required to address bushfire risk, and will also need to address the following:

- The impact of any ignition events arising from the renewable energy infrastructure on nearby communities, infrastructure and assets.
- The impact of bushfire on the renewable energy infrastructure (e.g. ember attack, radiant heat impact, flame contact).

A summary of the CFA Guideline sections (relevant to this wind farm project) is provided in the compliance assessment on Table 2 in Section 4, which includes the following:

2.5.1 [Siting and Vegetation Modification](#)

2.5.1.1 *Wind Turbines*

- CFA Guidelines recommend siting of turbines in “low-risk environments” which it defines as being in gently undulating grassland with good road access and away from “continuous” non-grassland vegetation (noting the term “continuous is not defined), which are considered “high-risk environments”.
 - The CFA Guidelines don’t preclude siting of renewable infrastructure in “high-risk environments”, but note that strengthened or additional risk mitigation measures will be required.
- A Non-Vegetated Zone (NVZ) must be established and maintained around the base of wind turbines.
 - In low-risk environments, this is to be 10m wide and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.
- Where wind turbines are sited in high-risk environments (including timber plantations), strengthened or additional fire risk mitigations will be required as per the stage approach detailed in the CFA Guidelines, with the following recommended:
 - Implementation of an additional Asset Protection Zone (APZ; reduced-fuel zone cleared of trees and scrub [as permitted by authority] and grass to <100mm high in bushfire season) around the base of wind turbines, on the outside perimeter of the NVZ, with width:
 - no less than 20m, or
 - to the envelope of the wind turbine blades.
 - There is no further guidance on how to apply this.

Interpretation Note – Continuous and Non-Continuous Vegetation

- *Given the lack of definition around the term “continuous” vegetation, which is critical to the assessment of what is considered ‘low-risk’ and ‘high-risk’ environments as per CFA Guidelines it is recommend the following broad principles are considered as being “non-continuous” when assessing the siting and vegetation management around turbines:*

- *Plots of non-grassland vegetation that are sufficiently small and/or isolated from other forest/woodland/scrub vegetation, by either grassland or low shrubland, such that the resultant bushfire passing through these plots would not be considered to be a significantly exacerbated or likely to reach steady state, or be uncontrollable by attending firefighters.*
- *Consideration is given to the size and location of the plot, proximity to continuous non-grassland vegetation, access to and around the plot (either via roads, tracks or agricultural land).*
- *Examples are plots of paddock trees or isolated plots of forest/woodland/scrub vegetation within paddocks, where a bushfire passing through would not represent a significant escalation in bushfire behaviour, nor produce behaviour that would make the fire uncontrollable attending firefighters, who would be expected to have reasonable access and water supply.*

2.5.1.2 BESS – Siting and Vegetation Modification

- The provision of a NVZ and/or APZ around battery energy storage systems and related infrastructure.
 - Of a width of at least 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure

2.5.2 Vehicular Access

- Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure.
- Construction of a minimum four (4) metre perimeter road within the perimeter NVZ/APZ, and:
 - Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.
 - Otherwise have standard similar to private driveway specifications of the WA Guidelines
 - Ensure any fencing along access routes allows for width of fire trucks.
- Ideally the provision of at least two (2) but preferably more access points to each part of the facility.

2.5.2.1 Wind Turbines

- Suitable emergency vehicle access is required to each turbine and building on-site (with number and location of access point to be determined in liaison with fire brigade).
 - Specifications are similar to private driveways from WA Guidelines, but with passing bays permitted every 600 m in lieu of 200 m.

2.5.2.2 BESS

- The provision of at least two access points into each section where battery energy storage systems are located.

2.5.3 Firewater

- The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure
- Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements similar to that of the WA Guidelines
- Vehicular access to be provided to within 4 m of all firewater tank suction connections.

2.5.3.1 Wind Turbines

- At least one static fire water storage tank of at least 45,000L effective capacity at each site entrance

- Additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated in facility design (in consultation with fire brigade).

2.5.3.2 BESS

- Where no reticulated water is available, provision of a fire water supply in static storage tanks, where:
 - The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater.
 - The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5(D).

2.5.4 [General Design](#)

2.5.4.1 Wind Turbines

- Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.
- Wind turbines must be located no less than 300 metres apart.
- Wind turbines must be provided with automatic shut-down capability, and the ability to be completely disconnected from the power supply in the event of fire.
- Notification of installed weather monitoring stations to the Civil Aviation Safety Authority (CASA) and marking of all guy wires and monitoring towers.

2.5.4.2 BESS

- A separation distance that prevents fire spread between battery containers/enclosures and other site elements.
 - Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements.
- A NVZ and/or APZ around the battery energy storage system and related infrastructure, of a width of no less than 10m (or greater where determined).
- A layout of site infrastructure that:
 - Considers the safety of emergency responders.
 - Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system.
 - Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure.
- Battery energy storage systems must be:
 - Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).
 - Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of fire at the battery energy storage system.)
 - Provided with in-built fire and gas detection systems.
 - Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.
 - Provided with suitable ember protection.

- Provided with suitable access roads for emergency services vehicles.
- Installed on a non-combustible surface.
- Provided with suitable ventilation.
- Provided with suitable impact protection.
- Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.
- Provided with spill containment that includes provision for management of fire water runoff.

2.5.5 [Substations](#)

- The entire substation must be surfaced to eliminate all vegetation including grasses.
- Firewater must be provided to cover substations

2.5.6 [Transmission Lines](#)

- Comply with any local electricity supply legislation or guidance prescribing the vegetation clearance requirements for electric lines.

2.5.7 [Construction, Commissioning, Operations and Maintenance](#)

- Design, construction and commissioning requirements for renewable energy infrastructure (especially turbines and BESS) and any Dangerous Goods (if any).
- Ongoing operation, maintenance and housekeeping requirements for renewable energy infrastructure
- Ensure familiarisation visit for relevant firefighters, prior to commissioning

2.5.8 [Emergency Planning](#)

- Development and preparation of comprehensive Emergency Management Plan for the facility, with relevant prevention, preparedness and response information for bushfires and onsite renewable energy infrastructure fires.
- Include measures attending firefighters and Emergency Plan for onsite personnel
- Staff training and exercises
- Ongoing review of emergency management plan

3 Bushfire Risk Strategy and Management Measures - Renewable Energy Assets

Based on the guidance from the review of the renewable energy assets, hazards and historical fires in Section 2, and informed by the relevant Model Requirements of the CFA Guidelines, the following bushfire safety strategy and associated risk management measures are to be incorporated into the proposed facility to manage bushfire risk to the renewable energy infrastructure, while also managing the escape of fire within the infrastructure to ignite a bushfire.

It is noted that while most management measures relate to management of bushfire impact on the proposed renewable energy infrastructure, some also relate to internal hazards which is also critical to avoid ignition of bushfires.

The subsections below detail the proposed bushfire risk management measures to be adopted by the project, with a compliance assessment in Section 4 demonstrating how these measures align with the principles from the CFA Guidelines.

The risk management measures have also been summarised in the BMP, to provide a comprehensive list of the Proponents bushfire risk management obligations for this project. Where possible, the bushfire management measures for both the buildings and renewable energy infrastructure have been depicted on Figures 5-1, 5-2 and 5-3 in the BMP.

3.1 Wind Turbines

3.1.1 Turbine Siting and Vegetation Modification and Management

Based on the guidance from the CFA Guidelines, in addition to the interpretation note on “continuous” and “non-continuous” non-grassland vegetation, the following vegetation modification and management philosophy is proposed around the base of the turbines, based on location and proximity to “continuous” non-grassland vegetation.

- Turbines would ideally be separated by at least 300 m from “continuous” non-grassland vegetation on the following basis, in order to minimise vegetation management measures:
 - CFA Guidelines require separation between turbines of 300 m and maximum Non-Vegetated Zone (NVZ)/Asset Protection Zone (APZ) is to the blade envelope.
 - The proposed turbines will have a maximum tip height of 234 m, which with a 10% safety margin, if they toppled would be a safe distance of 258 m.
- A NVZ and APZ is to be established around the perimeter of each of the wind turbine base in accordance with the low, transition and high-risk site criteria detailed in Sections 3.1.1.1, 3.1.1.2 and 3.1.1.3 (refer to Figures 5-2 and 5-3 in the project BMP for nominated turbine risk ratings).
 - The majority of the proposed turbines are assessed as Low-Risk sites, with only 11 in Transition Risk.
 - There are no turbines nominated in High-Risk sites.
- Should turbines be relocated (or new turbines added):
 - The risk category of the turbine should be reviewed by a bushfire practitioner, and adjustments made to the NVZ/APZ as required.
 - Turbines could straddle the turbine risk categories above (e.g. turbine on edge of non-grassland and grassland vegetation may be both high-risk and transition risk). In these instances, we propose that:

- The NVZ/APZ be appropriate to the interfacing vegetation e.g. high-risk treatment in direction of forest, with transition (or low) risk treatment in direction of grassland, or
 - the NVZ/APZ for the highest risk category is applied entirely around the turbine.
- All wind turbines must be located no less than 300 metres apart
- The Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) and the standards for “firebreaks” from CFA Guidelines as follows:
 - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
 - Free of vegetation and obstructions at all times.
 - No combustible plant or equipment.
- The Asset Protection Zone (APZ) can be either non-vegetated or managed low threat landscaping established in accordance with the APZ standards from the WA Guidelines and AS 3959 Clause 2.2.3.2 (e) and (f).
- All NVZ and APZ around turbines are to be established and maintained by the Proponent for the life of the wind farm, especially during bushfire season.

