

NON-MANDATORY GUIDANCE ASSESSMENT

APPLICABLE BUSHFIRE PLANNING GUIDELINES/OVERLAYS

APPLICABLE PLANNING DOCUMENTS

"Design Guidelines and Model Requirements for Renewable Energy Facilities v4.4" - Victorian Country Fire Authority – Specialist Risk and Fire Safety Unit (June 2025).

COMPLIANCE ASSESSMENT

COMPLIANCE WITH THE RELEVANT ACCEPTABLE SOLUTIONS (APPROVED MEASURES)

The Planning Document/s

The applicable planning documents establish packages of bushfire protection measures that are to be applied, each with different sets of specifications and requirements to be satisfied and applied to different types of development or use with appropriate variations.

The aim of these is to provide for the protection of human life and minimise impacts on property from the threats of bushfire, while having due regard to development potential, site characteristics and protection of the environment.

The bushfire protection measures are typically grouped under a common and specific purpose. Each purpose has:

1. A performance outcome, objective, criteria or intent to be met (satisfied); and
2. Provides for two pathways to satisfy the required performance:
 - a) Prescriptive measures and their requirements as acceptable solutions (approved measures); or
 - b) The ability to develop an alternative solution.

The Compliance Assessment

The assessment will consist of:

1. Identification of the relevant development type/use associated with the subject site.
2. Identify if the Design Advice or Model Requirement criteria is relevant within the context of the Western Australian Planning System.
3. Where a Design Advice or Model Requirement criteria is relevant:
 - a. Determine whether the existing planning or design of the proposed development complies with the criteria or its intent; or
 - b. Provide recommendations for the proposed development to meet the criteria or its intent; or
 - c. Detail why the measure is not or cannot be met.
4. Potential alternative solutions may be provided, but this is applied as a 'Modification' as there is no body or process for consultation/verification that the alternative meets the intent of the criteria.

APPLICABLE DEVELOPMENT	
Type	Applicable
All Facilities <i>Definition (Renewable Energy Facility):</i> A site or installation dedicated to the generation and/or capture of renewable energy. Stand-alone battery energy storage systems are considered renewable energy facilities for the purposes of this guideline.	✓
Wind Energy Facilities <i>Definition:</i> A facility where wind turbines use the energy of the wind to spin an electric generator which produces electricity, then power conversion equipment (inverters) convert the power into alternating current (AC). The facility may include grid connection infrastructure to feed power into the electricity grid.	✓
Solar Energy Facilities <i>Definition:</i> A facility where solar panels convert sunlight into direct current (DC) electricity; then power conversion equipment (inverters) convert the power into alternating current (AC). The facility may include grid connection infrastructure to feed power into the electricity grid. Solar energy facilities may utilise either solar photovoltaic or solar thermal technologies. • Large-scale solar: >5MW • Micro solar: ≤5MW	
Battery Energy Storage Systems <i>Definition:</i> A system comprising one or more cells, modules or batteries, power conversion equipment (PCE) and isolation and protection devices. Battery energy storage systems convert energy into electrical energy and stores the energy internally. For the purposes of this guideline: • Large-scale battery systems: >1MWh • Small-scale battery systems: ≤1MWh	✓
Assessment Criteria	
The <i>Design Guidelines and Model Requirements for Renewable Energy Facilities v4.4</i> provides Design Advice and Model Requirements for each use type. Design Advice whilst not requirements, are factors to consider in planning of the proposal. These items should be considered and applied where feasible. Model Requirements are 'CFA's minimum requirements for renewable energy facilities in low-risk environments, and must be reflected in the RMP.' Alternatives can be considered as 'Modifications to Model Requirements must be in consultation with CFA.' Applications in High-Risk Environments (analogous to Bushfire Prone Areas in Western Australia) are assessed against Section 4.1.1 of the Guidelines (within this Compliance Assessment). As consultation is not available, variations/modifications to Model Requirements are justified either to meet the intent of the Model Requirement, or to justify why the Model Requirement should not be applied. This is the 'alternative solution' pathway applicable. The measures within the <i>Design Guidelines and Model Requirements for Renewable Energy Facilities v4.4</i> are not applied independently of the associated Bushfire Risk Report. The criteria are instead applied in the applicable section in the body of the Bushfire Risk Report. The intent is to produce a single 'package' of protection measures recommended/required to be applied to the proposal (regardless of their source), for clarity of the proponent and decision maker(s).	

SECTION 2: CFA INVOLVEMENT WITH RENEWABLE ENERGY FACILITIES

Subsection 2.2.1: Pre-Planning

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	a) Where located within a Bushfire Prone Area, bushfire risk is addressed according to the Victoria Planning Provisions, Clause 13.02-1S (Bushfire Planning), through bushfire hazard identification and assessment (including a bushfire hazard site and landscape assessment). This assessment must include risks to the proposed technologies from the landscape (bushfire/grassfire).	Complies with Intent	5.1.3
	Assessment Comment: The development is assessed under the Western Australian Planning Provisions, being SPP 3.7 and the associated Planning for Bushfire Guidelines (September 2024). The WA provisions also require landscape assessments. A 'broader landscape' assessment has been provided within Section 5.1 of this Bushfire Risk Report. The methodology differs from that required under WA and Victorian Planning Provisions, as: - The planning context is not available to consider the assessment against. - Supplementary technical information is required to assess the inherent threat from the broader landscape. From <i>Applying the Bushfire Hazard Landscape Assessment in a Bushfire Management Overlay v4.0</i> (CFA March 2022): 'Where 'buildings and works' are proposed in landscape types Three or Four, it may be necessary to further enhance safety through additional bushfire protection measures.' The applicable landscape type is unknown, as the methodology within <i>Planning Permit Applications Bushfire Management Overlay – Technical Guide</i> pp13-16 (DELWP September 2017) does not consider pasture landscapes. Additional protection measures are applied through this document regardless of the bushfire hazard type.		
	b) Address risks from proposed technologies through a comprehensive risk management process, documented in a Risk Management Plan.	Complies with Intent	
	Assessment Comment: Bushfire risks for the proposed development sites are considered within the associated Bushfire Risk Report. (240073-2 - Dinner Hill Wind Farm Badgingarra (BRR))		
	c) Indicate where the exact specifications of elements within the renewable energy facilities will be determined during the detailed design phase, such as wind turbine model/manufacturer and battery chemistry.	Fully Complies	
	Assessment Comment: Product specifications have not been determined/finalised and datasheets are not available. This information is intended to be provided during procurement after planning approval.		

	d) Explicitly state that the following documentation will be prepared in accordance with this guideline, in consultation with CFA, before development starts: • Risk Management Plan • Fire Management Plan • Emergency Plan	Complies with Intent	
	Assessment Comment: These documents, or WA equivalent, will be produced. However, their content will not be in accordance with the Victorian CFA guideline.		

SECTION 3: FIRE RISK MANAGEMENT

Intent: Fire risk must be identified and measures to eliminate or reduce its occurrence and consequences must be incorporated into facility design and operations.

Subsection 3.3: Risk Management Plan

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	A Risk Management Plan must be developed all renewable energy facilities. The Risk Management Plan must:		
	a) Describe the infrastructure (natural and built), landscape, nature of operations and occupancy of the facility.	Fully Complies	2.1, 5.1.3; 5.2
	Assessment Comment: The proposal details are provided in Section 2.1 of the Bushfire Risk Report (240073-2 - Dinner Hill Wind Farm Badgingarra (BRR)) . Section 5.2 provides the Identified Elements at Risk.		
	b) Describe the risks and hazards at the facility to and from the renewable energy infrastructure (including battery energy storage systems).	Fully Complies	Section 5
	Assessment Comment: See item (c) below.		
	c) Specify and justify, in accordance with Section 4.2 of this guideline: - The location of the facility in the landscape, and the proposed infrastructure on-site. - 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 (a minimum of two). - Provides access to renewable energy infrastructure, substations and fire service infrastructure. - Firefighting water supply for the facility. - A fire break width 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 infrastructure. - The separation distance, based on radiant heat flux (output) as an ignition source, between: - Adjacent renewable energy infrastructure (e.g. between adjacent battery containers/enclosures). - Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation.	Complies with Intent	Section 5

	All other controls for the management of on-and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).		
	Assessment Comment: This Bushfire Risk Report addresses the requirements for mitigation of bushfire-related hazards. Threats, exposures and vulnerabilities, to and from the site are addressed and, where necessary, treatments recommended. This forms the bulk of the Bushfire Risk Report. Non-bushfire hazards, including fires due to asset failure, should be addressed through product design or the appropriate regulation.		
	d) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.	Not Applicable	N/A
	Assessment Comment: The associated Bushfire Risk Report comprehensively assesses bushfire risk reduction measures. The effectiveness of each measure is based on experience and logic as evidence is not available for the quantitative impact of a single measure. Fully established bushfires cannot be tested in vitro. See Appendix 1.2 of the Bushfire Risk Report for the risk assessment framework. The BESS has a Thermal Management System and Fire Suppression System.		
	e) Form the basis for the design of the facility.	Complies with Intent	N/A
Assessment Comment: The siting of wind turbines includes a multitude of factors. The installation of foundations, laydown/work areas, and access to wind turbines will result in a substantial setback from vegetation, and thus the bushfire assessment will not form the 'basis of design.' Other assets including BESS, switchyards, and operations buildings, have considered existing bushfire prone vegetation in their siting. The Risk Assessment process may occur before (during initial consultation) or after (as an update/amendment) the submission of the Development Application. As the Risk Assessment is not a clearly stated requirement within Western Australia, there are many cases where it occurs after the first series of drafts and submission. For existing developments, the Risk Assessment may encourage modifications to the design but cannot 'form the basis of design.' Any modifications to the design of the development are applied prior to the final determination by the Decision Maker.			

SECTION 4: FACILITY LOCATION AND DESIGN

Subsection 4.1: Facility Location

Intent: Renewable energy facilities must be located in low-risk environments wherever possible, to reduce the risk of external fire impacting the facility and its consequences.

Item 4.1.1: High-Risk Environments

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	Planning applications for all renewable energy facilities proposed in high-risk environments must address the following:		
	a) An assessment against policy at <i>Clause 13.02-1S (Bushfire Planning)</i> where the facility is located in a Bushfire Prone Area (BPA).	Not Applicable	N/A
	Assessment Comment: Not applicable to Western Australian planning system.		
	b) The impact of any ignitions arising from the infrastructure (wind turbines, battery energy storage systems, electrical infrastructure) on nearby communities, infrastructure and assets.	Fully Complies	Section 5
	Assessment Comment: <u>BESS:</u> Radiant heat flux in battery fires is relatively low, the Victorian Big Battery Fire (July 2021) required only a 20m exclusion zone for personnel (such an exclusion zone would generally be <4kW/m ² radiant heat flux). The BESS Structure is to be located to achieve the minimum distances as indicated in Table 3.1: Summary of applied calculation input variables applied in deriving the BAL rating for the identified exposed element (the relevant building/structure) in the Bushfire Management Plan. Therefore, in the reasonable worst-case scenario, flame contact would not be possible, and radiant heat flux would be insufficient to ignite a bushfire in the surrounding vegetation. Embers can travel beyond any applicable APZ. <u>Substations and Switchyards: (Not necessarily connected to the renewable energy facilities)</u> Ignitions arising from substations are a known factor and are managed through state and national regulation, and organisational operating procedures. <u>Wind Turbines:</u> Wind turbines are frequently subject to lightning strikes. The outcome of lightning strikes are either no effect (due to appropriate design or response), damage of a blade, or damage to the turbine potentially resulting in fire. Modern designs can either implement nonconductive blade manufacture through removing the quantity of carbon, or through specific design aiming to earth the strike. Alternatively, advanced lightning detection can allow shutdown of the turbine prior to lightning strikes. Wind turbines are required to comply with AS 61400.1 which includes lightning protection.		

Any fire caused by lightning is due to a major fault and cannot be specifically addressed by a bushfire consultant. Other electrical, mechanical, or chemical hazards resulting in ignition of the wind turbine are subject to the engineering design standards applicable to the turbine.

Individual minor failures are not considered- the 'asset failure' for the purposes of the bushfire assessment is ignition of the wind turbine in its entirety. Regardless of the likelihood of the event or controls applied to reduce this risk, the bushfire consultant must **assume** the ignition of the turbine is a possibility.

Assuming the ignition of a turbine, bushfire risk can be managed through preventing bushfire ignition, containment of the ignition, or response to the ignition.

Prevention

Preventing the ignition of a bushfire would require either preventing ignition of fuels (so a pilot does not ignite contacted material) or preventing the interaction (ensuring a pilot does not contact flammable material).

In the bushfire season grassland fuels will be highly or fully cured and will readily ignite when exposed to a pilot flame. Maintaining vegetation to APZ standards will not prevent its ignition as cured grass of 5mm height will still readily ignite and spread. This surface fire can rapidly spread to bushfire prone vegetation. Therefore, the standards applied to the APZ are not relevant.

There is no reasonable APZ dimension which can prevent the spread of fire from a wind turbine to ignite classified vegetation. The nacelle (containing combustible components) will be approximately 200m from ground level, and the tip of a blade up to 300m from ground level. Directly falling or wind-blown material can land beyond any APZ.

The APZ maintenance and dimensions can reduce bushfire impacts on the asset but cannot prevent ignition of vegetation due to an asset fire.

Containment

Containment could include isolating the fire or limiting its spread. Containment of a fire through a planning mechanism could be imposed through firebreaks, however, this would be impractical to apply over such a large area.

Firebreaks can contribute to slowing or preventing fire spread. A firebreak in Western Australia is not expected to impact fire spread, which is appropriate as a planning mechanism due to unreliability and site and seasonal variation. However, a firebreak **can** limit fire spread where:

- The associated vegetation produces minimal or no embers (more importantly on the fireline side).
- The slopes are flat or downslope relative to the direction of fire spread.
- The vegetation is not an extreme hazard with relatively short flame lengths.
- Daily conditions are conducive (humidity, wind speed/direction).

The wind turbines are distributed across a very large area and multiple lots. Buildings, access tracks, firebreaks, and public roads are installed throughout the area. A 'mosaic' firebreak pattern is partly established, with each turbine enclosed within a remote perimeter firebreak or road.

Response

Emergency responses for the remote site may have a delay. Local landowner groups may be capable of managing spot fires. Local VFRS and BFB may be invited through the Shire Emergency Management Coordinator or Chief Bushfire Control Officer (CBFCO), Local VFRS and BFB may be invited through the Shire Emergency Management Coordinator (CBFCO), such Moora, Jurien Bay and Dongara VFRS, Cervantes VFESU and Hill River, Badgingarra, Canover, and Warradarge BFB.

Establish an ongoing schedule to contact the Shire Emergency Management Coordinator (CBFCO) prior to the bushfire season.

Firefighting operations should include local Bushfire Brigades. The purpose of the Bushfire Brigade response is to establish a containment perimeter, a safe distance from asset fire.

Aerial obstruction is addressed in Item 4.2.6.

Recommendation:

The trafficable firebreak network within the development area should be accurately mapped based on ground information. This map should also include the access roads to development locations, private driveways, and crossovers onto public roads. The map is intended to provide operational information to site staff, landowners, and Emergency Services.

Contact the local emergency control agencies through the Chief Bushfire Control Officer (CBFCO) or Community Emergency Services Manager (CESM) prior to commissioning and offer a familiarisation visit and explanation of emergency procedures, access, hazards, and fire detection and suppression systems. Establish an ongoing schedule to contact the Chief Bushfire Control Officer (CBFCO) or Community Emergency Services Manager (CESM) prior to the bushfire season. Response procedures by Emergency Services (including Bushfire Brigades) should include the safe distances to establish a containment perimeter to monitor and respond to bushfire ignition.

c) The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).

Fully Complies

5.3.5, 5.3.6, 5.3.7

Assessment Comment:**BESS:**

BESS technologies are continuing to develop and the critical heat flux thresholds of assets may vary slightly between engineering designs. The exterior and structural components of battery cabinets are non-combustible, generally being metal, fibrous cement, mineral wool etc. A single battery rack consists of battery cells (each cell connected into a module), a fire suppression system and a control box with chiller. Power and computer cabling is associated within and between racks. These are the relevant components regarding potential for fire.