3.1.1.1 Low-Risk Turbine Site

- ***A turbine is considered to be in a low-risk environment when it is sited within grassland vegetation and further than 300 m from “continuous” non-grassland vegetation.***
- If assessed as low-risk, implement the following measures, as per requirements of CFA Guidelines for low-risk environments:
 - ***10 m NVZ around base of turbine tower***
- While target BAL rating is not specifically required for turbines, a 10 m NVZ would achieve BAL-29 at the turbine tower casing (i.e. exposed to grassland vegetation with moderate downslope up to 10°).
- Currently all but 5 of the proposed wind turbines at this wind farm are assessed as Low Risk (see Table 4, and Figures 5-2 and 5-3 in the project BMP).

3.1.1.2 Transition Risk Turbine Site

- ***A turbine is considered to be in a transition-risk environment when it is sited as follows:***
 - ***closer than 300 m to “continuous” non-grassland vegetation, (but not within this non-grassland vegetation) or***
 - ***within “non-continuous” non-grassland vegetation (e.g. small plots of forest, woodland, scrub or shrubland vegetation***
- If assessed as transition-risk, implement the following measures, as per minimum requirements from the CFA Guidelines for high-risk environments:
 - ***10 m NVZ around base of turbine tower; and***
 - ***20 m APZ outside the 10 m NVZ***
- While target BAL rating is not specifically required, the 30 m NVZ/APZ would achieve BAL-29 or lower at the turbine tower casing (i.e. for forest, woodland, scrub or shrubland on gentle to moderate slopes), and would generally provide a BAL-19 or BAL-12.5 impact.
 - The Transition Risk category is aimed more at providing greater separation from “non-continuous” non-grassland vegetation when turbines are sited in/near small plots of forest, woodland, scrub or shrubland vegetation, rather than the instances where

turbines are still in grassland areas but within 300 m of “continuous” non-grassland vegetation, and the overall 30 m NVZ/APZ is probably greater than required. Notwithstanding, a consistent vegetation management approach is being applied to both occurrences.

- Currently only 5 proposed wind turbines are assessed as Transition Risk, namely turbines 73, 76, 77, 78 and 79., (see Table 4, and Figures 5-2 and 5-3 in the project BMP).

3.1.1.3 High-Risk Turbine Site

- ***A turbine is considered to be in a high-risk environment when it is unavoidable to site turbines within “continuous” non-grassland vegetation (e.g. plots of forest/woodland/scrub/shrubland vegetation considered to be continuous).***
- If assessed as high-risk, implement the following measures, as per the maximum requirements from the CFA Guidelines for high-risk environments:
 - ***10 m NVZ around base of turbine tower***
 - ***APZ (or extension of NVZ) to the blade envelope (rotor diameter), outside the 10 m NVZ***
- While target BAL rating is not specifically required, the NVZ/APZ of this dimension would achieve BAL-29 or lower at the turbine tower casing (i.e. from forest, woodland, scrub or shrubland vegetation), more likely BAL-12.5.
- Currently none of the wind turbines proposed at this wind farm are assessed as High Risk (see Table 4 in project BMP).

3.1.2 Vehicular access to turbines

- The internal driveway network accessing the wind turbines is to comply with the requirements of CFA Guidelines.
- The following site entrances are to be established for the facility:
 - Main site entrance from Walkaway-Nangetty Road, north of the proposed wind farm building, substation and BESS envelopes
- Internal wind farm access driveways are to be provided to each turbine, from the nominated site entrances, as follows:
 - Driveways are to be >4 m wide, but if <6m wide, passing bays are to be provided every 600 m that are 6m wide x 20m long
 - Other than passing bay separation, all turbine access driveways are to comply with private driveway specifications of WA Guidelines
- A turning head is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround.
 - The turnaround is to comply with the requirements of the private driveway specifications of WA Guidelines.
 - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm driveway network needs to provide vehicular access to each proposed firewater tank, with access is to be provided to within 4 m of the tank suction point.
- Any wind farm gates, including those at main site entrance, are to have clear opening of no less than 6 m.

- If any nominated site entrances are to be locked, keys are to be provided to DFES/local fire brigades prior to operation.
- Emergency Information Book and Signage (see Section 3.9) is to be provided at all nominated wind farm site entrances (but not existing farm gates), for attending emergency services personnel (unless otherwise directed by DFES).
- The internal wind farm access driveways, site entrances, gates and signage are to be constructed and maintained by the Proponent for the life of the wind farm.

3.1.3 Firewater for turbines

- Firewater supply for the turbines is to be compliant with the CFA Guidelines for wind farm facilities as much as possible.
 - It is noted that other than having a 45 kL firewater tank at each site entrance, there is limited detail to guide sizing and location of firewater tanks, especially as there is no definition of what is considered a site entrance.
 - Experience on other projects has been that local fire brigades have been reticent to have firewater sited near public roads, due to concern about tank security and potential nefarious use. On this basis, the siting of firewater tanks away from site entrances from public roads has not been considered an issue, especially where it offers operational benefit for fire personnel.
 - Given the above, while the firewater tank locations proposed represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent.
- Firewater tanks as proposed in the following locations around the wind farm site to provide 300 kL of turbine firewater capacity:
 - One (1No) 100 kL firewater tank in the northern part of the site, at an intersection of Casuarinas Road and the internal driveway providing access to turbine 20.
 - One (1No) 100 kL firewater tank in the western part of the site, adjacent to the internal driveway providing access to turbine 61.
 - In addition to the two turbine firewater tanks above, either a standalone 100 kL firewater tank is to be installed in the wind farm building envelope, for wind turbine firewater in the local area, or the 100 kL should be added to the building firewater tank.
- All firewater tanks will comply with the standards from the WA Guidelines, and the following from the CFA Guidelines:
 - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
 - Firewater tanks are to be at least 10 m from wind turbines, but ideally well outside the rotor diameter.
 - The tank suction point must be within 4 m of a driveway or hardstand
- All firewater tanks are to be sited in an area of BAL-29 or lower as follows:
 - Within a BAL-29 or lower area within the wind farm building envelope
 - Where outside the wind farm building envelope, have a 9 m wide APZ around the perimeter of the tank.
- Vehicular access to each firewater tank is to be via proposed internal wind farm driveways.

- Access is to be provided to within 4 m of the tank suction point.
- Emergency Information Book and Signage (see Section 3.9) is to be provided at all nominated wind farm site entrances, especially the main site entrance, for attending emergency services personnel (unless otherwise directed by DFES).
 - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.
- The firewater tanks, and associated APZs, are to be constructed and maintained for the life of the project by the Proponent.

3.1.4 General turbine design and emergency management

In addition to the measures detailed above, the following are also required for the proposed turbines to manage the risk of turbine fires.

3.1.4.1 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.
- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.
- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel locally onsite, or via remote offsite monitoring.
 - A procedure to be incorporated to ensure that activation of the fire detection system results in notification being provided immediately to the following people that there is an onsite turbine fire:
 - Wind farm personnel (including on-call technician),
 - DFES and local fire brigades
 - Nearby landowners/ farmers

3.1.4.2 Operational Status Monitoring and Control of Turbines

- In addition to the fire detection, alarm and suppression systems, appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
 - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of wind farm on-call technician.
- Monitoring of turbine operational status is to be able to be conducted both locally onsite and remotely offsite.
- Operational control of turbines should be possible from either onsite or from offsite, to enable both local and remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.
 - It is expected that any fault/s resulting in operation outside tolerable limits, would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

3.1.4.3 Turbine Shutdown and Disconnection from Power

- Each turbine can be remotely controlled (as long as there is connection through the optic fibre cables) from any duly trained technician or engineer from their laptop (either onsite or offsite) during and

placed in the Y position in a bushfire event (in consultation with DFES, Western Power, Australian Energy Market Operator [AEMO]).

- This will result in the turbine blades turning very slowly (e.g. windmilling) but not generating any power nor supplying to the grid.
- This will also reduce any turbulence (wake effect) created by the turbine, as much as possible.
- In addition to turbine operation status monitoring and control detailed above, all wind turbines are to be configured to automatically shut-down in the event of turbine fire.
- The CFA Guidelines notes that wind turbines should be able to be places are not able to be automatically or remotely placed in the “Y” pattern (rabbit ears position) during bushfires
 - The process for placing the turbines in the “Y” pattern (rabbit ears position) is a manual one, that needs to be conducted by staff within the nacelle of each actual turbine (taking at least 1hr or more per turbine to achieve).
 - Given staff need to be within each turbine, this is not considered a safe procedure to require wind farm staff to undertake in a bushfire emergency.