- The individual batteries have been found to be highly resistant to conductive heat. Applied temperatures exceeding 400 degrees Celsius destroyed, but not ignite, running battery cells. See UL 9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Cell Energy Storage Systems, Third Edition (UL LLC; 8 July 2020). Other trigger/failure conditions must be met for battery cells to ignite (mechanical rupture, flame contact, product failure etc).
- The product is tested in accordance with UN 38.3. UN 38.3.4.2 Test T.2: *Thermal test* requires cells and batteries to be tested to 72C ± 2°C for 6 hours, with 10 repeats of the same set of cells or batteries. Radiant heat from a bushfire or other source against the battery cabinet can heat the interior, however direct calculations between ambient temperature and radiant heat are not available. It must be considered that battery cells are tested to be able to withstand sustained high temperatures beyond human endurance.
 - The ABCB Handbook requires refuge structures for a tenable human environment be subject to <10kw/m2 radiant heat flux, and a maximum mean internal temperature <39°C for 1 hour (and peak of 45°C).
 - The thermal insulation of the battery cabinet is not readily available.
- Control boxes are computers which will apply thermal throttling and thermal shutdown if internal temperatures exceed a determined threshold. Once a computer system is shut down in this scenario, the threshold is expected to be that of the cabling (below).
- Associated cabling (both power transmission and computer). Common electrical cabling reaches its critical point at >12kWm2 (Kaczorek-Chrobak et al. 2021) [49]. Electrical cabling and components are expected to exceed this standard, being industrial and high capacity, however the 12kW threshold is adopted for the highest potential vulnerability.

Multiple potential locations for the BESS development are being considered, all being on flat to gently undulating ground and not within a Bushfire Prone Area (impacted by pasture only). The APZ to be installed will ensure exposure to the bushfire hazard threat of radiant heat will be limited to a maximum radiant heat flux of 10 kW/m² (calculated with an assumed flame temperature of 1090K). The required dimension shown below is 25m.

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	110	Rate of spread	20.19 km/h
Vegetation classification	Grassland	Flame length	8.16 m
Understorey fuel load	4.5 t/ha	Flame angle	51 °, 60 °, 68 °, 73 °, 75 ° & 80 °
Total fuel load	4.5 t/ha	Elevation of receiver	3.8 m, 4.38 m, 5.03 m, 5.71 m, 6.13 m & 9.9 m
Vegetation height	n/a	Fire intensity	46,945 kW/m
Effective slope	5 °	Transmissivity	0.884, 0.872, 0.854, 0.832, 0.819 & 0.748
Site slope	-5 °	Viewfactor	0.5914, 0.4357, 0.2914, 0.1969, 0.1601 & 0.0438
Flame width	100 m	Minimum distance to < 40 kW/m ²	7.1 m
Windspeed	n/a	Minimum distance to < 29 kW/m ²	9.6 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m ²	14.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m ²	20.7 m
		Minimum distance to < 10 kW/m ²	25 m

HV Substations: (Not necessarily connected to the renewable energy facilities)

AS 2067-2016 *Substations and high voltage installations exceeding 1 kV a.c.* does not provide radiant heat or flame exposure thresholds, nor any general bushfire protection measures. 'Consideration of the area surrounding the installation should also be included, in particular the effect of fire on or from surrounding vegetation.' (AS 2067-2016 s6.7.1.2).

Standard vegetation clearances are provided in *Western Australian Distribution Connections Manual 2015* (Western Power 2015).

The following document was found to be relevant in the assessment of proposed substations: *NS187 Passive Fire Mitigation Design of Major Substations* - Internal Document No. NW000-S0007 (Ausgrid 2020). Ausgrid Pty Ltd is Australia's largest electricity distributor (in terms of customers and energy load), and the document referenced is an internal network standard. The below table is sourced from Section 12 of the network standard.

Table 3 – Radiant Heat Exposure Limits for Bushfires

Item	Maximum allowable radiant heat flux (kW/m ²)	Comment
Cable	12.5	PVC Cables begin to distort and may ignite.
	20	Ignition of XLPE cables between 85 and 550 seconds.
Steel support structure	35	To 60% of yield strength after a maximum duration of 5 minutes. Applies where elastic deflections due to elevated temperatures are not critical.
Porcelain bushing/Insulators	>30	Damage may occur requiring replacement or in extreme case resulting in catastrophic failure. See Note 2.
Polymeric bushing/insulators	>30	Damage may occur requiring replacement or in extreme case resulting in catastrophic failure. See Note 2.
Aluminium busbar	20	Based on 250°C after a maximum duration of 5 minutes. Comparable to withstand temperature under fault conditions.
Copper busbar	25	Busbars may undergo significant distortion and impose significant stresses on rigid insulators.
Transformer tank	>35 (see Note 1)	Refer to above regarding bushings and cables.
Combustibles	12.5	Piloted ignition may occur on timber.

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

'Combustibles' in this description are consequential fire hazards for the purposes of the bushfire assessment: packing materials, pallets, waste, and other assorted debris. These should not be present within the substation footprint and where necessary should be positioned away from infrastructure components, applied in Measure 6.7.

The internal network standard and the *Asset Management System Distribution Substation Plant Manual 2019*: Chapter 5 – Substation Fire Risk (Western Power March 2021) align in identifying Transformer Oil as being a consequential fire source (within the context of bushfire assessments). This is a flammable material with a low flash point of 135°C, and a radiant heat flux threshold dependent on the period of exposure: 3-4 hours at 4.5kW/m² (the residence period of a bushfire is <10 minutes). The network standard considers radiant heat impact from asset fires on transformer oil but not bushfires, which appears to be due to the greatly reduced residence period and the transformer oil being contained within the transformer tank, which provides shielding/insulation to the contents to prevent the flash point being reached. As an appropriate heat flux for the short residence period of a bushfire is not available, the capacity for this risk to be managed is dependent on the developer recognising the issue and ensuring that the design/procedures that are applied to manage transformer oil fires, also consider the possibility of external bushfire impact igniting the oil (either through piloted ignition from embers or radiant heat only).

PVC cables should be either enclosed within structures or installed underground where practical. Exposed cabling (not shielded or buried underground) positioned within 12kW<19kW buffer may be damaged/destroyed in a bushfire event and require replacement.

Wind Turbines:

A wind turbine has many features, but the components for the purposes of bushfire impact (receiving radiant heat, flame, or embers) are the nacelle, hub, blades, and tower.

Nacelle

The nacelle is the cabinet containing the gearbox, shafts, brake, generator, and monitoring/control systems. The rotor hub (with blades attached) connect to the nacelle, which sits atop the tower. Of the materials identified within the nacelle, transformer oil has the lowest critical heat flux threshold of 4.5-5.8kW/m² (Suzuki et al 2007)¹; (Zhenhua et al 2018)²; (Ausgrid 2020)³. A 4kW/m² radiant heat flux exposure has been adopted for the nacelle, to ensure this threshold is not exceeded. The shielding effects of the nacelle exterior is ignored as a conservative approach- this accounts for potential leaks, exterior damage, etc.

Using AS 3959-2018 Detailed Method 2 procedure, the Elevation of Receiver is the height at which the considered component exists for calculating bushfire impacts. An example wind turbine tower height of 170m has been applied as the elevation of receiver input to the base of the nacelle. The outputs below are based on the BAL-29 dimensioned APZ for planning approval.

¹ Suzuki K, Sugawa O, Yamagishi A, Miyagi K, Kamiya K (2007). Experimental study on ignition and combustion behaviors of insulation fluids for transformer using cone calorimeter. *IEEJ Transactions on Power and Energy*, 127(7), 797-802.

² Zhenhua W, You F, Rein G, Juncheng J, Xuefeng H, Junhua H, Wei S (2018). Flammability hazards of typical fuels used in wind turbine nacelle. *Fire and Materials*, 42(2), 1-12.

³ Ausgrid (2020). NS187 Passive Fire Mitigation Design of Major Substations. *Network Standard NW000-S0007 Amendment 2*.



Calculated October 8, 2024, 2:00 pm (BALc v.4.9)

Bushfire Attack Level calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	3.38 km/h
Vegetation classification	Forest	Flame length	26.22 m
Understorey fuel load	25 t/ha	Flame angle	113 °
Total fuel load	35 t/ha	Panel height	24.14 m
Vegetation height	n/a	Elevation of receiver	170 m (user defined value)
Effective slope	5 °	Fire intensity	61,280 kW/m
Site slope	-5 °	Transmissivity	0.8
Distance to vegetation	27 m	Viewfactor	0.0011
Flame width	100 m	Radiant heat flux	0.06 kW/m ²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005



Calculated October 8, 2024, 2:01 pm (BALc v.4.9)

Bushfire Attack Level calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.03 km/h
Vegetation classification	Woodland	Flame length	16.21 m
Understorey fuel load	15 t/ha	Flame angle	116 °
Total fuel load	25 t/ha	Panel height	14.57 m
Vegetation height	n/a	Elevation of receiver	170 m (user defined value)
Effective slope	5 °	Fire intensity	26,263 kW/m
Site slope	-5 °	Transmissivity	0.829
Distance to vegetation	17 m	Viewfactor	0.0002
Flame width	100 m	Radiant heat flux	0.01 kW/m ²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005



Calculated October 8, 2024, 2:01 pm (BALc v.4.9)

Bushfire Attack Level calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Grassland Fire Danger Index	110	Rate of spread	20.19 km/h
Vegetation classification	Grassland	Flame length	8.16 m
Understorey fuel load	4.5 t/ha	Flame angle	117 °
Total fuel load	4.5 t/ha	Panel height	7.27 m
Vegetation height	n/a	Elevation of receiver	170 m (user defined value)
Effective slope	5 °	Fire intensity	46,945 kW/m
Site slope	-5 °	Transmissivity	0.86
Distance to vegetation	9 m	Viewfactor	0
Flame width	100 m	Radiant heat flux	0 kW/m ²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Rotor Hub

The rotor hub connects the rotor blades to the rotor shaft and is designed to withstand extreme loads. Rotor hubs for large wind turbines are composed entirely of cast iron, and thus extremely resistant to radiant heat (threshold >100kW/m²).

Blades

Rotor blades for large turbines are composite materials with the components being resin matrix (epoxy/ polyurethane) and fibre reinforcement (carbon fibre/fibreglass). These materials have variable temperature thresholds depended on the chemical composition.

Epoxy resin and thermoplastic polyurethane have relatively low critical temperatures of 155-180°C. (Ge et al 2023)¹; (Welte 1984)².

Fibreglass displays significant tensile strength degradation (becoming brittle) above approximately 200°C, and carbon fibre above approximately 300°C. (Feih et al 2009)³

However, the composite material does not ignite even when reaching extreme temperatures resulting in decomposition >600°C. This does not consider potential pilot flame, and thus flame contact must still be avoided. The solid flame length of forest vegetation modelled below is 26.22m, below the ground clearance height of the blade. Turbines will be locked in the 'rabbit ear' position during passage of a bushfire, thus one blade will be aligned perpendicular to the ground. The ground

clearance for the rotor blades will be determined based on the product selected during procurement, to a minimum of the requirements set out in AS 61400.1. The ground clearance currently assumed is 50m (applied below).

Based on the thermal limits of the resin matrix, a turbine blade **may** suffer damage during the passage of a bushfire within adjacent Class A Forest vegetation. After passage of a bushfire through vegetation (other than grassland) adjacent to a wind turbine, the blade perpendicular to the ground should be checked for damage (including to coating/sealants) and hogging. For consistency, this will be applied to all vegetation.

Calculated December 16, 2024, 4:23 pm (BALc v.4.9)				Calculated December 16, 2024, 4:24 pm (BALc v.4.9)				Calculated December 16, 2024, 4:25 pm (BALc v.4.9)			
Bushfire Attack Level calculator - AS3959-2018 (Method 2)				Bushfire Attack Level calculator - AS3959-2018 (Method 2)				Bushfire Attack Level calculator - AS3959-2018 (Method 2)			
Inputs		Outputs		Inputs		Outputs		Inputs		Outputs	
Fire Danger Index	80	Rate of spread	3.38 km/h	Fire Danger Index	80	Rate of spread	2.03 km/h	Grassland Fire Danger Index	110	Rate of spread	20.19 km/h
Vegetation classification	Forest	Flame length	26.22 m	Vegetation classification	Woodland	Flame length	16.21 m	Vegetation classification	Grassland	Flame length	8.16 m
Understorey fuel load	25 t/ha	Flame angle	94 °	Understorey fuel load	15 t/ha	Flame angle	105 °	Understorey fuel load	4.5 t/ha	Flame angle	113 °
Total fuel load	35 t/ha	Panel height	26.16 m	Total fuel load	25 t/ha	Panel height	15.66 m	Total fuel load	4.5 t/ha	Panel height	7.51 m
Vegetation height	n/a	Elevation of receiver	50 m (user defined value)	Vegetation height	n/a	Elevation of receiver	50 m (user defined value)	Vegetation height	n/a	Elevation of receiver	50 m (user defined value)
Effective slope	5 °	Fire intensity	61,280 kW/m	Effective slope	5 °	Fire intensity	26,263 kW/m	Effective slope	5 °	Fire intensity	46,945 kW/m
Site slope	-5 °	Transmissivity	0.8090000000000001	Site slope	-5 °	Transmissivity	0.833	Site slope	-5 °	Transmissivity	0.861
Distance to vegetation	27 m	Viewfactor	0.1086	Distance to vegetation	17 m	Viewfactor	0.0275	Distance to vegetation	9 m	Viewfactor	0.0033
Flame width	100 m	Radiant heat flux	6.69 kW/m²	Flame width	100 m	Radiant heat flux	1.74 kW/m²	Flame width	100 m	Radiant heat flux	0.22 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5	Windspeed	n/a	Bushfire Attack Level	BAL-12.5	Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg			Heat of combustion	18,600 kJ/kg			Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K			Flame temperature	1,090 K			Flame temperature	1,090 K		
Rate of Spread - McArthur, 1973 & Noble et al., 1980				Rate of Spread - McArthur, 1973 & Noble et al., 1980				Rate of Spread - Noble et al. 1980			
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980				Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980				Flame length - Purton, 1982			
Flame angle - Douglas & Tan, 2005				Flame angle - Douglas & Tan, 2005				Flame angle - Douglas & Tan, 2005			
Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005				Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005				Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005			

¹ Ge L, Jiang H, Feng H, Xu C, Lu Y, Li X, Chen B, Xu C (2023). Study on the thermal transformation of basic components of wind turbine blade. *Asia-Pacific Journal of Chemical Engineering*, 18(5), apj2938.

² Welte RE (1984). Calculation and Measurement of Reaction Temperatures in Rigid Polyurethane and Polyisocyanurate Foams. *Journal of Cellular Plastics*, 20(5), 351-356.

³ Feih S, Boiocchi E, Kandare E, Mathys Z, Gibson AG, Mouritz AP (2009). Strength degradation of glass and carbon fibres at high temperature. *ICCM International Conferences on Composite Materials*, 44, 392-400.

Tower Hub

The installation of the proposed wind turbines requires an underground concrete footing approximately 6m deep and 25m diameter, with a central pile to which the tower hub is mounted. The tower hub will have an approximately 6m diameter, thus the first 9.5m of the APZ will be concrete. A footing work area is a cleared hardstand surrounding the hub with a 30-60m diameter, providing an indicative minimum 12-27m APZ (60-6/2). The dimensions required will vary on the wind turbine specifications (height and hub design) and the soil conditions (less stable substrate require a larger foundation). Portions of the outer foundation may be subsurface, but the shallow soil layer will allow only grasses to establish.

The resultant BAL would not exceed BAL-29 based on Class G Grassland up to 15 degree slopes. Higher vegetation threats may require additional APZ dimensions to achieve the required separation.

The crane area and blade laydown will have an approximate dimension of 60x80m, providing additional hazard separation and operational area. See below for an indicative layout, which is to be taken as an example only.

A wind turbine tower is an assemblage tapering tubes. These are generally composed of steel with some elements of concrete, connected to a steel and concrete pile and foundation. The exterior is thus not vulnerable to bushfire impacts. The power transmission running through the interior is the vulnerable element.

Common electrical cabling reaches its critical point at $>12\text{kW/m}^2$ (Kaczorek-Chrobak et al. 2021)¹. Electrical cabling and components are expected to exceed this standard, being industrial and high capacity, however the 12kW threshold is adopted for the highest potential vulnerability.

Currently available wind turbine models include steel, concrete, and hybrid (concrete and steel) tower designs. Steel towers are available up to heights of approximately 170m, with larger towers applying concrete components. The limitation of 4.5m transportation width greatly limits the potential transport of prefabricated steel tubes for the base portion for larger towers, where the base diameter would be $>4.5\text{m}$. For tower heights $>100\text{m}$, the use of concrete for the ground section likely improves efficiency and previous hybrid designs have applied a concreting height of approximately 25%+ of the tower. (Way and van Zijl 2015)² (Chen et al 2020)³

Regarding bushfire impact, the concrete shell would completely block radiant heat impact for the duration of fire passage (<10 minutes) and residual heat period (2 hours) as plain concrete has an FRL 180/180/180 at 170mm thickness (NCC 2019; Schedule 5 Table 1).

Recent research has found that a concreting height of approximately 65% provides cost and structural efficiencies, so it can be expected that the 25% tower height will be generally increased in future designs (Cheng et al 2024)⁴. Based on 25% concreting height on the expected $>200\text{m}$ tower, the concreting height would be 50m. Sections will likely be in 20m prefabricated sections, so 40m is the applied elevation of receiver to conservatively account for only 2 sections potentially being installed. Shown below, a 40m concreting height would limit radiant heat flux impact to $<12\text{kW/m}^2$.