3.1.4.4 Aerial Notification and Marking

- Ensure DFES and DBCA (especially Aviation Services), and Air Services Australia, are notified of the turbine and mast locations for inclusion in the Vertical Obstruction Database.
- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

3.2 Battery Energy Storage System (BESS)

3.2.1 BESS Siting and Vegetation Modification and Management

Given the potential for BESS modules to react to elevated temperatures, NVZ/APZ to achieve a target radiant heat flux of no less than 10 kW/m² is considered appropriate. Additionally, given there has been historical BESS explosion igniting vegetation 23 m from the container, the NVZ/APZ for the BESS is to be no less than 25 m wide, to manage risk of bushfire ignition from an explosion. It is noted that this historical explosion was in a BESS that didn't have explosion management system nor many of the fire and safety features currently required, and as such, is not likely to be replicated, so the 25 m minimum NVZ/APZ is considered conservative.

As detailed in Section 5.1.3 of the project BMP, the following separation distances from vegetation surround the BESS envelope are required to achieve the target radiant heat flux of 10 kW/m²:

- Class G Grassland (Downslope 2°): 22.5 m (increased 25.0 m for explosion risk)
- Class C Shrubland (Downslope 2°): 24.8 m (increased 25.0 m for explosion risk)
- Class B Woodland (Downslope 2°): 37.4 m

The perimeter NVZ/APZ around the BESS modules is required to include the following:

- A 10 m wide NVZ adjacent to the BESS envelope that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.
- Outside the 10 m NVZ, the remaining 15 m to 32.3 m can be non-vegetated or low threat vegetation complying with the APZ standards from the WA Guidelines, with the following clarifications:
 - Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS

All land within the BESS perimeter NVZ/APZ (i.e. within BESS module clusters) are to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.

All other infrastructure within the BESS Envelope (e.g. PCS, Auxiliary Skids, Emergency Generator Skids Switchgear etc) is required to have a suitably sized NVZ/APZ to achieve BAL-29 or lower, and would ideally be non-vegetated land, but could consist of low threat vegetation complying with the APZ standards from the WA Guidelines.

The mapping in the project BMP depicts the BAL contours across the entire BESS Envelope assuming the entire envelope was cleared, and shows:

- BESS modules could be contained anywhere within the envelope that is 10 kW/m² or less, which is currently anywhere further than 25.0 m from the nominated BESS Envelope boundary.
- All other BESS infrastructure (and the BESS O&M building) are to be sited in areas of BAL-29 or lower, which is currently anywhere further than 9 m from the nominated BESS Envelope boundary.

The indicative BESS layout plan in Appendix A of the project BMP depicts a potential layout that would comply with the required setbacks detailed above, and enable establishment of the perimeter NVZ/APZ around the BESS modules and all other BESS infrastructure within the BESS Envelope.

All BESS NVZ/APZs are to be established prior to BESS commissioning by the Proponent, and are to be maintained for the life of the project.

3.2.2 [Vehicular access to BESS](#)

The internal road network accessing the renewable energy infrastructure is to comply with the private driveway specifications of WA Guidelines, with the following additional guidance provided from the CFA Guidelines:

- At least 2 entrance/exit gates are to be provided to the BESS Envelope from the proposed internal road to the east (providing access to the wind farm building and substation envelopes).
- Provide a perimeter loop road around the BESS modules, and provide appropriate access in between the BESS module clusters
 - These roads are to be 6 m minimum width (to enable two-way fire appliance travel), and otherwise compliant with private driveway standards of the WA Guidelines.
 - This internal road should also be configured as loop road, to avoid creation of any internal dead-end roads.
- Any gates, including those at main site entrance, are to have clear opening of no less than 6 m.
 - If any nominated site entrances are to be locked, keys are to be provided to DFES/local fire brigades prior to operation.
- Provide vehicular access to the firewater tanks (or tank suction connection) required for the BESS infrastructure, to enable attending fire appliances to refill, including a hardstand adjacent to tank suction connection and sufficient provision for fire appliance turnaround.
- Emergency Information Book and Signage (see Section 3.9) is to be provided at the entrances into BESS Envelope (or other location agreed with DFES and local brigades) for attending emergency services personnel.

The indicative BESS layout plan in Appendix A of the project BMP depicts a potential internal road network that would comply with the above requirements.

The internal roads to (and within) the BESS, site entrances, gates and signage are to be constructed and maintained by the Proponent for the life of the wind farm.

3.2.3 Firewater for BESS

Firefighting water supply for proposed BESS modules is to comply with the requirements of CFA Guidelines for BESS facilities in areas without reticulated water supply as follows (unless agreed otherwise with DFES as detailed below):

- *The firewater supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater.*
- *The quantity of static firewater storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5(D).*
- *Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.*
- *The firewater supply must be located at vehicle entrances to the facility, at least 10m from any renewable energy infrastructure and buildings.*
- *The firewater supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (e.g. Fire water tanks are to be located closer to the site entrance than the battery energy storage system).*
- *The firewater supply must comply with relevant Australian Standards (including AS 2419.1)*

Covey note that while compliance with the CFA Renewable Guidelines is stated as a requirement of this BRMP as detailed below, it is also noted that these may lag current BESS firefighting practice requiring less use of firewater, and on this basis, should DFES and the Proponent review the firewater system requirements and agree to a rationalised system or firewater capacity in line with current BESS firefighting responses, then this BMP would view this as an acceptable deviation from the CFA Guidelines.

Given the substantial amount of firewater required for the BESS, no additional capacity is proposed for bushfire fighting purposes (other than the 10 kL per building required to comply with the WA Guidelines as detailed in project BMP).

- All firewater tanks will comply with the standards from the WA Guidelines, and the following from the CFA Guidelines:
 - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
 - Firewater tanks are to be at least 10 m from wind turbines, but ideally well outside the rotor diameter.
 - The tank suction point must be within 4 m of a driveway or hardstand
- All firewater tanks (including pumproom and booster if provided) are to be sited in an area of BAL-29 or lower as follows:
 - Within a BAL-29 or lower area within the BESS envelope
 - Where outside the BESS envelope, have a 9 m wide APZ around the perimeter of the tank.
- Vehicular access to each firewater tank is to be via proposed internal wind farm and BESS roads.
 - Access is to be provided to within 4 m of the tank suction point.

- Emergency Information Book and Signage is to be provided at the entrances into BESS Envelope (or other location agreed with DFES and local brigades) for attending emergency services personnel.
 - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.

The indicative BESS layout plan in Appendix A of the project BMP depicts potential firewater tank locations within the BESS Envelope that should be able to comply with the requirements detailed above (noting the final capacity and location will depend on the area of the BESS modules and the BESS compound design).

The firewater tanks, and associated APZs, are to be constructed and maintained for the life of the project by the Proponent.

3.2.4 [BESS – General Design](#)

In addition to the above measures, the following design requirements are also required for the BESS from a bushfire risk management perspective:

- External container is to be non-combustible material (e.g. metal).
- Provide suitable ember protection (e.g. BAL-12.5 construction) to prevent embers from penetrating the container and causing catastrophic failure of the BESS including, but not limited to:
 - Battery enclosures via any external walls/roofs (if not completely sealed) and gas ventilation inlets/outlets.
 - Thermal management system (chiller) inlets and outlets
- BESS installation is on a non-combustible surface (e.g. concrete)

While outside purely bushfire risk management, the CFA Guidelines note that BESS's must be provided with the following, which are still considered important to address to manage risk of bushfire ignition:

- Provided with battery management/monitoring systems for monitoring the state of battery systems to ensure safe operation.
- Warning and alarm systems within the battery containers, and/or the facility, to enable early warning for faults, operation of the battery energy storage system above 'normal'/safe parameters, smoke, off-gassing, and fire.
- Provided with in-built fire and gas detection systems.
 - Systems for detecting smoke, heat (thermal), fire and toxic off-gassing within battery containers. Detection systems for off-gassing must be single trigger and provide for both lighter and heavier than air gases.
- Systems to prevent heat/fire spread within battery containers (such as thermal barriers, shutdown separators, isolation systems, cooling systems).
 - Consider the provision of non-combustible, floor-to-ceiling partition 'walls' (thermal barriers) between battery racks (stacked modules) within battery containers/enclosures.
- Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels and with suitable ventilation
 - Systems to prevent explosion within battery containers (such as ventilation, pressure relief and exhaust systems).
- Provided with systems to prevent water ingress to battery containers and appropriate ingress protection (IP) ratings for containers/cabinets and/or battery modules.
- Provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers/ enclosures.
- Provided with spill containment that includes provision for management of fire water runoff.

- All electrical equipment, including electrical cabling, junction boxes, inverters and transformers, must comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Where relevant and appropriate to the type of BESS installed, consider adopting:
 - Current versions of UL 9540 or FM Global Property Loss Prevention Data Sheet 5-33, for the design and operation of BESS's.
- Separation between the BESS's and any other electrical infrastructure, must be at least the distance where the radiant heat flux from a fully involved in fire in the infrastructure, does not create the potential for ignition of these site elements (adjacent battery containers/enclosures, on-site buildings, substations).
 - This is outside the bushfire scope, and is expected to be addressed by complying with relevant codes and standards, including Australian Standards, and any manufacturers recommendations.

It is expected that the above requirements will be incorporated into the BESS design, and maintained by the Proponent for the life of the project.