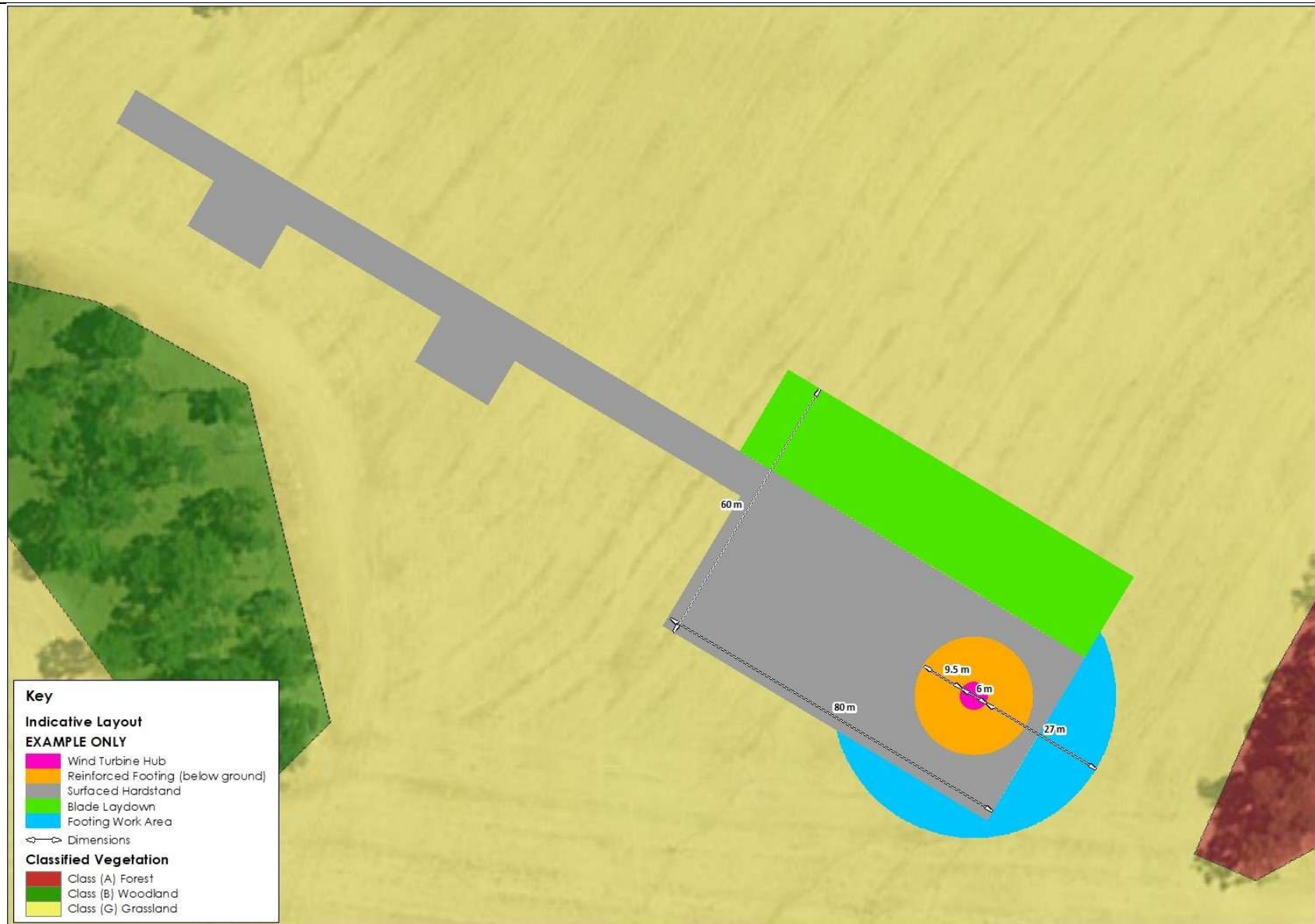


Figure 1 Typical Wind Turbine arrangement



Calculated October 8, 2024, 1:54 pm (BALc v.4.9)

Bushfire Attack Level calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	3.38 km/h
Vegetation classification	Forest	Flame length	26.22 m
Understorey fuel load	25 t/ha	Flame angle	87 °
Total fuel load	35 t/ha	Panel height	26.19 m
Vegetation height	n/a	Elevation of receiver	40 m (user defined value)
Effective slope	5 °	Fire intensity	61,280 kW/m
Site slope	-5 °	Transmissivity	0.8129999999999999
Distance to vegetation	27 m	Viewfactor	0.1929
Flame width	100 m	Radiant heat flux	11.93 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - McArthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005



Calculated October 8, 2024, 1:56 pm (BALc v.4.9)

Bushfire Attack Level calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.03 km/h
Vegetation classification	Woodland	Flame length	16.21 m
Understorey fuel load	15 t/ha	Flame angle	101 °
Total fuel load	25 t/ha	Panel height	15.91 m
Vegetation height	n/a	Elevation of receiver	40 m (user defined value)
Effective slope	5 °	Fire intensity	26,263 kW/m
Site slope	-5 °	Transmissivity	0.835
Distance to vegetation	17 m	Viewfactor	0.0572
Flame width	100 m	Radiant heat flux	3.63 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - McArthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005



Calculated October 8, 2024, 1:57 pm (BALc v.4.9)

Bushfire Attack Level calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Grassland Fire Danger Index	110	Rate of spread	20.19 km/h
Vegetation classification	Grassland	Flame length	8.16 m
Understorey fuel load	4.5 t/ha	Flame angle	111 °
Total fuel load	4.5 t/ha	Panel height	7.62 m
Vegetation height	n/a	Elevation of receiver	40 m (user defined value)
Effective slope	5 °	Fire intensity	46,945 kW/m
Site slope	-5 °	Transmissivity	0.862
Distance to vegetation	9 m	Viewfactor	0.0073
Flame width	100 m	Radiant heat flux	0.48 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

¹ Kaczorek-Chrobak K, Fangrat J, and Papis BK (2021). Calorimetric Behaviour of Electric Cables. *Energies* 14(4): 1007.

² Way A and van Zijl G (2015). A Study on the Design and Material Costs of Tall Wind Turbine Towers in South Africa. *Journal of the South African Institution of Civil Engineering*, 57(4), 45-54.

³ Chen J, Li J, He X (2020). Design Optimization of Steel–Concrete Hybrid Wind Turbine Tower Based on Improved Genetic Algorithm. *The structural design of tall and special buildings*, 29(10), a.1741.

⁴ Cheng Y, Zhao Y, Qi H, Zhou X (2024). Intelligent optimal design of steel-concrete hybrid wind turbine tower based on evolutionary algorithm. *Journal of Constructional Steel Research*, 218, a.108729.

d) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.

Complies with Intent

Section 5

Assessment Comment:

Refer to b).

Recommendations

BESS

A minimum $<10\text{kW/m}^2$ APZ is to be installed around electrical components and infrastructure associated with the BESS development (25m for Class(G) Grassland downslope $<0-5$ degrees).

The 10m portion of the APZ immediately around the assets must be entirely and permanently non-vegetated (sealed, compacted limestone, gravel, mineral earth etc).

Onsite fine and heavy fuel sources are required to be eliminated in project design and strictly controlled in ongoing operation to prevent the capacity for embers to be generated.

The product datasheet or manufacturer is likely to specify a setback between BESS cabinets. Where this is not provided, a setback of $>1\text{m}$ on the shorter and $>3\text{m}$ on the longer side is recommended.

Where the product datasheet or manufacturer specification does not specify a distance between battery containers and other combustible/critical assets, the applied distance should be 15m (based on >1 hour intervention).

Wind Turbine

A BAL-29 dimensioned APZ is appropriate for hybrid concrete/steel tower designs, which is expected to be any turbine $>170\text{m}$ height. For most proposed sitings, this requirement will be exceeded by the turbine foundations and footing work area. The APZ dimension is stated to confirm the planning requirement is/can be met.

After passage of a bushfire through vegetation (other than grassland) adjacent to a wind turbine, the blade perpendicular to the ground should be checked for damage (including to coating/sealants) and hogging.

The trafficable firebreak network within the development area should be accurately mapped based on ground information. This map should also include the access roads to development locations, private driveways, and crossovers onto public roads. The map is intended to provide operational information to site staff, landowners, and Emergency Services.

Contact the local emergency control agencies; Chief Bushfire Control Officer (CBFCO) or Community Emergency Services Manager (CESM) prior to commissioning and offer a familiarisation visit and explanation of emergency procedures, access, hazards, and fire detection and suppression systems. Local VFRS and BFB may be included through the CBFCO or CESM.

Establish an ongoing schedule to contact the Chief Bushfire Control Officer (CBFCO) or Community Emergency Services Manager (CESM) prior to the bushfire season.

Response procedures by Emergency Services (including Bushfire Brigades) should include the safe distances to establish a containment perimeter to monitor and respond to bushfire ignition.

Substation/Switchyard

The Substations and Switchyards are required to apply the same APZ specifications as for the BESS development (10kW/m^2).

The closest 10m portion of the APZ around the substation site should be entirely non-vegetated. The substation footprint (within perimeter fence line) should be entirely and permanently non-vegetated (sealed, compacted limestone, gravel, mineral earth etc).

SECTION 4: FACILITY LOCATION AND DESIGN

Subsection 4.2: Facility Design

Intent: Renewable energy facilities must be designed to eliminate or reduce the risk of fire occurring and if it does occur, its consequences.

Item 4.2.1: Emergency Vehicle (Fire Truck) Access

Assessment Criteria Detail (summarised)

Assessment
Status

Applicable
Protection
Measure

a) Construction of a four (4) metre perimeter road within the perimeter fire break.

Fully Complies

5.4.2

Assessment Comment:

Wind farms do not require a perimeter road, see below.

Other operational areas (BESS and Operations and Maintenance buildings) include a loop driveway design.

b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e. g. no compacted earth).

Fully Complies

5.4.2

c) 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. Ensure any fencing along access routes allows for width of fire vehicles.

Fully Complies

5.4.2

d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than fifty (50) metres.

Fully Complies

5.4.2

e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.

Fully Complies

5.4.2

f) Roads must 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. At least one passing bay must be incorporated where roads are less than 600 metres long.

Fully Complies

5.4.2

Assessment Comment:

Items b) to f) are met or exceeded through compliance with the Western Australian *Planning for Bushfire Guidelines* (WAPC 2024).

Internal access roads will be constructed to 6 metre trafficable width so additional passing bays are not required.

g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure, substations and grid connection areas.

Fully Complies

5.4.2

Assessment Comment:

The submitted layout provides vehicular access to all areas of the site.

ALL FACILITIES

	Internal roads will be installed to access all operational areas and renewable energy infrastructure. These roads will be required for delivery and operations vehicle access, which are larger/heavier than Emergency Services vehicles.		
	h) The provision of at least two (2) but preferably more access points to each part of the facility. The number of access points must be informed through a risk management process, in consultation with the CFA.	Complies with Intent	5.4.2
	Assessment Comment: The development site is across multiple lots and crossed by public roads. There are many potential access points, including potentially informal crossovers, and some lots with no public road access (accessed internally). The site layout will include numerous points of entry from public roads onto the internal access network, linking the wind turbine locations. Each section of the facility may not have two specific access points installed; however, these internal access routes will link to landowner tracks/driveways which will provide alternative access. The internal access network should be considered an 'access point' given the construction standard applied, as well as public roads. It is considered appropriate for the BESS development to have primary access be via a public road, with secondary access provided by the internal access network of the wind farm.		
WIND ENERGY FACILITIES	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. The number and location of vehicle access points must be determined in consultation with CFA.	Fully Complies	N/A
	Assessment Comment: Maintenance of internal access is a standard condition of Bushfire Management Plans in Western Australian. Maintenance of internal access is a responsibility applied in Section 6 of the BMP.		
	Design Advice: Construction of a four (4) metre perimeter road is not required for wind energy facilities (4.2.1(a)). However, suitable fire truck access is required to each turbine and building on-site.	Fully Complies	N/A
	Assessment Comment: Applied above.		
BATTERY ENERGY STORAGE SYSTEMS	At least two access points are to be provided into each section where battery energy storage systems are located. The number and location of vehicle access points must be determined in consultation with CFA.	Complies with Intent	5.4.2
	Assessment Comment: The BESS development will be contained within a single 'section' for this purpose. The internal access network should be considered an 'access point' given the construction standard applied, as well as public roads. It is considered appropriate for the BESS development to have primary access be via a public road, with secondary access provided by the internal access network of the wind farm.		

Item 4.2.2: Firefighting Water Supply

Assessment Criteria Detail (summarised)			Assessment Status	Applicable Protection Measure
ALL FACILITIES	a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	b) Static water storage tank installations must comply with AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning.		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.		Not Applied	N/A
	Assessment Comment: Cannot be confirmed the refill period depends on the availability of delivery tankers etc.			
	e) 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 (solar panels, wind turbines, battery energy storage systems, etc.).		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	f) The hard-suction point must be provided, with a 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance. Adapters that may be required to match the connection are: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters with a matching blank end cap to be provided.		Complies with Intent	5.4.4, 5.4.5, 5.4.6, 5.4.7
	Assessment Comment: This is a specification for Victorian firefighting operations- connections at the hard suction point will be as determined by the requirements of the Planning for Bushfire Guidelines and in consultation with local emergency services.			
	g) The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	i) The road access and hardstand must be kept clear at all times.		Fully Complies	5.4.4, 5.4.5, 5.4.6, 5.4.7
	j) The hard-suction point must be protected from mechanical damage (eg. bollards) where necessary.		Not Applied	N/A
	Assessment Comment: Not been applied as the location of tanks will not have public access, and they will be set back from carriageways. The necessity will be determined by the developer.			
	k) Where the access road has one entrance, an eight (8) metre radius turning circle must be provided at the tank.		Complies with Intent	5.4.4, 5.4.5, 5.4.6, 5.4.7

Assessment Comment: Turnaround area requirements within the *Planning for Bushfire Guidelines* will be applied.

l) An external water level indicator must be provided to the tank and be visible from the hardstand area.

Fully Complies

5.4.4, 5.4.5,
5.4.6, 5.4.7

m) Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.

Fully Complies

5.4.4, 5.4.5,
5.4.6, 5.4.7

n) Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).

Fully Complies

5.4.4, 5.4.5,
5.4.6, 5.4.7

Assessment Comment:

The Wind Turbines will install a strategic water tank network. To align with the *Planning for Bushfire Guidelines*, water tank volumes will be 50kL rather 45kL. The site is large-scale and is accessed via multiple lots and from multiple public roads. There are many potential access points, including potentially informal crossovers, and some lots with no public road access (accessed internally). The location of water tanks will be determined to meet the intent of *B.4.4 Strategic water supplies* (Guidelines Appendix B).

All wind turbines must be within 10-minute travel (20-minute turnaround) of a water tank. The locations can be determined once safe travel speeds are demonstrated. For example, at 30km/h travel speed, the 20-minute turnaround would require all wind turbines to be within 5km travel of a 50kL tank.

Each tank will be sited reasonably adjacent to internal access points (between lots) or external access points to (public roads) and will thus align with the intent of both guiding documents. One or more water tanks **may** be provided as a strategic water tank on public land and vested in the Local Government to improve the local firefighting water access.

The BESS development will require a water supply calculated following AS 2419.1 (Open Yard Protection).

The water supply installed associated with the BESS development can be considered a >50,000L water tank for the purposes of the strategic water tank network of the Wind Farm. Where a firefighting water supply for the BESS development is determined elsewhere, the greater volume is to apply.

A Substation will be reasonably adjacent to the BESS and will be serviced with the same water supply. Remote substations and switchyards will be subject to the water tank network, per the Wind Farm.

Recommendation: The following requirements apply to the firefighting water supply, via Measure 13.17 in the associated Bushfire Risk Report. The specifications will be confirmed at the detailed design stage.

Access

- Firefighting water access points (hydrants, hard suction, or drafting) must be clearly identifiable, visible from internal roads, and unobstructed.
- Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest firefighting water access point.
- An all-weather hardstand turnaround area meeting the requirements of the *Planning for Bushfire Guidelines* (Figure 30) must be provided within 4 metres static water storage tank(s) and any independent hard suction points (hydrants).
- Site Operating Procedures must include that access routes must be unobstructed at all times.

Siting and Capacity

- The Wind Farm development will require multiple tanks installed throughout the development area, each with a minimum capacity of 50,000L. The specific location of water tanks will be determined in an updated submission. The following requirements will apply:
 - Tanks must be installed reasonably adjacent to internal access points (between lots) or external access points to (public roads).
 - Tanks **may** be installed within public road reserves if requested by (or in consultation with) the Local Government.