3.3 Substation

- The substation envelope is proposed to be co-located with wind farm building envelope, which is a location surrounded by grassland vegetation.
- There are likely to be several buildings proposed within the substation envelope, and these will comply with the WA Guidelines as follow (and documented in the project BMP):
 - Provision of a compliant 9 m wide APZ around the perimeter of the substation envelope to ensure a rating of BAL-29 or lower is achieved on all substation infrastructure and buildings (e.g. switchroom building)
 - All land within the substation envelope is to be non-vegetated
 - Provision of compliant private driveway access to the substation envelope, from Walkaway-Nangetty River Road, that is compliant with the private driveway specifications of the WA bushfire Guidelines.
 - No specific firewater provided for the substation, however the firewater tanks within the wind farm building envelope, will provide nearby firewater for bushfire fighting around substation.
- Substation infrastructure is to be designed, constructed and maintained to relevant Australian Standards and Western Power specifications, by Western Power.

3.4 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Western Power specifications, by Western Power.
- This infrastructure will comply with any vegetation clearance requirements as per WA legislation (if any) and any of Western Powers own standards.
 - It is noted that the majority of the proposed transmission line is over existing grassland so there is likely to be limited vegetation clearing required for construction or ongoing maintenance.

3.5 Additional Management Measures

In addition to the measures detailed previously for the specific renewable energy infrastructure, the following is also required to manage bushfire risk for the wind farm facility.

3.5.1 Provision of mobile fire trailer

A mobile fire trailer (or similar approved) is required to enable wind farm staff to:

- have on standby during any approved tasks that may ignite a bushfire (e.g. hot-works etc), or
- provide a rapid first response to any small onsite ignition events while the fire is in the incipient stage to prevent growth and spread of the fire

This firefighting infrastructure is not to be used by staff to fight developed bushfire i.e. staff not expected to fight bushfires.

As a minimum, the fire trailer (or similar approved) should have:

- No less than 1000 L tank
- Fire pump and hose reel
- Mounted on trailer or ute to enable easy transport around the site.
 - If on trailer, sufficient vehicles shall be onsite with capability to mount the trailer (e.g. equipped with appropriate tow balls).

The Proponent is to supply the fire trailer (or similar approved) prior to commissioning, and ensure it is maintained and ready for use at all times during bushfire season, including ensuring a full water tank and pump fuel tank.

3.5.2 Facility Monitoring

- Appropriate system monitoring for all renewable energy infrastructure must be provided at times (both locally onsite and remotely offsite), especially the BESS BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification.
 - Monitoring is to be configured to provide warning to relevant onsite and offsite personnel.

3.6 Bushfire resilient construction

- Bushfire construction provisions of the National Construction Code require that buildings comply with the AS 3959 construction requirements, in accordance with the assessed BAL under AS 3959, provided the building is a Class 1, 2, 3 or associated Class 10a building/deck, or a “certain Class 9” building.
 - The renewable energy infrastructure will not be any of the classifications nominated above, therefore in accordance with the National Construction Code, and as such, there is no statutory requirement to meet the construction requirements of AS 3959.

3.7 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) must comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.

- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Provide wind farm mobile fire trailer (or similar approved) prior to commissioning of the renewable energy infrastructure.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for Dangerous Goods as per relevant Australian Standards.
- Ensure tight ignition source control measures, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the Construction Management Plan (or other relevant document) for the construction and commissioning phase of the facility, adopting similar concepts to those in Section 3.11, for the operational wind farm, which includes:
 - Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days.
 - Regularly monitor for, and otherwise be aware of, bushfires in the local area, and evacuate offsite prior to bushfire impact onsite.
 - Emergency procedures for identified risks and hazards of the renewable energy infrastructure, including but not limited to:
 - Onsite fire in renewable energy infrastructure (e.g. electrical infrastructure faults and fire in turbines, BESS or substation)
 - Bushfires
 - Ensure the response for any onsite fire or bushfire is the immediate notification of DFES.
 - The priority response action for a bushfire is immediate evacuation of all onsite personnel to offsite safer location (away from bushfire) ahead of bushfire impact on the site, and before bushfire impact (including smoke) on the vehicular access network to the offsite location.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the wind turbines and BESS.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 3.10.

3.8 Operation, Maintenance and Housekeeping

- Ensure ongoing compliance with the endorsed BMP and BRMP is achieved, especially prior to, and during, bushfire season. This includes all vegetation management, internal driveway access, fire system and firewater obligations.
- Ensure any Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and the requirements of the BMP.
- Ensure the Emergency Information Book and/or signage is appropriately stored at all nominated site entrances (or as otherwise agreed with DFES and local brigades), and reviewed on an annual basis (see Section 3.9).

- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing liaison with DFES and regular staff training and exercises are conducted (see Section 3.11 below).
- Ensure inspection, maintenance and any required repair activities are conducted by the Proponent for all renewable energy infrastructure (turbines, substation), associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.
 - With respect to the BESS units, this should include the following:
 - A schedule, list of activities and accountabilities for the inspecting, testing, monitoring and servicing of the battery and its monitoring, safety and protective systems.
 - Monthly inspections of battery enclosures/ containers and related infrastructure for physical damage. Any damage must be immediately assessed and rectified by a suitably qualified person.
 - Regular inspection and removal of all combustible materials near the battery enclosures/containers and related infrastructure.

3.9 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at the nominated site entrance to the facility, with any plans or information books provided in a weatherproof container (unless otherwise agreed with DFES).

The Emergency Information Book and/or signage is intended to provide to emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
 - Buildings, substations and renewable energy infrastructure (including turbines and BESS),
 - Internal driveways and surrounding public roads
 - Fire protection systems and equipment, including firewater tanks
 - Grid connections, drains and isolation valves,
 - Dangerous goods storage areas
 - Landowners within wind farm, and neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
 - North direction and scale
- The following wind turbine information:
 - Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
 - The shutdown and/or isolation procedures if the turbines are involved in fire or emergency incident, and appropriate personnel contact details to verify that the turbine has been shutdown and de-energised during emergencies.
- The following BESS details and plans:

- Schematics and technical data for BESS units, the number of units on-site, and the number of battery racks or modules within each unit.
- Details of the hazards for the BESS, including thermal events/runaway, electrical safety hazards, explosion hazards, dangerous goods hazards (including off-gassing), and the effects of fire on the BESS (e.g., explosion, release of toxic gases).
- Details of all provided battery failure/safety and protective systems, including a description, the activation process/automatic trigger, and any hazards associated with these systems.
- Specifications for safe operating conditions for temperature.
- Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available.
- The shutdown and/or isolation procedures if the BESS are involved in fire or emergency incident, and appropriate personnel contact details for verifying that the battery enclosure/container system has been isolated/shutdown and de-energised during emergencies.
- Details of any emergency equipment, including the type and location of fire and gas detection and suppression systems.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

3.10 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 3.9) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

3.11 Emergency Management Plan

An Emergency Management Plan is to be developed for the facility, the procedures for preparing for, and responding to, hazards to the facility, including the following for off-site bushfire, and on-site fire, emergencies:

- Facility details including key contacts and technical support during an emergency, site plan, details of renewable energy infrastructure, details of fire and emergency systems, and a manifest of dangerous goods.
- The identified risks and hazards associated with the renewable energy infrastructure, such as onsite fire and bushfires.

- Detail preparedness and pre-emptive actions to address the above hazards, including the following for onsite infrastructure fires and bushfire:
 - Ongoing compliance with the approved BMP and BRMP.
 - Ensuring ongoing maintenance of all buildings, fire and communication systems.
 - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
 - Modifying Site Activities (based on Forecast FDR and TFB/HVMB).
 - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, and understanding the decision-making triggers.
- Detail emergency response procedures to address to all identified hazards (including for onsite infrastructure fires and bushfire).
- For a bushfire emergency, the response should include the following:
 - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
 - Conducting early offsite evacuation of all staff away from the bushfire if safe to do so (preferred response), ideally to Geraldton, however Dongara, Mingenew or Mullewa may also be considered in order to travel away from approaching bushfire.
 - Essential staff may remain onsite where required for operational management and/or shutdown procedures, however only if requested and permitted by authorized DFES/local fire brigade personnel, and where safe to do so.
 - Conduct facility shutdown, if safe to do so prior to staff evacuation:
 - Conduct remote shutdown and de-energisation of turbine/s (in consultation with DFES, Western Power, AEMO), should it be required.
 - Reduce the BESS to a low energy state in consultation with authorised DFES personnel (where possible)
 - Ensure all other buildings and plant are properly secured.
 - Ensure all vehicular access routes are unlocked and available for use (as much as practical and safe to do so)
 - Ensure all fire and communications systems are ready for use.
 - If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place in the O&M and/or BESS O&M buildings.
 - It is noted that these buildings are not constructed for onsite refuge from bushfire and should only be considered as a last resort option only if offsite evacuation is not possible.
- Response to onsite fire, including turbine or BESS fire, is to include:
 - Immediately notify DFES to enable a rapid turnout, and relevant wind farm personnel
 - Confirm shutdown and deenergise any turbine/s on fire, and any other relevant turbines
 - Strongly consider full emergency shutdown of the BESS and substation unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible).
 - If fire is within the BESS unit/s, ensure staff relocate as far as possible from the fire, and no less than 50 m away.

- If fire is not in BESS containers (e.g. turbine fire), and only if safe to do so, trained personnel to conduct first attack response on any spot fires with mobile fire trailer to prevent fire escape, until DFES arrival. Staff are not expected to fight onsite infrastructure fires, but only limit any potential for bushfire ignition.
- Notify neighbouring landowners.