	○ All wind turbines must be within 10-minutes travel (20-minute turnaround) of a water tank. The locations can be determined once safe travel speeds are demonstrated. • The BESS development requires a minimum 288,000L firefighting water. This is to account for both bushfire and asset fire. ○ Where another firefighting water supply is determined elsewhere, the greater volume is to apply. ○ This water tank can be considered a strategic water tank for the purposes of the water tank network for the Wind Farm (above). ○ The required water supply in compliance with AS 2419.1 will be determined based on the final footprint of the BESS development. Based on the supplied footprint (27,000m²), a fire water supply of 576,000L is required. • All BESS cabinets must be wholly within 70m of a water outlet. • Water tanks must be positioned >15m from BESS cabinets, wind turbines, PCUs, etc. • Water tanks should apply a BAL-29 dimensioned APZ at a minimum. <u>Construction</u> • Static water storage tanks must be an above-ground water tank constructed of concrete or steel. • An external water level indicator must be installed on static water storage tanks and be visible from internal roads and the adjoining turnaround area. • Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. Couplings at hard suction points are required to be 125mm Storz fittings (<i>Guidelines B.4.1.2</i>). DFES Built Environment and the local emergency services should be contacted for input on appropriate couplings and adaptors.		
WIND ENERGY FACILITIES	a) The fire protection system for wind energy facilities must incorporate at least one static fire water storage tank of at least 45,000L effective capacity at each site entrance.	Complies with Intent	5.4.6
	Assessment Comment: See the assessment for 'All Facilities' above.		
	b) Additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated in facility design. The number and location of tanks is to be determined through a comprehensive risk management process (Risk Management Plan), in consultation with CFA.	Complies with Intent	5.4.6
	Assessment Comment: See the assessment for 'All Facilities' above.		
	c) Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.	Fully Complies	5.4.6
	Assessment Comment: The Nacelle is required to have fire protection systems under AS 61400.1.		
BATTERY ENERGY STORAGE SYSTEMS	<u>1. Centralised or Stand-Alone Facilities</u> The fire protection system must apply requirement a) OR b) below.		
	a) Where reticulated water is available, a fire hydrant system that meets the requirements of AS 2419.1-2021: Fire hydrant installations, Section 3.9: Open Yard Protection, and Table 2.2.5(d): Number of Fire Hydrants Required to Flow Simultaneously - Open Yards. 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.	Not Applicable	N/A

	b) Where no reticulated water is available, a fire hydrant system that complies with AS 2419.1-2021 must be provided: i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions of AS 2419.1-2021: Fire Hydrant installations, Table 2.2.5(D) for open yards flowing for a period of no less than four hours at 20L/s, whichever is the greater. ii. 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). iii. 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. iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings). v. The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (Eg., Fire water tanks are to be located closer to the site entrance than the battery energy storage system). vi. The fire water supply must comply with AS 2419.1-2021: Fire hydrant installations - Section 5: Water storage tanks.	Fully Complies	5.4.5
	Assessment Comment: The detailed requirements of the hydrant system are outside the field of a Bushfire Consultant and must be confirmed by an appropriate Fire Engineer. Recommendation: During the detailed design stage, the entity designing the firefighting water supply should provide information on compliance with AS2419.1-2021 (Open Yard Protection) and what variations are applied (if any).		
	<u>2. Decentralised Facilities</u> The fire protection system must apply requirement a) OR b) below.		
	a) Where reticulated water is available, a fire protection system as per Model Requirement (1 a) under 'Centralised Battery Energy Storage Systems'.	Not Applicable	N/A
	b) Where no reticulated water is available, a fire water supply in static storage tanks, where a minimum 45,000L static water tank is provided within 120m of each battery container. The aggregate quantity of fire water supply at the facility must be no less than 288,000L to the satisfaction of CFA.	Not Applicable	N/A
	Assessment Comment: The facility is a centralised system.		

Item 4.2.3: Fire Detection and Suppression Equipment

Assessment Criteria Detail (summarised)

Assessment
Status

Applicable
Protection
Measure

Suitable fire detection and suppression equipment must be provided:

a) For on-site buildings and structures, according to the requirements of the National Construction Code.

Fully Complies

N/A

Assessment Comment: Compliance with the NCC is a regulatory requirement.

b) For storages of dangerous goods, according to the requirements of any Australian Standards for storing and handling of dangerous goods.

Fully Complies

N/A

Assessment Comment: The site requires a Dangerous Goods Licence which will detail the requirements.

c) For electrical installations, a minimum of two (2) suitable fire extinguishers must be provided within 3m-20m of each PCU.

Fully Complies

5.4.5

Assessment Comment: N/A

Recommendation: Two suitable fire extinguishers should be provided within 20m of each PCU/PCS.

d) 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.

Fully Complies

N/A

Assessment Comment: Fire extinguishers will be provided in operational vehicles as an OSH requirement. The type of fire extinguisher will be as applicable to the facility hazards (e.g. chemical, electrical fires).

ALL FACILITIES

Item 4.2.5: Fire Breaks

Note: The Victorian and Western Australian definition of 'Fire Break' differ.

In Western Australia, a 'Fire Break' is a trafficable perimeter used primarily for Emergency Services access. It is not expected to impact bushfire spread.

In Victoria, a 'Fire Break' is a gap in fuel intended to restrict bushfire spread, which may also be used for Emergency Services access. A Victorian 'Fire Break' is therefore wider than in Western Australia and need not be trafficable. A 'Fire Break' may even follow a road.

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	The width of fire breaks must be a minimum of 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.	Fully Complies	5.3.5, 5.3.6, 5.3.7
	Assessment Comment: See Item 4.1.1.		
	a) A fire break must be established and maintained around the perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.	Fully Complies	5.4.5, 5.4.6, 5.4.7
	Assessment Comment: See Item 4.1.1.		
	b) A fire break must be established and maintained around the perimeter of control rooms, electricity compounds, substations and all other buildings on-site.	Fully Complies	5.4.5, 5.4.6, 5.4.7
	Assessment Comment: See Item 4.1.1. The 'perimeter fire break' refers to a non-vegetated portion of the APZ around the assets, as 'fire break' has different definitions between Victoria and WA.		
WIND ENERGY FACILITIES	A fire break must be established and maintained around the base of wind turbines.	Fully Complies	5.4.6
	Assessment Comment: See Item 4.1.1.		
	<u>Design Advice:</u> Fire breaks are not required around the perimeter(s) of wind energy facilities.	Fully Complies	N/A
	Assessment Comment: A firebreak network (WA definition) has been installed as required by the Local Government Firebreak Notice.		

BATTERY ENERGY STORAGE SYSTEMS	A fire break must be established and maintained around battery energy storage systems and related infrastructure.	Fully Complies	5.3.5
	Assessment Comment: The criterion can be summarised as a permanently non-vegetated buffer around the asset (the first 10m of the APZ).		
	Recommendation: The 10m portion of the APZ immediately around BESS cabinets must be entirely and permanently non-vegetated (sealed, compacted limestone, gravel, mineral earth etc).		
	Site Operating Procedures should include that no items (plant or equipment) can be stored on access roads or on the 10m non-vegetated buffer.		

Item 4.2.6: Design Specific to Facility Type			
Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
WIND ENERGY FACILITIES	a) Wind turbines must be located no less than 300 metres apart.	Fully Complies	N/A
	b) Wind turbines must be provided with automatic shut-down, and the ability to be completely disconnected from the power supply in the event of fire.	Fully Complies	N/A
	Assessment Comment: Wind turbines will meet AS 61400.1, which includes shutdown requirements.		
	c) Installed weather monitoring stations must be notified to the Civil Aviation Safety Authority (CASA) as per CASA Advisory Circular AC 139.E-05 v1.1, October 2022 (as for all structures 110m or more above the ground).	Fully Complies	5.4.6
	d) All guy wires and monitoring towers must be clearly marked, even where marking is not required by CASA.	Fully Complies	5.4.6
	Assessment Comment: Criteria c) and d) may be regulated but have been applied as an additional requirement for clarity.		
	Recommendation: The details of Meteorological Masts should be provided to Airservices Australia (Civil Aviation Safety Authority). See CASA Advisory Circular AC 139.E-05 v1.1. Mark meteorological masts and guy wires regardless of CASA requirements.		