The emergency management plan is to be reviewed regularly, and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

The above is a high-level summary, with further specific detail on the requirements of the emergency management plan relating to bushfire and onsite infrastructure fire is provided in Section 5 and Appendix I of the project BMP.

4 CFA Guidelines Compliance Assessment

As detailed previously, the project is applying the Model Requirements from the CFA Guidelines to the renewable energy infrastructure of the project as much as possible as part of the bushfire risk management strategy, albeit rationalised for a WA context where required (e.g. use of WA standards for APZs, driveways, firewater tanks etc).

The proposed bushfire management strategy and mitigation measures have been detailed above in Section 3, with a compliance assessment of these measures against the Model Requirements of the CFA Guidelines provided below in Table 2.

The assessment demonstrates that compliance has been achieved with all Model Requirements, other than some rationalisations for the WA context. As previously noted, not all Model Requirements relate to bushfire impact on the proposed development, however the management of many of these internal hazards is also critical to avoid ignition of bushfires, so have been discussed as much as relevant.

Table 2: Summary of Renewable Energy Facility requirements relating to bushfire and the development response (CFA, 2025)

CFA Guideline Section	Requirement	Type	Development Response
Section 3: Fire Risk Management	<u>Risk Management Plan</u> - A Risk Management Plan must be developed for the facility, before development starts. <u>Additional Guidance from CFA Guidelines</u> - A Risk Management Plan (RMP) is critical in informing fire risk management in the design and operation of facilities, particularly where infrastructure or operations pose additional hazards to the landscape, occupants and emergency responders.	<u>All Facilities</u>	- This Bushfire Risk Management Plan assesses the bushfire hazards and risks for the proposed renewable energy infrastructure against the requirements of the CFA Guidelines, and details how the risk has been appropriately managed. - The required mitigation measures for the renewable energy infrastructure, has been incorporated into the project Bushfire Management Plan, to ensure they are implemented and maintained for the life of the project. <i>Based on the above, all requirements with the CFA Guidelines have been met.</i>
Section 4: Facility Location	<u>Landscape Risk to Facility</u> - An assessment that considers: - The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets. - The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	<u>All Facilities</u>	- The proposed development is largely within existing agricultural land, and is mainly grassland with smaller plots of retained shrubland, scrub, woodland and forest vegetation within the subject site, with the only significant plot of unmanaged vegetation being Burma Nature Reserve. - As detailed in Section 2.3.3, while bushfires have historically been a regular occurrence in the local region, especially in areas of retained non-grassland vegetation, those occurring in grassland have tended to be smaller likely due to quicker suppression. - While there appear to be few historical bushfires within the site, bushfires within Burma Nature Reserve highlight that a combination of unfavourable conditions can support significant behaviour which could escape into neighbouring land. - The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: - NVZ and APZs around renewable energy infrastructure to reduce bushfire impact to moderate levels, especially on the basis that the turbines and much of the BESS infrastructure are largely non-combustible materials. - The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). - For the turbines, the concepts for the above are detailed in Section 3.1.1 of this BRMP and summarised in Section 5.1.2 of the project BMP. This involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. - As detailed in Section 3.2.1 of this BRMP and Section 5.1.3 of the project BMP, the BESS units are more susceptible to elevated heat which could potentially trigger thermal runaway, and on this basis, the NVZ/APZ has been sized to achieve a target of 10 kW/m², but with a minimum width of 25 m to address any explosion risk. All other BESS infrastructure requires sufficient APZ to achieve BAL-29 or lower, which is typically 9 m wide in the current BESS Envelope location. - Vehicular access and firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and provide significant resources for attending firefighters to fight bushfires both within the wind farm site, and also throughout the local area: - The internal driveway network enables attending firefighters to access all proposed renewable energy infrastructure in a bushfire emergency, while also improving access throughout the wind farm site in general and to the surrounding public roads. - The internal driveways and crane pads also provide significant cleared areas within the wind farm site, which in grassland areas, may also be useful in controlling bushfire spread. - The onsite firewater supplies, provide a significant quantity of additional firewater for attending firefighters to refill appliances, without extended travel time. - All turbines will automatically shut-down upon detection of fire (i.e. turbine detecting fire will shut-down) - All turbines, monitoring towers are registered with CASA and compliantly marked, to manage risk to aerial firefighting appliances and enable them to move around the wind farm in a bushfire emergency.

CFA Guideline Section	Requirement	Type	Development Response
			○ The BESS modules are designed to incorporate bushfire resilience through non-combustible construction and targeted ember protection (if required). Additionally, the BESS modules are designed with a number of fire and safety systems to limit the potential for thermal runaway, fire and explosion from the unit, including ▪ Battery management/monitoring systems ▪ Thermal management/monitoring systems ▪ Fire detection, alarm and suppression systems ▪ Explosion management systems ○ During a bushfire emergency, all renewable energy infrastructure can be remotely shut-down from offsite, to prevent exacerbating bushfire behaviour and also to limit risk to aerial firefighting appliances and enable them to move around the wind farm, as much as possible. ○ System monitoring for all electrical infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification. ○ Strong liaison with DFES and local fire brigade from facility commissioning and for the duration of operation ○ Emergency Management Plan that addresses bushfire preparedness, prevention and response activities, including notification of DFES, facility shutdown and offsite evacuation. • Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Facility Risk to Landscape</u> • As assessment of the fire risk from the proposed facility to the landscape	<u>All Facilities</u>	• As detailed in Section 2.4, based on historical occurrences in Australia, there appears to be a relatively low likelihood of wind turbine, substation or BESS fires. It is noted that these types of grid scale BESS facilities are relatively new, therefore the opportunity for fire damage and loss is limited. BESS fires in Australian appear to have generally been contained to 1 or 2 BESS units, with limited spread across adjacent BESS. • The focus on addressing risk to the landscape is primarily through prevention of uncontrolled turbine or BESS fire through the provision of the following: ○ Operational status monitoring, fault monitoring etc, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified. ○ Fire detection and alarm systems to ensure early notification to wind farm personnel and DFES/local fire brigade and enable early turnout. ○ Automatic fire suppression system in the nacelle to prevent any ignition events from becoming uncontrolled turbine fires. ○ The BESS modules are designed to incorporate bushfire resilience through non-combustible construction and targeted ember protection (if required). Additionally, the BESS modules are designed with a number of fire and safety systems to limit the potential for thermal runaway, fire and explosion from the unit, including ▪ Battery management/monitoring systems ▪ Thermal management/monitoring systems ▪ Fire detection, alarm and suppression systems ▪ Explosion management systems • The above is supplemented by the provision of ○ Onsite vegetation management, including NVZ/APZs around renewable energy infrastructure, to limit the ability of onsite fire in the renewable energy infrastructure to escape to surrounding unmanaged vegetation. ○ Vehicular access and firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and provide significant resources for attending firefighters to fight fire within the facility: ▪ The internal road network enables attending firefighters to access all proposed BESS and turbine infrastructure, and the substation, including the provision of multiple entrances to the site

CFA Guideline Section	Requirement	Type	Development Response
			▪ The onsite firewater supplies, provide a significant quantity of firewater for attending firefighters to control or suppress onsite fires. • Ensuring appropriate onsite response capabilities, through provision of: ○ Emergency Information Book and signage at site access points, to assist firefighter when turning out, aided by DFES/local brigade familiarisation both prior to facility operation and regularly throughout operation as required. ○ Compliant internal vehicular access and firewater supplies for attending firefighters, ○ Mobile fire trailer and training, to enable a rapid response by onsite wind farm personnel to address any spot fires until firefighter turnout. • Based on the above, all requirements with the CFA Guidelines have been met.
Section 4: Facility Design	<u>Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)</u> • The provision of NVZ and/or APZ: ○ Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. ○ Of a width of at least 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure • A NVZ must be: ○ Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. ○ Free of vegetation and obstructions at all times. ○ No plant or equipment of any kind is to be stored in fire breaks. <u>Additional Requirements for Wind Facilities</u> • The provision of NVZ (and APZ if required) is not required around the perimeter of the wind energy facility, but must be established around the base of each wind turbine. • Where wind turbines are sited in high-risk environments, additional vegetation management must be considered, with the implementation of an additional reduced-fuel zone recommended around the base of wind turbines, abutting the fire break. The reduced fuel zone may be: ○ No less than 20m, or ○ To the envelope of the wind turbine blades. <u>Additional Requirements for BESS</u> • The provision of a NVZ and/or APZ around battery energy storage systems and related infrastructure.	<u>All Facilities</u> <u>Wind Facilities</u> <u>BESS</u>	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Sections 3.1.1, 3.1.3, 3.2.1 and 3.3 of this BRMP. ○ Primarily this involves the establishment of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ, either 20 m wide or extending out to the blade envelope, where proposed turbines are near or within non-grassland vegetation. ○ The BESS modules are to have a 25 m wide perimeter NVZ/APZ to achieve 10 kW/m² or lower and address any explosion risk for bushfire ignitions, consisting of the following: ▪ A 10 m wide NVZ adjacent to the BESS units, that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible. ▪ Outside the 10 m NVZ, the remaining 15 m can be non-vegetated or otherwise comply with the APZ standards from the WA PBG, with the following clarifications: • Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS • Largely consist of managed grassland (<100 mm in height) or low groundcovers ○ All other BESS infrastructure is to be sited in BAL-29 or lower which primarily this involves the establishment of a 9 m APZ based on current location. ○ The substation is to be sited in BAL-29 or lower which involves the establishment of a 9 m APZ based on current location. All land within the substation perimeter APZ is to be non-vegetated. ○ An APZ is also to be established around firewater tanks to achieve BAL-29 or lower. ○ No perimeter NVZ has been provided for the wind turbines, as permitted by the CFA Guidelines. • These vegetation modification and management requirements have been incorporated into Sections 5.1 and 5.3 of the project BMP, which are to be maintained for the life of the wind farm facility. • Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Emergency Vehicle Access</u> • Construction of a minimum four (4) metre perimeter road within the perimeter fire break. • Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth). • Constructed roads should: ○ Be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface. ○ Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.	<u>All Facilities</u> <u>Wind Facilities</u> <u>BESS</u>	• Vehicular access requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.2 and 3.2.2 of this BRMP. ○ Compliant internal driveway access is to be provided from the nominated wind farm site entrances to each turbine and firewater tank, including turnaround. ○ At least 2 entrance/exit gates are to be provided to the BESS Envelope from the internal road network, and the internal road within the BESS Envelope to be configured as loop road, to avoid creation of any internal dead-end roads. ○ The specifications are to comply with the private driveway specifications of the WA Guidelines, with the only deviation being that if the internal wind farm driveways are less than 6 m wide, passing bays will be provided every 600 m (6m wide x 20m long) in accordance with the CFA Guidelines.