BATTERY ENERGY STORAGE SYSTEMS	1) The design of the facility must incorporate:		
	a) A separation distance that prevents fire spread between battery containers/enclosures and: • Other battery containers/enclosures. • On-site buildings. • Substations. • The site boundary. • Any other site buildings. • Vegetation. <i>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.</i>	Complies with Intent	5.3.5
	Assessment Comment: The design and layout of the facility has been determined by the relevant designer/engineer and are assumed to be appropriate in reducing the risk of structure-to-structure (or asset) fire. Setbacks between assets and vegetation is considered within Item 4.1.1. Recommendation: The product datasheet or manufacturer is likely to specify a setback between BESS cabinets. Where this is not provided, a setback of >1m on the shorter and >3m on the longer side is recommended. Where the product datasheet or manufacturer specification does not specify a distance between battery containers and other combustible/critical assets, the applied distance should be 15m (based on >1 hour intervention).		
	b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m, or greater where determined in the Risk Management Plan. Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. <i>The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.</i>	Fully Complies	5.3.5
	Assessment Comment: See Item 4.2.5.		
	c) A layout of site infrastructure that: i. Considers the safety of emergency responders. ii. Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. iii. Minimises the potential for fires in battery containers/enclosures to impact on-site and off- site infrastructure.	Complies with Intent	5.3.5
	Assessment Comment: See Item 4.2.5.		

2) Battery energy storage systems must be:		
a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).	Complies with Intent	5.4.5
Assessment Comment: Grid-scale BESS developments must be sited reasonably adjacent to major transmission lines. Access to the BESS development to be via constructed access road and clearly signposted.		
b) 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.)	Not Applied	N/A
Assessment Comment: The prevailing wind direction are southerly and easterly. The site entry and water tanks will be east of the BESS development. This is due to the lot and transmission line layout.		
c) Provided with in-built detection and suppression systems. Where these systems are not provided, measures to effectively detect fires within containers must be detailed within the Risk Management Plan.	Unable to Verify	5.4.5
d) Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.	Unable to Verify	5.4.5
Assessment Comment: Automatic fire detection and suppression systems, and explosion prevention/mitigation, are design components applied via national/international safety standards. The product has not yet been selected and so compliance cannot be confirmed.		
e) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.	Complies with Intent	5.3.5
Assessment Comment: N/A Recommendation: For all structures, vents should be screened with maximum 2mm aperture metal ember screens. All gaps are to be sealed, or screened with maximum 2mm aperture metal ember screens. The manufacturer or appropriate engineers should be contacted to enquire if it is possible to apply ember screening to intake/exhaust/air conditioning vents and other paths of entry to the interior cavity of BESS cabinets.		
f) Provided with suitable access roads for emergency services vehicles, to and within the site, including to battery energy storage system(s) and fire service infrastructure.	Fully Complies	5.4.5
Assessment Comment: See Item 4.2.1.		
g) Installed on a non-combustible surface such as concrete.	Fully Complies	5.3.5
Assessment Comment: See Item 4.1.1.		
h) Provided with suitable ventilation.	Not Applicable	N/A

	Assessment Comment: The criteria likely refers to ventilation around BESS cabinets where contained within a structure. The cabinets will be open-air.		
	i) Provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers/enclosures.	Not Applied	N/A
	Assessment Comment: Not been applied as the BESS locations will not have public access, and they will be set back from carriageways. BESS will be within a secured compound with >2m tall security fencing.		
	j) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.	Fully Complies	5.3.5
	Assessment Comment: N/A Recommendation: Cabling and plumbing subject to >10kW/m2 (not within the <10kW/m2 setback), or beyond footprint of buildings or constructed assets, are recommended to be installed underground, or shielded with non-combustible material (or enclosed) where practical.		
	k) Provided with spill containment that includes provision for management of fire water runoff.	Complies with Intent	4.2.2
	Assessment Comment: The consideration is beyond the scope of a bushfire assessment. Recommendation: Spill containment must be considered.		

SECTION 5: FACILITY CONSTRUCTION AND COMMISSIONING		
Intent: Fire risks must be identified and effectively managed during the construction and commissioning of renewable energy facilities.		
Subsection 5.1: Recommended Risk Controls		
Item 5.1.4: Emergency Management		
	Assessment Criteria Detail (summarised)	Assessment Status Applicable Protection Measure
ALL FACILITIES	An Emergency Plan must be developed for the construction and commissioning phase, before development starts.	Unable to Verify 5.4.1
	Assessment Comment: It is expected that an Emergency Management Plan for the construction and commissioning phase will be prepared in line with safety requirements/codes. Contractors and visitors will attend at different times, and hazards and resources will change. The requirements for Total Fire Bans and/or Harvest and Vehicle Movement Bans would restrict operations during construction and commissioning. Recommendation: Ensure bushfire response is included in the construction site Emergency Plan or produced as a separate document.	

SECTION 6: FACILITY OPERATION

Intent: Fire risks must be effectively managed for the duration of the operational life of renewable energy facilities.

Subsection 6.1: Fire Management Plan

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	A Fire Management Plan must be developed for the facility, in conjunction with CFA, before development starts.	Complies with Intent	5.1.4
	Assessment Comment: A 'Fire Management Plan' does not have an analogue in Western Australia. The contents are generally contained within the site Emergency Management Plan (e.g. as a Fire and Emergency Management Plan). Recommendation: The site Emergency Management Plan should contain fire prevention and response, 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.		

SECTION 6: FACILITY OPERATION

Subsection 6.2: Fire Hazards and Risk Controls

Item 6.2.1: Bushfire and Grassfire

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan.	Complies with Intent	5.1.4
	Recommendations: See Item 6.1 above.		

Item 6.2.2: Vegetation Management			
Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	Facility operators must undertake the following measures during the Fire Danger Period: a) Grass must be maintained at or below 100mm in height during the declared Fire Danger Period. b) Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. c) Restrictions and guidance must be adhered to during the Fire Danger Period, days of High (and above) fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au).	Complies with Intent	5.1.4
	Assessment Comment: The above requirements broadly align to those within a Local Government Firebreak Notice (Bush Fires Act 1954). Harvest and Vehicle Movement Bans restrict vehicle movements in fire risk areas. Site Operating Procedures will expand on management of hot works. Recommendation: Site Operating Procedures should include procedures to ensure heavy equipment is not operated where long grass (>100mm) or heavy leaf litter is present, particularly during the bushfire season (see the Local Government Prohibited Burning Period).		
Item 6.2.4: Facility and System Monitoring			
Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	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. Any fire must be notified to 000 immediately.	Unable to Verify	N/A
	Assessment Comment: It is expected that appropriate equipment monitoring systems exist, or will exist, on all sites. The product has not yet been selected and so compliance cannot be confirmed. Recommendations: Ensure that all facilities/sites have appropriate equipment monitoring systems in place.		

Item 6.2.5: Maintenance

Item 6.2.5: Maintenance			
Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	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 and the manufacturer's requirements.	Fully Complies	N/A
	Assessment Comment: Compliance with relevant Australian Standards is a regulatory requirement. Ongoing maintenance is not related to bushfire. Scheduled ongoing maintenance will be included in the appropriate operational/planning approval document.		

SECTION 7: EMERGENCY PLANNING

Intent: Emergencies at renewable energy facilities must be planned for and effectively managed.

Subsection 7.1: Emergency Plans

Subsection 7.1: Emergency Plans			
Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	An Emergency Management Plan must be developed specific to the facility, in conjunction with CFA, before development starts.	Complies with Intent	N/A
	Assessment Comment: The production of an Emergency Management Plan is a requirement for the application.		

SECTION 8: PROVISION OF EMERGENCY INFORMATION

Subsection 8.1: Developing and Emergency Information Book

Assessment Criteria Detail (summarised)		Assessment Status	Applicable Protection Measure
ALL FACILITIES	An Emergency Information Book must be developed and available to emergency responders. Emergency Information Books must be located in Emergency Information Containers, provided at each vehicle entrance the facility.	Not Applied	5.1.4
	Assessment Comment: DFES Emergency Response Guide (FES-ERG) is required for some sites which store or handle dangerous goods. This manifest is equivalent to a CFA Emergency Information Book, including the required location within a signed weatherproof container at site entry. Recommendation: As BESS Systems are not currently classified as dangerous goods unless they are in transit this is not required.		

SECTION 9: BATTERY ENERGY STORAGE SYSTEMS AT COMMERCIAL AND INDUSTRIAL FACILITIES

Increasingly, small-scale battery energy storage systems (<1MW) are being installed at commercial and industrial buildings to supplement power requirements for business operations.

Assessment Comment: The proposal is >1MW and thus the section is not applicable. The Section outlines guidance to be applied *instead* of Sections 2-8.

SECTION 10: NEIGHBOURHOOD BATTERY ENERGY STORAGE SYSTEMS

Community or neighbourhood-scale battery energy storage systems range from approximately 100kW to 5MW, and where connected to a section of the electricity distribution network operating with a nominal voltage not exceeding 66,000 volts may be exempt from planning permit requirements in most planning zones.

Assessment Comment: The proposal is not a neighbourhood system. The Section outlines guidance to be applied *instead* of Sections 2-8.