CFA Guideline Section	Requirement	Type	Development Response
	- Otherwise comply with the private driveway specifications of the WA Guidelines - Ensure any fencing along access routes allows for width of fire trucks. - Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. - The provision of at least two (2) but preferably more access points to each part of the facility. <u>Additional Requirements for Wind Facilities</u> - Construction of a four (4) metre perimeter road is not required for wind energy facilities, however, suitable emergency vehicle access is required to each turbine and building on-site. - Constructed roads developed during the construction phase of facilities must be maintained post-commissioning and throughout the operational life of the facility, to allow access to each turbine for maintenance and emergency management purposes. <u>Additional Requirements for BESS</u> - The provision of at least two access points into each section where battery energy storage systems are located.		- These vehicular access requirements have been incorporated into Section 5.2 of the project BMP. Based on the above, the proposed of wind farm driveway and site entrances, supplemented by the use of existing public roads, farm roads and entrances, is considered sufficient to provide a flexible vehicular access network to, and within the proposed wind farm, for emergency services use in a bushfire emergency
	<u>Firefighting Water Supply</u> - Water access points must be clearly identifiable and unobstructed to ensure efficient access. - Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA Guidelines: - The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. - An external water level indicator must be provided to the tank and be visible from the hardstand area. - Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. - Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). - The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. - The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure - The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. - The hard-suction point must be protected from mechanical damage where necessary. - The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. - An all-weather road access and hardstand, compliant with the private driveway specifications of the WA Guidelines and at least 6 m wide and 8 m long, must be provided to the hard-suction point. - The road access and hardstand must be kept clear at all times. - Where the access road has one entrance, an 18 metre diameter turning circle must be provided at the tank. <u>Additional Requirements for Wind Facilities</u> - Fire water storage tanks of at least 45,000L are provided at each site entrance. - Additional fire water storage tanks of at least 45,000L are incorporated in facility design. <u>Additional Requirements for BESS (Centralised)</u> - Where reticulated water is available, the provision of a fire hydrant system that meets the requirements of AS 2419.1-2021 Clause 3.9: Open Yard Protection, and Table 2.2.5(D): Number of Fire Hydrants Required to Flow Simultaneously - Open Yards. OR	<u>All Facilities</u> <u>Wind Facilities</u> <u>BESS</u>	- Firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and detailed in Sections 3.1.3 of this BRMP. - At least 300 kL of firewater is to be provided for the wind turbines, currently proposed to be stored in three (3) 100 kL firewater tanks across the site. - While the firewater tank locations proposed represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent - Provision of firewater supply for BESS facilities in areas that is to be 288,000L or more, or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5(D). - These firewater tanks will comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA Guidelines, supplemented by some requirements from the CFA Guidelines: - Rather than siting the tanks at the wind farm site entrances, signage will be placed at all wind farm site entrances to indicate to attending firefighters the location of the firewater tanks within the wind farm. - While the firewater tank locations proposed represent the current siting approach, there remains flexibility to relocate or amalgamate the firewater tank/s, provided there is agreement with DFES, local fire brigades and the Proponent - These firewater requirements have been incorporated into Section 5.3 of the project BMP. Based on the above, all requirements with the CFA Guidelines have been met, other than the siting of the firewater tanks away from site entrances in some instances, however signage will be provided to clearly indicate the location of the firewater tanks in the development.

CFA Guideline Section	Requirement	Type	Development Response
	- Except, that fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet. - Where no reticulated water is available, provision of a fire water supply in static storage tanks, where: - The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater. - The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5(D). - Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet. - The fire water supply must be located at vehicle entrances to the facility, at least 10m from any renewable energy infrastructure and buildings. - The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (e.g. Fire water tanks are to be located closer to the site entrance than the battery energy storage system). - The fire water supply must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA Guidelines		
	<u>Fire Detection and Suppression Equipment</u> - For on-site buildings and structures, according to the requirements of the National Construction Code. - For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. - For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. - In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	<u>All Facilities</u>	<u>National Construction Code (NCC) compliance</u> - All buildings are to comply with the fire detection and suppression requirements of the NCC. - As detailed in Section 3.6 of the BRMP, from a bushfire construction perspective, the NCC requires additional resilience to be added to Class 1, 2, 3, associated 10a and “certain” Class 9 buildings. - None of these building classifications are proposed at the facility, however the Proponent may consider voluntary adoption of bushfire construction measures to some buildings. <u>Dangerous Goods compliance</u> - It is understood that no significant quantities are proposed at the facility, other than the proposed BESS modules which have been appropriately managed using strategies from the CFA Guidelines. - Notwithstanding, should significant quantities of dangerous goods be stored or handled onsite in the future: - These will need to comply with all relevant Dangerous Goods legislation, codes and standards - They should be reviewed by a BPAD Level 3 bushfire practitioner to ensure they are sited in areas of BAL-29 or lower, and appropriately protected from bushfire impact. <u>Portable fire extinguishers</u> - Portable fire extinguishers are to be provided in (or near) the following in accordance with Australian Standards and Shell requirements: - Each wind turbine - Throughout BESS infrastructure - Each building - Substation rooms (e.g. switchroom/control room) - Wind farm vehicles

CFA Guideline Section	Requirement	Type	Development Response
			Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Design Specific to Facility Type</u> <u>Additional Requirements for Wind Facilities</u> - As wind energy facilities pose hazards for aerial firefighting operations in certain weather and terrain conditions, the following design requirements are to be incorporated: - Wind turbines are located no less than 300 metres apart. - Provision of automatic shut-down, and the ability for wind turbines to be completely disconnected from the power supply in the event of fire. - Notification of installed weather monitoring stations to the Civil Aviation Safety Authority (CASA). - Marking of all guy wires and monitoring towers. - Nacelles are equipped with automatic fire detection, alarm, and fire suppression systems. <u>Additional Requirements for BESS</u> - Facility design that incorporates: - A separation distance that prevents fire spread between battery containers/enclosures and other site elements. - Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements. - A NVZ and/or APZ around the battery energy storage system and related infrastructure, of a width of no less than 10m (or greater where determined). - NVZ must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. - The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping. - A layout of site infrastructure that: - Considers the safety of emergency responders. - Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. - Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure. - Battery energy storage systems must be: - Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles). - Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of fire at the battery energy storage system.) - Provided with in-built fire and gas detection systems. - Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels. - Provided with suitable ember protection. - Provided with suitable access roads for emergency services vehicles. - Installed on a non-combustible surface. - Provided with suitable ventilation. - Provided with suitable impact protection. - Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection. - Provided with spill containment that includes provision for management of fire water runoff.	<u>Wind Facilities</u> <u>BESS</u>	<u>Turbine Siting</u> - The wind turbines will all be located further than 300 m from each other. <u>Turbine Automatic Shutdown and Disconnection</u> - Wind turbines will be automatically shut-down in the event of turbine fire, with the ability to be completely disconnected from the power supply. - There will also be ability to shut-down the turbines (either locally onsite or remotely from offsite) in a bushfire event if required <u>Installed Turbine and Weather Monitoring Station Notification</u> - Ensure DFES and DBCA (especially Aviation Services), and Air Services Australia, are notified of the turbine and mast locations for inclusion in the Vertical Obstruction Database. - While outside the scope of this bushfire risk management plan, it is noted that the Proponent will advise CASA of all-weather monitoring stations installed as part of the proposed development <u>Marking Guy Wires and Monitoring Towers</u> - While outside the scope of this bushfire risk management plan, it is noted that the Proponent will mark all guy wires and monitoring towers installed as part of the proposed development. <u>Turbine Fire Systems</u> - All turbines are to be fitted with fire detection, alarm and suppression system to provide early warning of internal fire and automatic response - Activation of fire detection systems will be locally and remotely monitored at all times - An emergency management procedure will be incorporated into the wind farm Emergency Management Plan to rapidly notify DFES, wind farm personnel (including on-call technician) and nearby landowners/farmers, of the onsite turbine fire detection or suppression system activation. <u>BESS Separation Distance</u> - While outside the bushfire risk management scope, the BESS related siting requirements have been nominated as per the stated CFA Guideline requirements, in Section 3.2.4 of this BRMP. - The expectation is this will be addressed by complying with relevant codes and standards, including Australian Standards, and any manufacturers recommendations. <u>NVZ/APZ around BESS and Related Infrastructure</u> - Vegetation modification and management requirements for the BESS has been determined through application of the CFA Guidelines and detailed in Section 3.2.1 of this BRMP. <u>BESS Design Requirements</u> - The BESS related design requirements have been nominated as per the stated CFA Guideline Model Requirements, and detailed in Section 3.2.4 of this BRMP. - Based on the above, all requirements with the CFA Guidelines have been met.

CFA Guideline Section	Requirement	Type	Development Response
Section 5: Facility Construction and Commissioning	<u>Emergency Plan (Construction)</u> • An Emergency Plan must be developed for the construction and commissioning phase of the facility. <u>Additional Guidance from CFA Guidelines</u> • An emergency communication system must be provided that is reliable and will operate in the event of power failure. • Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction. • Provide first-aid firefighting equipment, such as fire extinguishers (and where possible, portable fire hose reels), appropriate to the identified emergency scenarios, at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles. • Provide training for personnel in the use of on-site first-aid firefighting equipment, and responsibilities during emergencies. • Provide the required fire protection equipment for any storages of dangerous goods as per the relevant Australian Standards. • It is recommended the development of safe work procedures for the facility, encompassing but not limited to: ○ Electricity and chemical management. ○ Vegetation management. ○ Ignition source control, including hot works. ○ Infrastructure, equipment and vehicle maintenance. ○ Emergency management • Adhere to restrictions on Total Fire Ban or days of elevated fire danger • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. • Fire brigade must be notified at least seven (7) days prior to the commissioning of any high-risk infrastructure at the facility (e.g., battery energy storage systems).	<u>All Facilities</u>	• Emergency procedures for the construction phase are to be incorporated in the Construction Management Plan as mentioned in Section 3.7 of this BRMP. • It is recommended that the bushfire emergency management concepts summarised in Section 3.11 of this BRMP and detailed in Section 5.8 of the project BMP for the operational renewable energy facility, are incorporated into the Construction Management Plan for bushfire preparedness and response, as much as applicable. • Additional bushfire related construction and commissioning requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and documented in Section 3.7 this BRMP and Section 5.4 of the BMP, including the specific requirement to notify DFES ahead of commissioning any renewable energy infrastructure. • <i>Based on the above, all requirements with the CFA Guidelines have been met.</i>
Section 6: Facility Operation	<u>Fire Management Plan</u> • A Fire Management Plan must be developed for the facility, before development starts. <u>Additional Guidance from CFA Guidelines</u> • A Fire Management Plan is based on the outcomes of the Risk Management Plan and outlines the activities, processes and accountabilities for the ongoing management of fire risk at the facility including: ○ A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy. ○ Description of control measures to prevent fire occurring and limit the consequences of fire at the facility. ○ Description of control measures to prevent and reduce the consequences of external fire impacting the facility. ○ Details of equipment and resources to manage fire at the facility ○ Policies and procedures that ensure all control measures are appropriate and effective, and remain so. ○ Procedures for review of the Plan <u>Additional Requirements for BESS</u> • A Fire Management Plan for a facility that incorporates a battery energy storage system must also include: ○ A schedule, list of activities and accountabilities for the inspecting, testing, monitoring and servicing of the battery and its monitoring, safety and protective systems.	<u>All Facilities</u> <u>BESS</u>	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and summarised in Section 3.0 of this BRMP. • These bushfire risk management measures for the renewable energy infrastructure have also been summarised in Section 5.0 of the project BMP, including the nomination of responsible entities for implementation and ongoing management in Section 7. • <i>Based on the above, all requirements with the CFA Guidelines have been met.</i>

CFA Guideline Section	Requirement	Type	Development Response
	- Monthly inspections of battery enclosures/ containers and related infrastructure for physical damage. Any damage must be immediately assessed and rectified by a suitably qualified person. - Seismic activity as a trigger for inspecting, testing and servicing of the battery energy storage system and its related infrastructure. Any damages or changes in operating parameters must be immediately assessed and rectified by a suitably qualified person. - Regular inspection and removal of all combustible materials near the battery enclosures/containers and related infrastructure.		
	<u>Bushfire and Grassfire</u> - If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. <u>Additional Guidance from CFA Guidelines</u> - Your facility may be at-risk of bushfire if it is: - Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. - Identified as being in a Designated Bushfire Prone Area. - Address bushfire prevention and preparedness activities	<u>All Facilities</u>	- Bushfire preparedness and response actions for the renewable energy infrastructure has been determined through application of the CFA Guidelines and documented in Section 3.11 of this BRMP. - These bushfire preparedness and response actions have been incorporated into Section 5.8 and Appendix I) of the project BMP. Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Vegetation Management</u> - Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): - Grass must be maintained at or below 100mm in height during the nominated bushfire season. - Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. - Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days <u>Additional Requirements for BESS</u> - Containers/enclosures and infrastructure for battery energy storage systems must be maintained to be clear of vegetation, including grass, for at least 10 m on all sides (or greater where determined).	<u>All Facilities</u> <u>BESS</u>	- Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Guidelines and detailed in Sections 3.1.1, 3.1.3, 3.2.1 and 3.3 of this BRMP. - These vegetation modification and management requirements have been incorporated into Section 5.1 of the project BMP, which are to be maintained for the life of the facility. - Compliance with restrictions and guidance on days of elevated Fire Danger Rating, and Total Fire Ban days is summarised in Section 3.11 of this BRMP and expanded upon in Section 5.8 an Appendix I of the BMP Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Arc Flash Hazard Management</u> <u>Additional Guidance from CFA Guidelines</u> Where required, appropriate demarcation of arc boundaries to at least 10m from PCU arc flash outlet flaps (blow-out panels) must be provided.	<u>All Facilities</u>	- While outside the bushfire risk management scope, the Proponent has advised they will comply with relevant arc flash standards. Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Facility and System Monitoring</u> - Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately. <u>Additional Requirements for BESS</u> - For battery energy storage systems, appropriate monitoring and intervention measures must be provided to ensure that the following are rapidly identified and notified to 000 immediately: - Any shorts, faults, temperature increases above normal parameters (eg., precursor to thermal events/runaway). - Equipment failures with the potential to ignite or propagate fire. - Off-gassing, smoke or fire. - The provision for direct alarm monitoring to the fire brigade for battery energy storage system automatic	<u>All Facilities</u> <u>BESS</u>	- The proposed renewable energy infrastructure (especially BESS, solar and wind turbines) is to be monitored at all times, both locally onsite (during business hours) and remotely offsite (at all times), as detailed in Section 3.5.2 - The following emergency response procedures included in the bushfire emergency management arrangements in Section 3.11: - Immediately notify DFES to enable a rapid turnout of any onsite fire. - If possible, ensure relevant vehicular access routes are open and available, to enable attending firefighters to gain access to the location of the fire. - Ensure all fire and communications systems are ready for use. - Ensure attending firefighters have access to any relevant specialist technical personnel (onsite or offsite), to assist by providing technical advice. - Turbine fire detection and suppression systems will be remotely monitored at all times, and upon activation, the response procedure is to include immediate notification to DFES, wind farm personnel (including on-call technician) and local landowners/farmers (if required) of potential onsite turbine fire.

CFA Guideline Section	Requirement	Type	Development Response
	detection systems must be considered		○ The wind turbine will be automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely if required (in consultation with DFES, Western Power, AEMO). ○ If the fire in in the BESS, ensure no staff approach the BESS (if there are any onsite). Staff should move to safe distance from the project area, no less than 50 m (or as advised). ▪ Strongly consider full emergency shutdown of the BESS and substation unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible). • The substation functionality will be monitored by Western Power. • Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Maintenance and Housekeeping</u> • Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. • Maintenance must be in line with any relevant Australian Standards, the manufacturer's requirements. • Site-wide housekeeping inspections must be conducted regularly at facility. If your facility is at-risk of bushfire, site-wide bushfire preparedness housekeeping inspections must be conducted at least three months, and again one month, prior to the Fire Danger Period.	<u>All Facilities</u>	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Guidelines and documented in this BRMP, including specific requirements during the operation phase relating to maintenance and housekeeping in Section 3.8. • These bushfire risk management measures for the renewable energy infrastructure, including ongoing maintenance and management requirements, have also been summarised in the project BMP in Section 5, including the nomination of responsible entities for ongoing management on Table 6 of the BMP. • Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Safe Dangerous Goods Storage and Handling</u> <u>Additional Guidance from CFA Guidelines</u> • Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2022 and the relevant Australian Standards must be provided at the site entrance, dangerous goods storage locations, and storage tanks where applicable. • Appropriate material for cleaning up dangerous goods spills and leaks (including absorbent, neutralisers, tools, disposal containers and personal protective equipment) must be provided and available on-site. • Training must be provided for site personnel on the hazards, safe use and emergency response for spills, leaks and fire involving dangerous goods. • All dangerous goods stored on-site must have a current Safety Data Sheet (SDS). Safety Data Sheets must be provided within the facility's Emergency Information Book(s), in the Emergency Information Container(s). • The requirements of the dangerous goods legislative framework, and all relevant Australian Standards must be complied with for all facilities, including facilities with battery energy storage systems.	<u>All Facilities</u>	• It is understood that no significant quantities are proposed at the facility, however if this changes in the future, it is expected it will be transported, handled and stored in accordance with relevant Australian Standards and Dangerous Goods legislation. • The proposed BESS units will contain Li-ion batteries (or similar) that will be classified as Dangerous Goods. ○ This BMP demonstrates the bushfire risk management measures align with recommendations from the CFA Guidelines, including reviewing and assessing the potential risk to and from the BESS units. • The Emergency Information Book is to contain a current manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for Dangerous Goods stored on-site. • Notwithstanding, should significant quantities of dangerous goods be stored or handled onsite in the future: ○ These will need to comply with all relevant Dangerous Goods legislation, codes and standards ○ They should be reviewed by a BPAD Level 3 bushfire practitioner to ensure they are sited in areas of BAL-29 or lower, and appropriately protected from bushfire impact. • Based on the above, all requirements with the CFA Guidelines have been met.
	<u>Fire Risk Review</u> <u>Additional Guidance from CFA Guidelines</u> • Fire risk must be effectively managed at operating facilities to meet obligations for providing a safe workplace under the OHS Act. • Fire brigade recommends that facility operators consider the design guidelines and model requirements contained in this document and develop procedures to ensure that: ○ The Fire Management Plan is reviewed and updated regularly, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility. ○ The Emergency Plan is reviewed and updated to reflect any changes in the Fire Management Plan, including where fire risks emerge or change, risk controls are added or modified, or where there is a near miss or incident at the facility. • Where substantive changes are made to these documents, fire brigade recommends considering peer-review	<u>All Facilities</u>	• The mitigation of fire risk from the proposed facility has been derived from the relevant Model Requirements from the CFA Guidelines, and documented in Section 3 this BRMP and Section 5 of the project BMP. • Like any BMP or BRMP, if there are significant changes to the development, they should be reviewed, and if required amended, to reflect those changes. • The Emergency Management Plan for the facility is to be reviewed and amended as summarised in Section 3.11 of the BRMP and Section 5.8 and Appendix I of the project BMP. • Based on the above, all requirements with the CFA Guidelines have been met.

CFA Guideline Section	Requirement	Type	Development Response
	by a suitably qualified, independent third party.		
Section 7: Emergency Planning	<u>Emergency Plan (Operational)</u> - An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. <u>Additional Guidance from CFA Guidelines</u> - An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. - The EP should address the following for each hazard: - Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) - Personnel Training - Emergency Exercises - The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. <u>Additional Requirements for Wind Facilities</u> - Any EP for a Wind Energy Facility must include: - Emergency procedures for fires within, and in the vicinity of, wind turbines. - Details of any triggers or circumstances for ceasing operation of wind turbines or shutting down the facility, such as on Extreme or above days or approach of bushfire/grassfire to the facility. - Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk. - This information must also be provided within the facility's Emergency Information Book. - Wherever possible, rotors are to be stopped into a 'Y' pattern during emergencies <u>Additional Requirements for BESS</u> - Emergency Plans for facilities with battery energy storage systems must additionally include: - Contact information for 24/7/365 specialist technical support for the battery energy storage system. - Emergency response procedures based on identified risks and hazards of the battery energy storage system and related infrastructure, including but not limited to: - Electrical infrastructure faults and fire. - Battery energy storage system damage or faults, including battery monitoring faults, temperature increases above normal operating parameters, electrical faults, chemical spills or reactions, off-gassing, thermal events/runaway, smoke and fire. - Bushfire and grassfire. - The management of fire water runoff. - Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available (e.g., at the BESS containers, in an on-site control room, off-site monitoring facilities). - A plan for partial and full decommissioning of the battery energy storage system in the event of an emergency incident that renders the facility inoperable or unsafe, before its anticipated end-of-life. - Any information that supports the considerations in Appendix B: Emergency Response Considerations for Large-Scale Battery Energy Storage Systems. - This information must also be provided within the facility's Emergency Information Book.	<u>All Facilities</u> <u>Wind Facilities</u> <u>BESS</u>	- Bushfire emergency management preparedness and response concepts for the renewable energy infrastructure has been summarised in Section 3.11 of this BRMP. - The bushfire emergency management preparedness and response concepts detailed in Section 5.8 (and Appendix I) of the project BMP, which cover both proposed buildings and renewable energy infrastructure, are to be incorporated into the overall facility Emergency Management Plan. - The additional requirements for wind farm facilities documented in the CFA Guidelines, have been included in the Emergency Information Book and signage for attending firefighters, and the site Emergency Management Plan - The CFA Guidelines specifically notes that wind turbines should be capable of being stopped in the "Y" pattern - Each turbine will be able to be placed in the "Y" pattern (rabbit ears position) in a bushfire emergency, either remotely by the offsite personnel, or locally by onsite personnel but only if safe remain onsite. - Any pausing of turbines and placing in the "Y" pattern, is expected to be conducted in consultation with DFES, Western Power, AEMO. Based on the above, all requirements with the CFA Guidelines have been met.
Section 8. Provision of Emergency	<u>Developing an Emergency Information Book</u> An Emergency Information Book must be developed and available to emergency responders, and include the	<u>All Facilities</u>	The Emergency Information Book and signage, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Guidelines and detailed in Sections 3.9 and 3.10 of this BRMP.

CFA Guideline Section	Requirement	Type	Development Response
Information	following: ○ A description of the premises, its infrastructure and operations. ○ Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. ○ A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. ○ Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) ○ Details of emergency equipment, including the type and location of gas detectors. ○ Up-to-date contact details for site personnel, regulatory authorities and site neighbours. ○ Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. ○ A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade. ○ A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.		• These requirements have been incorporated into Sections 5.6 and 5.7 of the project BMP. • <i>Based on the above, all requirements with the CFA Guidelines have been met.</i>

5 References

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Appendix A

Vegetation plot photos and description



Photo ID: 1a



Photo ID: 1b



Photo ID: 1c



Photo ID: 1d



Photo ID: 1e



Photo ID: 1f

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland at maturity, greater than 100 mm in height



Photo ID: 1g

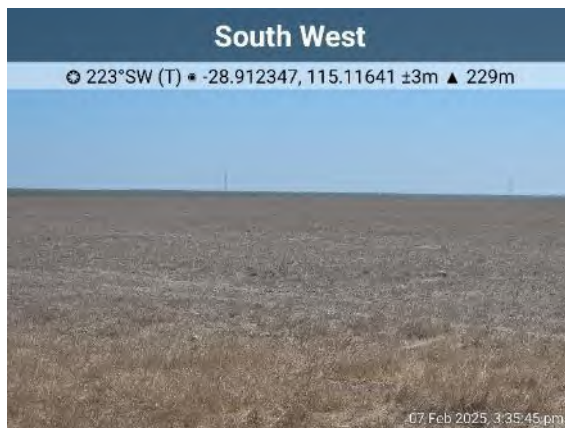


Photo ID: 1i



Photo ID: 1h

Plot number	Plot 1
Vegetation classification	Class G Grassland
Description / justification	Grassland at maturity, greater than 100 mm in height



Plot number	Plot 2
Vegetation classification	Class B Woodland
Description / justification	Trees 2-30 m at maturity, dominated by trees with a grassy understorey (lacks shrubby middle layer and deep surface litter)



Photo ID: 4a

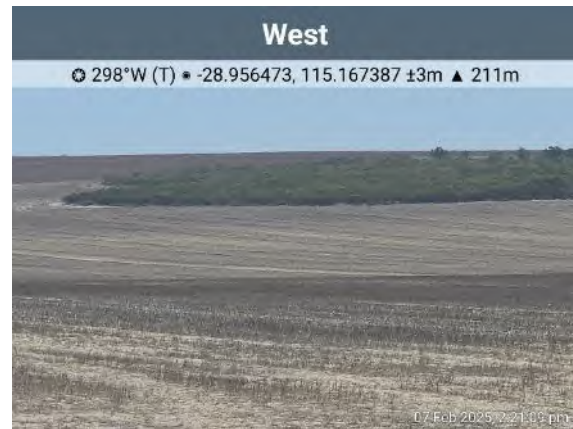


Photo ID: 4b



Photo ID: 4c



Photo ID: 4d



Photo ID: 4e



Photo ID: 4f

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 4g



Photo ID: 4h



Photo ID: 4i



Photo ID: 4j



Photo ID: 4k



Photo ID: 4l

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 4m



Photo ID: 4n



Photo ID: 4o



Photo ID: 4p

Plot number	Plot 4
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity



Photo ID: 5a



Photo ID: 5b



Photo ID: 5c



Photo ID: 5d

Plot number	Plot 5
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity



Photo ID: 6a



Photo ID: 6c



Photo ID: 6b

Plot number	Plot 6
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey