Bushfire Planning Advice

Planning Proposal:
Marri Wind Farm

Western Environmental Approvals Pty Ltd
(08) 6162 8980
PO Box 437, Leederville, WA 6903
enquiries@westenv.com.au
westenv.com.au

Bushfire Planning Advice

Planning Proposal:

Marri Wind Farm

Report No:
A24.306-RPT-BADV_0_FINAL
Issue Date:
24-Oct-2025
Status
FINAL

Prepared for:
Alinta Energy c/- Aurecon
Level 5
863 Hay Street
Perth WA 6000

Prepared by
Western Environmental Approvals Pty Ltd
Level 1, Suite 3, 1209 Hay Street
West Perth WA 6005
westenv.com.au

Internal Review

Author	Reviewed by	Approved by
Bridie Farrar Bushfire Consultant	**Daniel Panickar** Senior Principal and Partner Level 3 Accredited BPAD Practitioner - 38702	**Daniel Panickar** Senior Principal and Partner Level 3 Accredited BPAD Practitioner - 38702
24-Oct-2025	**24-Oct-2025**	**24-Oct-2025**

Distribution Record

Copies	Document ID / Version	Date	Received by
1	A24.306-RPT-BADV_A_DRAFT	24-Oct-2025	Ashleigh Westlund
1	A24.306-RPT-BADV_0_FINAL	24-Oct-2025	Ashleigh Westlund

Statement of Limitations

Copyright Statement

Scope of Services

This environmental report ("this report") has been prepared for the sole benefit and exclusive use of the Client for the purpose for which it was prepared in accordance with the agreement between the Client and WEPL ("the Agreement").

WEPL disclaims any and all liability with respect to any use of or reliance upon this report for any other purpose whatsoever.

In particular, it should be noted that this report is based on a scope of services defined by the Client, and is limited by budgetary and time constraints, the information supplied by the Client (and its agents) and, in some circumstances, access and/or site disturbance constraints.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in this report, or the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

Reliance on Data

In preparing this report, WEPL has relied on data, surveys, analyses, designs, plans and other information provided by the Client (or its agents), other individuals and organisations ("the data").

Except as otherwise stated in this report, WEPL has not verified the accuracy or completeness of the data. WEPL does not represent or warrant that the data is true or accurate, and disclaims any and all responsibility or liability with respect to the use of the data.

To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data.

WEPL does not accept any responsibility or liability for any incorrect or inaccurate conclusions should any data be incorrect, inaccurate or incomplete or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WEPL.

The conclusions must also be considered in light of the agreed scope of services (including any constraints or limitation therein) and the methods used to carry out those services, both of which are as stated or referred to in this report.

Bushfire Protection

The bushfire management measures and risk treatments proposed in this document do not guarantee that buildings or infrastructure will not be damaged in a bushfire, nor that there will be no injuries or fatalities either on the site or offsite while evacuating. Primarily, this is due to the unpredictable nature and behaviour of fire and fire weather conditions. In addition, implementation of the required bushfire management measures (including construction standards, maintenance etc.) and any other required or recommended measures, will depend upon, among other things, the ongoing actions of landowners and/or operators over which WEPL has no control.

Report for Benefit of Client

This report is confidential. Neither the whole nor any part of this report, or any copy or extract thereof, may be disclosed or otherwise made available to any third party without the prior written approval of WEPL.

WEPL accepts no liability or responsibility whatsoever in respect of any use of or reliance upon this report, by any person or organisation who is not a party to the Agreement. Reliance on this report by any person who is not a party to the Agreement is expressly prohibited. Any representation in this report is made only to the parties to the Agreement.

WEPL assumes no responsibility and disclaims any and all liability to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in this report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in this report (including without limitation matters arising from any negligent act or omission of WEPL or for any loss or damage suffered by any other party using or relying on the matters dealt with or conclusions expressed in this report, even if WEPL has been advised of the possibility of such use or reliance).

Other parties should not rely on this report or the accuracy or completeness of any conclusions contained in this report, and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

This report is intended to be read in its entirety, and sections or parts of this report should therefore not be read and relied on out of context.

WEPL will not be liable to update or revise this report to take into account any events or circumstances or facts becoming apparent after the date of this report.

Table of Contents

Tables

Figures

Appendices

1. Introduction

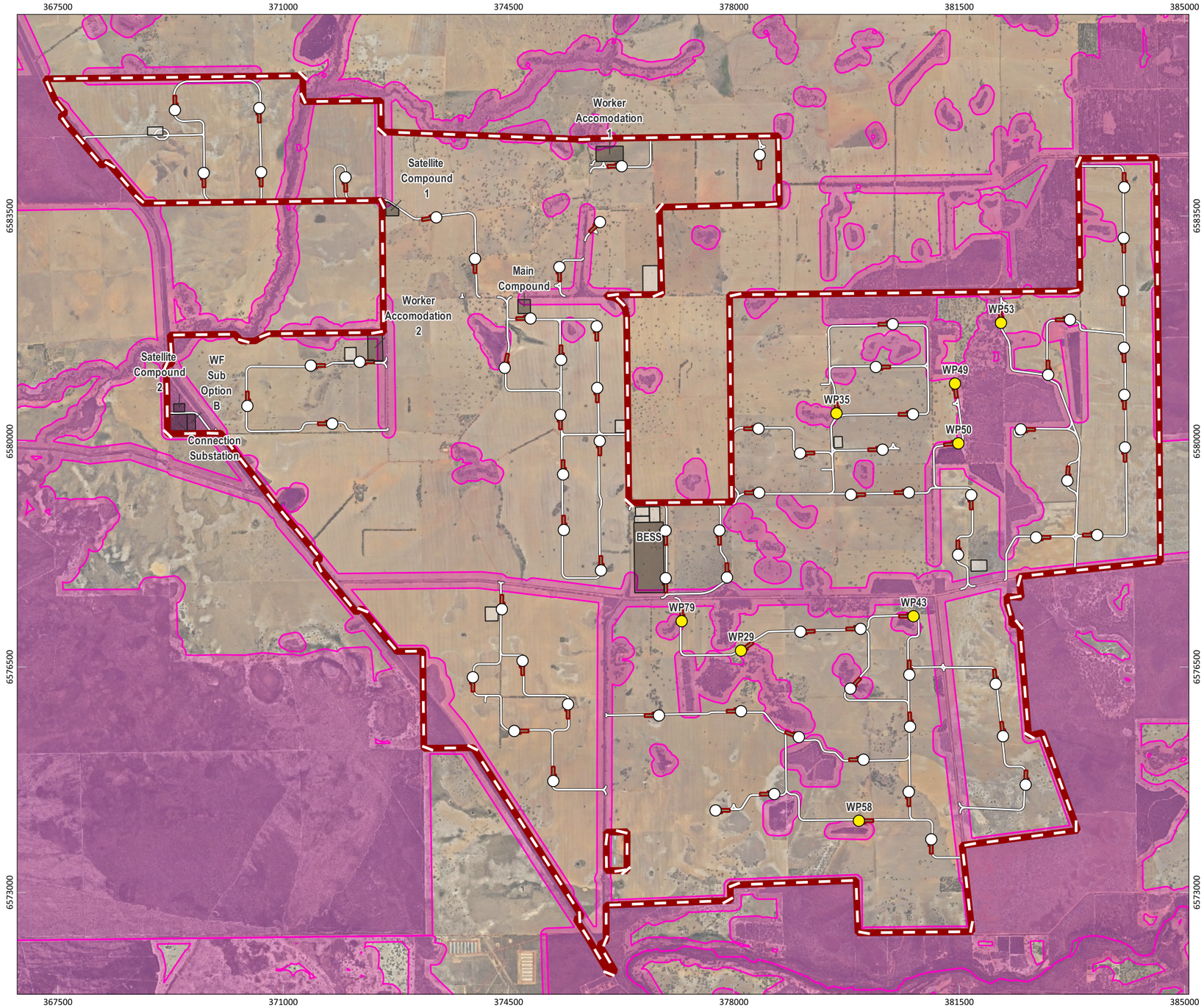
1.1 Proposal Details

Western Environmental Approvals Pty Ltd (WEPL) was commissioned to undertake a Bushfire Attack Level (BAL) assessment and provide preliminary bushfire planning advice to inform a planning proposal for the proposed Marri Wind Farm near Regan's Ford (the Project Footprint). The Project Footprint includes the proposed development of a number of habitable buildings and renewable energy infrastructure including:

- Battery Energy Storage System (BESS).
- Connection Substation.
- Main Compounds.
- Operation and Maintenance (O&M) Buildings.
- Satellite Compounds.
- Wind Farm Substations.
- Wind Turbines.
- Temporary Worker Accommodation.

Many of these assets are proposed to be situated within a designated bushfire prone area (Area 2) as per the Western Australia State Map of Bush Fire Prone Areas (DFES, 2024) which triggers an assessment under *State Planning Policy 3.7 Bushfire* (SPP 3.7; WAPC, 2024a) and the associated *Planning for Bushfire Guidelines* (the Guidelines; WAPC, 2024b). Given that SPP 3.7 and Guidelines do not adequately outlay bushfire planning requirements for renewable energy facilities, an assessment against the Victorian Country Fire Authority's (CFA) *Design Guidelines and Model Requirements for Renewable Energy Facilities Version 4* (the CFA Guidelines; State of Victoria, 2023) is currently considered best practice in WA to ensure the appropriate siting and design of these asset types. An overview of the Project Footprint and proposed assets is presented in Figure 1.

This bushfire planning advice has been prepared with due regard given to SPP 3.7, the Guidelines and the CFA Guidelines and is recommended for consideration when undertaking detailed design of the Marri Wind Farm facility.



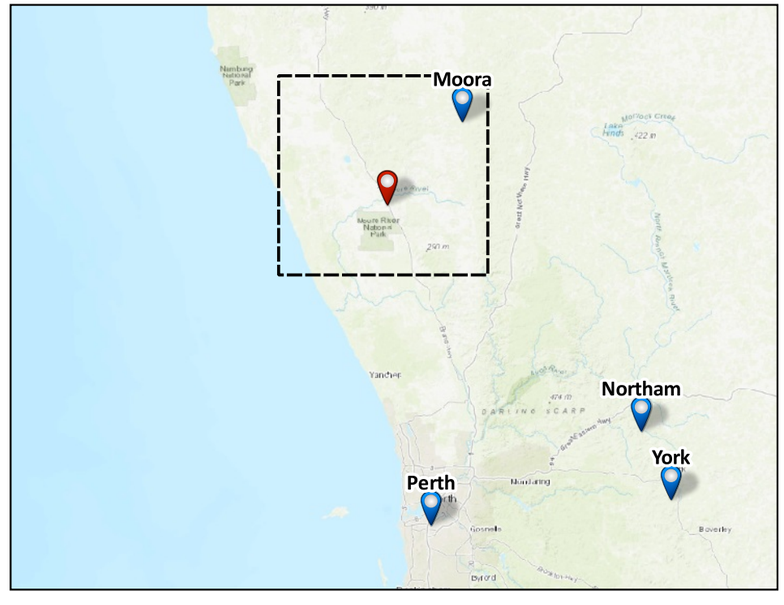


Figure 1: Site Overview

N

0 1 2 3 4 km

PROJECT/REPORT NAME: Bushfire Planning Advice Memorandum Marri Wind Farm, Regan's Ford		
SCALE: 1:70,000	SHEET SIZE: A3 COLOUR	CLIENT: Alinta Energy c/- Aurecon
COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 50	PROJECT NUMBER: A24.306	VERSION: 0
DATA SOURCE: LANDGATE AERIAL IMAGERY	DRAWN BY / REVIEWED BY: SM/BF	DATE: 24/10/2025

Legend

- Project Footprint
- Bush Fire Prone Area Planning (OBRM-023)
- Bushfire Prone Area 2
- Indicative Wind Turbine (Bushfire Prone)
- Indicative Wind Turbine (Not Bushfire Prone)
- Indicative Asset (Bushfire Prone)
- Indicative Asset (Not Bushfire Prone)
- Hardstand
- Proposed Road

No	Description	Drawn	Approved	Date
A	Original issue	SM	BF	24/10/2025

NOTES:

Cadastral boundary (LGATE-002). Base map ESRI Topo. Townsites (LGATE-248).

WESTERN ENVIRONMENTAL

Western Environmental Pty Ltd
08 6244 2310 | enquiries@westenv.com.au
Level 3/25 Prowse St, West Perth WA 6005
westenv.com.au

G:\GIS\Project Data\2024\A24.306\3. Projects\1.Memo\A24.306_Memo.qgz

1.2 Purpose and Application of this Report

This report has been prepared to support future planning applications and to demonstrate to the decision maker that the proposed wind farm has the ability to comply with SPP 3.7, the Guidelines and the CFA Guidelines. It also is intended to guide the detailed design of Marri Wind Farm to ensure the aforementioned objective is achieved.

This report achieves the objectives outlined above by comparing the current (at the time of preparation of this report) design of the facility to each of the relevant policy and guidance to demonstrate compliance or identify design considerations to achieve compliance with such guidelines. It should be noted that SPP 3.7 and the Guidelines are due regard documents and are not compulsory to comply with in their entirety given they do not specifically address renewables facilities. The CFA Guidelines is a Victorian document which does not hold any weight in Western Australia and similarly are not compulsory to comply with. Despite this, WEPL recommends that compliance with these documents should be a priority for the proposed development in order to improve the overall bushfire safety and resilience of the facility, as well as increase the chances of development approval.

The following sections will compare the proposed assets with the relevant guidance, organised by the relevant portions of the guidelines.

2. *State Planning Policy 3.7 Bushfire* and the *Planning for Bushfire Guidelines*

2.1 Policy Overview

Each of the proposed assets form part of a development application. Under SPP 3.7, all habitable buildings[1] must be assessed against the relevant section of the Guidelines and demonstrate that the Acceptable Solutions can be met in order to satisfy the requirements of each of four Elements:

- **Element 1:** Location.
- **Element 2:** Siting and Design.
- **Element 3:** Vehicular Access.
- **Element 4:** Water Supply.

Different Bushfire Protection Criteria apply to the various asset types proposed. These have been broken down by asset type in the following sections.

2.2 Residential Development Requirements

2.2.1 Temporary Worker Accommodation

When located within a bushfire prone area, temporary worker accommodation to be used during construction of the wind farm typically triggers application of SPP 3.7 and is required to address the Bushfire Protection Criteria for 'Residential Development' set out in Section 6 of the Guidelines. This involves designing the accommodation in a way that addresses each of the Acceptable Solutions in order to satisfy the requirements of each of the four Elements outlined in Section 2.1.

Each of the Acceptable Solutions are outlined below in Table 1. The temporary worker accommodation, if situated in a bushfire prone area, must comply with the Acceptable Solutions set out in the Guidelines where possible. WEPL understands that three potential locations for the Temporary Worker Accommodation are being considered as part of the project. Only two of these options are proposed within a bushfire prone area and are included in Figure 1 as Worker Accommodation Option 1 and Worker Accommodation Option 2. The third option is not proposed within a bushfire prone area and as such, does not require an assessment nor compliance with the bushfire planning framework.

[1] A permanent or temporary structure on land that is fully or partially enclosed; has at least one wall of solid material and a roof of solid material; and is used for a purpose that involves the use of the interior of the structure by people for living, working, studying or being entertained.

Table 1: Bushfire Protection Criteria 6: Acceptable Solutions for Residential Developments

Element 1: Location
Not Applicable for Development Applications.
Element 2: Siting and Design
A2.1a Siting and design Every residential habitable building has the ability to achieve radiant heat impact not exceeding 29 kW/m^2 (BAL-29). Refer to A2.1b below.
A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m^2 (BAL-40 or BAL-FZ) The siting of a commercial or industrial habitable buildings, with a radiant heat impact exceeding 29 kW/m^2 (BAL-40 or BAL-FZ) should only be considered where: • the lot was created prior to December 2015; and • there are demonstrated site characteristics and/or biodiversity or conservation values that prevent the achievement of a radiant heat impact not exceeding 29 kW/m^2 (BAL-29); and • it is demonstrated that the reduction of the building footprint or a redesign to manage or mitigate the risk, is not practical or appropriate. If the provision of an Asset Protection Zone (APZ) in accordance with acceptable solution A2.2 cannot be achieved, then the vegetation immediately surrounding the building is to be managed as defendable space in accordance with Appendix B.2, Table 9 – APZ technical requirements. It is unlikely that the temporary worker accommodation will be able to utilise this pathway and as such, should be sited in areas subject to BAL-29 or lower. Asset Protection Zones (APZ) may be used to achieve this as detailed in A2.2.
A2.2 Asset Protection Zone (APZ) Where a habitable building cannot be wholly within an area with a radiant heat impact not exceeding 29 kW/m² (BAL-29) in its pre-development state, an APZ is to be provided and meet the following requirements: • **Width:** the APZ is to be measured from any external wall or supporting post or column of the building, and of sufficient size to ensure the radiant heat impact of a bushfire does not exceed 29 kW/m² (BAL-29) to any part of the building, in all circumstances. • **Location:** the APZ is to be contained solely within the boundaries of the lot, except in instances where: - the vegetation on the adjoining lot(s) is, and will continue to be, low threat as per Clause 2.2.3.2 of AS 3959 or the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme, on an ongoing basis in perpetuity; or - the adjoining land is and will remain in perpetuity, non-vegetated. • **Management:** the APZ is managed in accordance with the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme. APZs will be required around the temporary worker accommodation. The location and size of these will depend on the final location of the temporary worker accommodation within the broader Project Footprint, as well as the exact locations of the building footprints. Potential APZ widths for each of two potential Temporary Worker Accommodation footprints are provided in Table 2**.**
A2.3 Clearing of native vegetation The development avoids, or where unavoidable, minimises the clearing of native vegetation. If development of the temporary worker accommodation requires clearing of native vegetation, this will need to be justified and minimised as far as reasonably practicable.

Element 3: Vehicular Access

A3.1 Private driveway

There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road.

In circumstances where the above conditions are not met such as at the subject site, the private driveway is to meet all of the following requirements:

- requirements in Appendix B.3 Table 10, Column 5 (Appendix A); and
- passing bays every 200 m with a minimum length of 20m and a minimum additional carriageway width of 2 m (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 m); and
- turn-around area (Figure 30 in the Guidelines) and within 30 m of the habitable building (Figure 38 in the Guidelines).

It should be noted that if the minimum width of the private driveway (the access road connecting the public road network to the temporary worker accommodation) is 6 m or greater, there are no requirements for passing bays. Internal roads servicing the temporary worker accommodation are not available in the current version of the design, however these can be designed to achieve the above requirements.

It is likely that roads servicing the temporary worker accommodation will be required to comply with this Acceptable Solution.

Element 4: Water Supply

A4.1 Water supply for residential habitable buildings

Where a reticulated water supply is existing or proposed, a hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority.

Where these specifications cannot be met, a water tank(s) should be provided in accordance with the requirements of Appendix B.4, Table 11 – Water supply dedicated for bushfire firefighting.

As the subject site is in a non-reticulated area, firefighting water tanks will be required – capacity to be determined following confirmation of accommodation design, layout and occupant capacity. It is likely that a 10,000 L water tank will be required for each habitable building.

In order to achieve a BAL rating of BAL-29 or lower for the habitable buildings within the Temporary Workers Accommodation, the setback distance identified in Table 2 is required to be implemented around these buildings in the form of an APZ. This setback distance has been calculated in accordance with Method 1 of *Australian Standard (AS) 3959: 2018. Construction of buildings in bushfire prone areas* (SA, 2018). If the accommodation buildings are to be constructed to a lower BAL rating, the separation distance in Table 2 will need to be increased commensurate with the level of risk.

Table 2: Method 1 BAL separation required to achieved 29 kW/m^2 or lower radiant heat flux

Asset	Vegetation classification most impacting the BAL rating	Effective slope	Separation distance to 29 kW/m^2 radiant heat flux threshold
Worker Accommodation Option 1	Class D Scrub	Upslope/flat land	13 m
Worker Accommodation Option 2	Class A Forest	Downslope >0 - 5 degrees	27 m

2.3 Commercial/Industrial Development Requirements

2.3.1 Industrial Habitable Buildings and Renewable Energy Infrastructure

When located within a bushfire prone area, development of industrial habitable building and renewable energy infrastructure typically triggers application of SPP 3.7 and is required to address the Bushfire Protection Criteria for 'Commercial and Industrial Development' set out in Section 7 of the Guidelines. This involves designing the assets in a way that addresses each of the Acceptable Solutions in order to satisfy the requirements of each of the four Elements:

- **Element 1:** Location.
- **Element 2:** Siting and Design.
- **Element 3:** Vehicular Access.
- **Element 4:** Water Supply.

Each of the Acceptable Solutions are outlined below in Table 3. The Acceptable Solutions are largely the same as those for Residential Developments, with one additional measure to address the storage of hazardous, flammable and combustible materials. Given the lack of a framework in WA for assessing renewable energy facilities, it is currently best practice to assess both the habitable buildings (typically required to be assessed) and non-habitable renewable energy infrastructure (recommended to be assessed) against Section 7 of the Guidelines. The following asset types, if situated in a bushfire prone area, must comply with the Acceptable Solutions set out in the Guidelines where possible:

- Wind Turbines.
- Battery Energy Storage System (BESS).
- Connection Substation.
- Wind Farm Substations.
- Main Compounds.
- Operation and Maintenance (O&M) Buildings.
- Satellite Compounds.

Table 3: Bushfire Protection Criteria 7: Acceptable Solutions for Commercial/Industrial Developments.

Element 1: Location
Not Applicable for Development Applications.
Element 2: Siting and Design
A2.1a Siting and design Every habitable building is able to achieve a radiant heat impact not exceeding 29 kW/m^2 (BAL-29) through the appropriate siting of assets within areas proposed to be cleared, as well as through the use of APZs as described in A2.1b. It is recommended that renewable energy infrastructure such as the BESS and the wind turbines be sited in areas subject to a radiant heat flux not exceeding 10 kW/m^2 as discussed in subsequent sections of this report.
A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m^2 (BAL-40 or BAL-FZ) The siting of a commercial or industrial habitable buildings, with a radiant heat impact exceeding 29 kW/m^2 (BAL-40 or BAL-FZ) should only be considered where: • the lot was created prior to December 2015; and • there are demonstrated site characteristics and/or biodiversity or conservation values that prevent the achievement of a radiant heat impact not exceeding 29 kW/m^2 (BAL-29); and • it is demonstrated that the reduction of the building footprint or a redesign to manage or mitigate the risk, is not practical or appropriate. If the provision of an Asset Protection Zone (APZ) in accordance with acceptable solution A2.2 cannot be achieved, then the vegetation immediately surrounding the building is to be managed as defendable space in accordance with Appendix B.2, Table 9 – APZ technical requirements. It is unlikely that the industrial habitable buildings and renewable energy infrastructure will be able to utilise this pathway. Asset Protection Zones (APZ) may be used to achieve an appropriate reduction in radiant heat exposure as detailed in A2.2.
A2.2 Asset Protection Zone (APZ) Where a habitable building cannot be wholly within an area with a radiant heat impact not exceeding 29 kW/m² (BAL-29) in its predevelopment state, an APZ is to be provided and meet the following requirements: • **Width:** the APZ is to be measured from any external wall or supporting post or column of the building, and of sufficient size to ensure the radiant heat impact of a bushfire does not exceed 29 kW/m² (BAL-29) to any part of the building, in all circumstances. • **Location:** the APZ is to be contained solely within the boundaries of the lot, except in instances where: - the vegetation on the adjoining lot(s) is, and will continue to be, low threat as per Clause 2.2.3.2 of AS 3959 or the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme, on an ongoing basis in perpetuity; or - the adjoining land is and will remain in perpetuity, non-vegetated. • **Management:** the APZ is managed in accordance with the requirements of Appendix B.2, Table 9 – APZ technical requirements, or an alternative standard in a gazetted local planning scheme. APZs will be required around the industrial habitable buildings and renewable energy infrastructure. The dimensions of the APZs which are likely required are contained within **Table 4** and **Table 5**.
A2.3 Clearing of native vegetation The development avoids, or where unavoidable, minimises the clearing of native vegetation. If development of the industrial habitable buildings and renewable energy infrastructure requires clearing of native vegetation, this will need to be justified and minimised as far as reasonably practicable.

A2.4 Storage of hazardous, flammable and/or combustible materials

Where a proposed land use will include the storage of hazardous, flammable and/or combustible materials as part of its ongoing day to day operations, the materials are to be stored in an area that:

- is subject to a radiant heat impact not exceeding 29 kW/m^2 (BAL-29);
- is non-combustible and shields the materials to reduce their exposure to radiant heat from the bushfire to levels significantly lower than 29 kW/m^2 and prevents the entry of debris and embers; and
- limits to the degree necessary and practical, the escape of sources of ignition from the stored materials into bushfire prone vegetation.

If development of the industrial habitable buildings or renewable energy infrastructure requires hazardous, flammable and/or combustible materials to be stored, this must be done so in line with the above requirements.

Element 3: Vehicular Access

A3.1 Private driveway

There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road.

In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements:

- requirements in Appendix B.3 Table 10, Column 5 (Appendix A); and
- passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and
- turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).

It is likely that roads servicing the industrial habitable buildings and renewable energy infrastructure will be required to comply with this Acceptable Solution.

Element 4: Water Supply

A4.1 Water supply

Where a reticulated water supply is existing or proposed, a hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority.

Where these specifications cannot be met, a water tank(s) should be provided in accordance with the requirements of Appendix A.4, Table 11 – Water supply dedicated for bushfire firefighting.

As the subject site is in a non-reticulated area, firefighting water tanks will be required – capacity to be determined following confirmation of building and infrastructure design, layout and capacity.

In order to achieve a BAL rating of BAL-29 or lower on the industrial habitable buildings, the setback distances identified in Table 4 are required to be implemented around each respective asset in the form of an APZ. These setback distances have been calculated in accordance with Method 1 of AS 3959: 2018. The setback distances required for renewable energy infrastructure are discussed in the following sections.

Table 4: Method 1 BAL separation required to achieved 29 kW/m^2 or lower radiant heat flux

Asset	Vegetation classification most impacting the BAL rating	Effective slope	Separation distance to 29 kW/m^2 radiant heat flux threshold
Satellite Compound 1	Class G Grassland	Downslope >0 – 5 degrees	9 m
Satellite Compound 2	Class A Forest	Upslope/flat land	21 m
Main Compound	Class G Grassland	Downslope >0 – 5 degrees	9 m

3. Design Guidelines and Model Requirements for Renewable Energy Facilities Version 4

3.1 Document Applicability

Given the lack of a current planning framework to assess renewable energy facilities in WA, the following asset types shall be assessed against the CFA Guidelines as per industry best practice at the time of preparation of this memorandum:

- Battery Energy Storage System (BESS).
- Connection Substation.
- Wind Farm Substations.
- Wind Turbines.

As the CFA Guidelines do not hold any weight in WA, compliance of the facility design with these guidelines is not compulsory, however highly encouraged to improve bushfire resilience and increase likelihood of development approvals. In order to achieve compliance with the CFA Guidelines, each of these assets are to be designed in accordance with the relevant sections of the CFA Guidelines, including but not limited to the following spatial/tangible categories:

- Emergency Vehicle Access.
- Firefighting Water Supply.
- Fire Detection and Suppression Equipment.
- Landscape Screening and On-Site Vegetation.
- Firebreaks.
- Wind Energy Specific Requirements.
- BESS Specific Requirements.
- Facility Construction and Commissioning.
- Vegetation Management.
- Emergency Planning.
- Provision of Emergency Information.

3.2 Radiant Heat Flux Calculations

In addition to the aforementioned categories, the CFA Guidelines, in several locations, discusses the requirement for specific assets to be distanced from classifiable vegetation to "at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure." The CFA Guidelines do not specify what radiant heat flux may be considered the threshold for each vegetation class; however, industry best practice is currently a 10 kW/m^2 threshold.

The following setback distances in Table 5 are recommended to be implemented around each of the renewable energy infrastructure assets, in the form of an APZ.

Table 5: Separation distances/APZs required at each renewable energy asset

Asset	APZ Width/Separation Distance (m)
Wind Turbine (Alinta Ref. WP29)	25
Wind Turbine (Alinta Ref. WP33)	25
Wind Turbine (Alinta Ref. WP35)	25
Wind Turbine (Alinta Ref. WP43)	25
Wind Turbine (Alinta Ref. WP49)	22
Wind Turbine (Alinta Ref. WP50)	60
Wind Turbine (Alinta Ref. WP53)	60
Wind Turbine (Alinta Ref. WP58)	25
Wind Turbine (Alinta Ref. WP79)	25
BESS	38
Connection Substation	49
Wind Farm Substation Option B (Alinta Ref. WF Sub Option B)	49

Each of the APZ widths provided in Table 5 is informed by a BAL calculation using Method 2 in *Australian Standard 3959: Construction of buildings in bushfire prone areas* to determine the distance at which a radiant heat flux of 10 kW/m^2 or lower can be achieved based on a 1090 K flame temperature. These distances are provided in Table 6, along with the vegetation classification and effective slope which are inputs to the Method 2 radiant heat flux calculation. Full calculations are included in Appendix B.

Table 6: Method 2 BAL separation required to achieved 10 kW/m² or lower radiant heat flux

Vegetation classification most impacting the radiant heat flux threshold	Effective slope	Separation distance to 10 kW/m² radiant heat flux threshold (1090 K)
Class A Forest	Downslope 5 degrees	60 m
Class A Forest	Flat land 0 degrees	49 m
Class D Scrub	Downslope 5 degrees	38 m
Class G Grassland	Downslope 5 degrees	25 m
Class G Grassland	Flat land 0 degrees	22 m

3.3 Facility Design

The following specifications are required to be incorporated into the project design to demonstrate compliance with the CFA Guidelines.

WEPL are to be provided with a checklist and brief outline of how compliance with each specification has been achieved to inform a future Bushfire Management Plan for the project.

3.3.1 Emergency Vehicle Access

All Facilities

Given the lack of detailed design at this stage in the planning process, the following specifications should be taken into account at future design phases and adopted where possible:

- Roads must be of all-weather construction and capable of accommodating a vehicle of 15 tonnes.
- Constructed roads should be a minimum of 4 m in trafficable width with a 4 m vertical clearance for the width of the formed road surface.
- 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 50 m.
- Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.
- Roads must incorporate passing bays at least every 600m, which must be at least 20 m long and have a minimum trafficable width of 6 m. At least one passing bay must be incorporated where roads are less than 600 m long.

Table 7 provides an assessment of the facility against the relevant portions of the CFA Guidelines at this early stage in the design process.

Wind Energy Specific Requirements

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.

Table 7 provides a preliminary assessment of the facility against the wind energy specific portions of the CFA Guidelines at this early stage in the design process.

BESS Specific Requirements

Table 7 provides a preliminary assessment of the facility against the BESS specific portions of the CFA Guidelines at this early stage in the design process.

Assessment of the Current Facility Design

The elements of the facility design, which were available at the time of preparation of this report have been assessed against the Emergency Vehicle Access section of the CFA Guidelines. This preliminary assessment of compliance is contained in Table 7.

Table 7: Assessment of the facility against the Emergency Vehicle Access portion of the CFA Guidelines

CFA Guideline Requirements (Adapted to WA)	Compliance Can Be Achieved	Compliance Comments
All facilities		
Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, BESS and related infrastructure, substations and grid connection areas.	✓	Vehicular access is available to all bushfire prone assets as depicted in Figure 1.
Provision of at least two 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 Shire of Dandaragan.	✓	Each part of the facility has at least two access points onto the public road network. The facility design, in its current state, can comply with this measure of the CFA Guidelines.
Wind Energy Specific Requirements		
Internal road access is required to each turbine and building on-site.	✓	Vehicular access is available to all bushfire prone assets as depicted in Figure 1.

CFA Guideline Requirements (Adapted to WA)	Compliance Can Be Achieved	Compliance Comments
BESS Specific Requirements		
At least two access points are to be provided into each section where battery energy storage systems are located.	✓	Two access points are available to the BESS if the following assumptions are proven true at detailed design stage: • Vehicular access is available throughout the entirety of the area demarcated for BESS assets (i.e. there are tracks and no obstructions [e.g. fences] separating some BESS assets from the others). • Access to the area demarcated for BESS assets is available via the hardstand areas to the east.

3.3.2 Firefighting Water Supply

All Facilities

Given the lack of detailed design at this stage in the planning process, the following specifications should be taken into account at future design phases and adopted where possible:

- Water access points must be clearly identifiable and unobstructed to ensure efficient access.
- Static water storage tank installations must comply with *AS 2419.1-2021: Fire hydrant installations* – System design, installation and commissioning.
- The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.
- 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 not be positioned within 10 m of any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.). Vehicle access points are the entrances from the public road network to the private property on which the proposed assets are accessed.
- The hard-suction point must be provided, with a 150 mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance.
- The hard-suction point must be positioned within 4 m to a hardstand area and provide a clear access for emergency services personnel.

- 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, 15 m long and 6 m wide, in accordance with *GL-11: DFES Site Planning and Fire Appliance Specifications* (DFES, 2023).
- The road access and hardstand must be kept clear at all times.
- The hard-suction point must be protected from mechanical damage (e.g. bollards) where necessary.
- Where the access road has one entrance, an 8 m radius turning circle must be provided at the tank.
- 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).

Wind Energy Specific Requirements

In addition to the requirements for all facilities, wind energy assets have the following specific firefighting water requirements:

- The fire protection system for wind energy facilities must incorporate at least one static fire water storage tank of at least 45,000 L effective capacity at each entrance.
- Additional static fire water storage tanks of at least 45,000 L effective capacity must also be incorporated in facility design. The number and location of tanks is to be determined through a comprehensive risk assessment, in consultation with the Shire of Dandaragan.
- Nacelles must be equipped with automatic fire detection, alarm and fire suppression systems.

BESS Specific Requirements

In addition to the requirements for all facilities, BESS assets have the following specific firefighting water requirements. These requirements have been identified under the assumption that the BESS will be a centralised/stand-alone system (Plate 1), as opposed to a decentralised system:

- For standalone BESS facilities where there is no reticulated water available, the fire hydrant system that complies with AS 2419.1-2021 must provide:
    i. the fire water supply must be of a quantity no less than 288,000 L or as per the provisions of *AS2419.1-2021: Fire hydrant installations*, Table 2.2.5 (D) for open yards flowing for a period no less than four hours at 20 L/s, whichever is the greater.

Given the proposed BESS yard is 50 ha in size, it falls into the >27 ha category, which totals 1.2 ML of water per BESS yard. This volume of water may be provided with any configuration of water tank number and sizes, as long as the volume is sufficient.

It should be noted that this calculation of water is conservative and is based on the worst-case assumption that all BESS units will be sited in bushfire prone areas. If the BESS assets are sited outside of the bushfire prone areas, this volume of water may not be required.

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 BESS is within reach of a 10 m hose stream issuing from a nozzle at the end of a 60 m length of hose connected to a fire hydrant outlet (70 m coverage).

iv. The fire water supply must be located at vehicle entrances to the facility, at least 10 m away from any infrastructure (electrical substations, inverters, BESS, buildings, etc).

v. The fire water supply must be reasonably adjacent to the BESS 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 BESS).

vi. The fire water supply must comply with *AS 2419.1-2021: Fire hydrant installations*, Section 5: Water storage tanks.

Plate 1: Best practice arrangement of fire service infrastructure for facilities with centralised battery energy storage systems with reticulated water supply meeting the performance requirements of *AS 2419.1-2021: Fire hydrant installations*.

3.3.3 Fire Detection and Suppression Equipment

All Facilities

All renewable energy facilities must provide suitable fire detection and suppression equipment:

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

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

c. For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3 m - 20 m of each Power Conversion Unit.

d. In all vehicles and heavy equipment, each vehicle must carry at least a 9 L 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.

3.3.4 Landscape Screening and On-Site Vegetation

All Facilities

Given the lack of detailed design at this stage in the planning process, the implementation of the following specifications in the facility design as they relate to landscape screening and on-site vegetation:

- Any proposed or existing vegetation must be considered in the BMP for its potential to intensify and propagate fire within and away from the site.
- Where landscape screening is required, for example, to screen visual impacts, the design must consider any potential increase in fire risk due to the type (species), density, height, location and overall width of the screening.
- Facilities must be designed so that the radiant heat flux (output) from vegetation does not create the potential for ignition of on-site infrastructure or other vegetation.
- Radiant heat impact leading to ignition may be mitigated through:
    - Vegetation removal (where permitted).
    - Separation from nearby infrastructure (e.g., fire breaks; refer to Section 3.3.5).
    - The provision of thermal barriers at nearby infrastructure.

Wind Energy Specific Requirements

The landscape screening requirements for wind energy specific infrastructure to comply with the CFA Guidelines has been assessed in Table 8.

Table 8: Assessment of the facility against the CFA Guidelines requirements for landscape screening and on-site vegetation

CFA Guideline Requirements (Adapted to WA)	Compliance Can Be Achieved	Compliance Comments
Wind Energy Specific Requirements		
It is recommended that the implementation of an additional reduced-fuel zone be considered around the base of wind turbines, abutting the fire break. The reduced fuel zone may be: • No less than 20 m, or • To the envelope of the wind turbine blades. This zone is to be cleared of trees and scrub (where permitted by the responsible authority) and grass must be no more than 100 mm during the Fire Danger Period.	✓	Each wind turbine will have a hardstand around the base of the turbines which will be devoid of vegetation. The hardstand extends beyond 20 m from the base of the turbine. The facility design complies with this measure in its current state.

Substation Specific Requirements

Substations should be surfaced to eliminate all vegetation including grasses.

3.3.5 Firebreaks

All Facilities

For all renewable energy facilities, the following firebreak requirements are to be adhered to in order to comply with the CFA Guidelines:

- A firebreak 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.
- A firebreak must be established and maintained around the perimeter of controls rooms, electricity compounds, substations and all other buildings onsite.
- The width of fire breaks must be a minimum of 10 m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure. Currently, best practice in WA is to adopt a 10 kw/m^2 threshold of radiant heat exposure for renewable energy infrastructure to reduce the potential for ignition of on-site infrastructure. It is recommended that the separation distances outlined in Table 5 be adopted to achieve this.

Wind Energy Specific Requirements

The firebreak requirements for wind energy specific infrastructure to comply with the CFA Guidelines has been assessed in Table 9.

Table 9: Assessment of the facility against the CFA Guidelines requirements for firebreaks

CFA Guideline Requirements (Adapted to WA)	Compliance Can Be Achieved	Compliance Comments
Wind Energy Specific Requirements		
A firebreak must be established and maintained around the base of wind turbines.	✓	Each wind turbine will have a hardstand around the base of the turbines which will be devoid of vegetation. The facility design complies with this measure in its current state.

BESS Specific Requirements

All renewable energy facilities containing BESS must meet the following firebreak requirements to be compliant with the CFA Guidelines:

- A firebreak must be established and maintained around battery energy storage systems and related infrastructure.
- In addition to radiant heat flux (output) from vegetation, the width of fire breaks between vegetation and battery energy storage systems must be at least the distance where the radiant heat flux (output) from the battery energy storage system fully involved in fire does not create the potential for ignition of vegetation. Currently, best practice in WA is to adopt a 10 kw/m^2 threshold of radiant heat exposure for renewable energy infrastructure to reduce the potential for ignition of on-site infrastructure. It is recommended that the separation distances outlined in Table 5 be adopted to achieve this.

3.4 Design Specific to Facility Type

The following specifications are taken from the CFA Guidelines and are required to be incorporated into the project design.

WEPL are to be provided with a checklist and brief outline of how compliance with each specification has been achieved to inform a future Bushfire Management Plan for the project.

3.4.1 Wind Energy Specific Requirements

Wind energy facilities pose hazards for aerial firefighting operations in certain weather and terrain conditions. The following model requirements support safe and effective firefighting operations and should be considered at detailed design stage in order to comply with the CFA Guidelines:

- 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.
- 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 110 m or more above the ground).
- All guy wires and monitoring towers must be clearly marked, even where marking is not required by CASA.

Table 10 offers an assessment of the facility against the wind energy specific design requirement of the CFA Guidelines.

Table 10: Assessment of the wind energy specific infrastructure against the CFA Guidelines

CFA Guideline Requirements (Adapted to WA)	Compliance Can Be Achieved	Compliance Comments
Wind Energy Specific Requirements		
Wind turbines must be located no less than 300 m apart.	✓	Each turbine is more than 300 m from the nearest wind turbine. The facility design complies with this measure in its current state.

3.4.2 BESS Specific Requirements

The CFA acknowledges that battery technologies are continually evolving, and that not all BESSs have the same level of fire risk. While the CFA Guidelines are based on lithium-ion battery chemistries which all have the potential for thermal runaway, including lithium iron phosphate batteries, the principles of risk-based facility design can be adopted across the spectrum of large-scale battery technologies and configurations. Consideration of the following requirements specific to the proposed BESS should be made at detailed design stage to comply with the CFA Guidelines:

- The design of the BESS facility must incorporate a separation distance that prevents fire spread between battery containers / enclosures and the following. The specific separation distance required to achieve this between BESS and other buildings/infrastructure should be determined in consultation with a suitably qualified fire engineer:
    - Other battery containers / enclosures.

- On-site buildings.
- Substations.
- The site boundary.
- Any other site buildings.
- Vegetation - Currently, best practice in WA is to adopt a 10 kw/m^2 threshold of radiant heat exposure for renewable energy infrastructure to reduce the potential for ignition of on-site infrastructure. It is recommended that the separation distances outlined in Table 5 be adopted to achieve this.

- The design must incorporate a firebreak around the BESS and related infrastructure, of a width of no less than 10 m.
- The design must incorporate a layout of site infrastructure that:
  - Considers the safety of emergency responders.
  - Minimises the potential for grassfire and/or bushfire to impact the BESS.
  - Minimises the potential for fires to battery containers / enclosures to impact on-site and off-site infrastructure.
- The BESS must be located reasonably adjacent to a site vehicle entrance suitable for emergency vehicles.
- The BESS must be 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 a fire at the BESS) which is easterly in the morning and south-westerly in the afternoon during the peak Fire Danger Period at the subject site.
- The BESS must be provided with in-built fire and gas detection systems. Where these systems are not provided, measure to effectively detect fires within containers must be detailed within the Risk Management Plan.
- The BESS must be provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.
- The BESS must be provided with suitable ember protection to prevent embers from penetrating battery containers / enclosures.

- The BESS must be provided with suitable access roads for emergency services vehicles, to and within the site, including to BESS and fire service infrastructure. The service roads within the BESS yard are to be included at detailed design stage.
- The BESS must be installed on a non-combustible surface such as concrete.
- The BESS must be provided with suitable ventilation.
- The BESS must be provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers / enclosures.
- The BESS must be provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.
- The BESS must be provided with spill containment that includes provision for management of fire water runoff.

3.5 Facility Construction and Commissioning

The following specifications are taken from the CFA Guidelines and are required to be incorporated into the project design.

Once detailed project design is completed, WEPL will be provided with a checklist and brief outline of how compliance with each specification has been achieved to inform a future Bushfire Management Plan for the project.

3.5.1 Fire Detection and Suppression Equipment

All sections of the facility are to achieve the following specifications in order to comply with the CFA Guidelines:

- Install and commission fire detection and suppression 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 the required fire protection equipment for any storage of dangerous goods as per the relevant Australian Standards.

3.5.2 Fire Risk Management

All sections of the facility are to achieve the following specifications in order to comply with the CFA Guidelines:

- Obtain appropriate permits for work during the restricted and prohibited burning periods and ensure that any conditions on the permits are adhered to.
- Adhere to restrictions on Total Fire Ban or days of elevated fire danger according to Emergency WA website.
- During the restricted and prohibited burning periods, ensure vehicle operators are instructed to remain on tracks and are not permitted to drive through paddocks.
- Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities.
- Provide remotely accessible site/system security monitoring at the facility.

3.5.3 Personnel Training

All sections of the facility are to achieve the following requirement in order to comply with the CFA Guidelines:

- Provide training for personnel in the use of on-site first aid firefighting equipment, and responsibilities during emergencies.

3.5.4 Emergency Management

All sections of the facility are to achieve the following requirements in order to comply with the CFA Guidelines:

- Develop an Emergency Plan for the construction and commissioning phase of the project.
- Provide an emergency communication system that is reliable and will operate in the event of power failure.
- Notify DFES and the Shire of Dandaragan at least seven days prior to the commissioning of any renewable energy infrastructure at the facility.

3.5.5 Occupational Health and Safety

All sections of the facility are to achieve the following requirement in order to comply with the CFA Guidelines:

- Develop safe work procedures for the facility, including but not limited to:
    - Electricity and chemical management.
    - Vegetation management.
    - Site security.
    - Ignition source control, including hot works.
    - Infrastructure, equipment and vehicle maintenance.
    - Emergency management.

3.6 Vegetation Management

Effective vegetation management can reduce both the risk of fire entering the facility, and the consequences of fire if it does occur. The following specifications are taken from the CFA Guidelines and are required to be incorporated into an operational management plan for the facility:

- Gutters, roof surfaces and valleys, kerbs, traps, sumps, bunds, drains, roofs or any other accumulation points for leaf litter, dry vegetation, or any other combustible materials must be cleared, and the debris removed from site.
- Vegetation management activities must be conducted across the entire facility (eg., grass slashing or mowing, removal of dead/fallen vegetation).
- Extraneous materials or vegetation in fire breaks at the site perimeter, at external building walls, and at other any site plant/assets must be cleared and removed from site.
- Extraneous or unnecessary materials (fuel loads) must be removed from site, e.g. mulch piles; dilapidated/stored vehicles, plant or equipment; excess fuel/chemicals; any combustible waste materials. Vehicles must not be parked on unmanaged vegetation.

3.6.1 All Facilities

Facility operators must undertake the following measures during the Fire Danger Period:

- Grass must be maintained at or below 100 mm in height during the declared Fire Danger Period.
- 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 Fire Danger Period, days of High (and above) fire danger and Total Fire Ban days.

3.6.2 BESS Facilities

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 as informed by the BMP.

3.6.3 Substations and Electric Lines

Vegetation management within any electric line easement must ensure that falling trees would not impact the transmission lines, towers and associated infrastructure.

3.7 Emergency Planning

The following specifications are taken from the CFA Guidelines and are required to be actioned prior to commencement of development.

3.7.1 All Facilities

An Emergency Plan must be developed specific to the facility before the development starts.

The Emergency Plan should be developed in accordance with *AS 3745-2010: Planning for emergencies in facilities* and include the following:

- Emergency prevention, preparedness and mitigation activities.
- Activities for preparing for emergencies.
- Control and coordination arrangements for emergency response (e.g. Evacuation procedures, shelter-in-place arrangements, emergency assembly areas and emergency response procedures).
- The agreed roles and responsibilities of on-site personnel (e.g. equipment isolation, fire brigade liaison, evacuation management, shelter-in-place management, if applicable).

3.7.2 Wind Energy Specific Requirements

A wind energy facility Emergency plan must additionally include:

- Emergency procedures for fires within, and near, wind turbines.
- Details of any triggers or circumstances for ceasing the 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.

3.7.3 BESS Specific Requirements

The Emergency Plan for a BESS facility should also include:

- The contact information for specialist technical support for the BESS.
- Emergency response procedures based on identified risks and hazards of the BESS and related infrastructure.
- 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. BESS containers, in an on-site control room, off-site monitoring facility).
- A plan for partial or full decommissioning of the BESS in the event of an emergency incident that renders the facility inoperable or unsafe, before its anticipated end-of-life.

3.8 Provision of Emergency Information

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 to the facility.

4. Conclusion

The proposed Marri Wind Farm has the ability to comply with *State Planning Policy 3.7 Bushfire* (WAPC, 2024a), the *Planning for Bushfire Guidelines* (WAPC, 2024b) and the *Design Guidelines and Model Requirements for Renewables Energy Facilities Version 4* (State of Victoria, 2023), where relevant.

WEPL recommends that the above siting and design requirements are implemented and documented at detailed design stage, with a Bushfire Management Plan prepared by a suitably qualified bushfire consultant to guide the design of the facility, post-development approval.

References

Country Fire Authority (CFA). (2023). *Design Guidelines and Model Requirements for Renewables Energy Facilities Version 4*. State of Victoria.

Department of Fire and Emergency Services (DFES). (2023). *GL-11: DFES Site Planning and Fire Appliance Specifications*. Government of Western Australia.

National Fire Protection Association (NFPA). (2023). *Standard for the Installation of Stationary Energy Storage Systems (NFPA 855)*.

Standards Australia (SA). (2021). *Fire hydrant installations (AS 2419.1-2021).*

Standards Australia (SA). (2010). *Planning for emergencies (AS 3745-2010).*

Western Australian Planning Commission (WAPC). (2024a). *State Planning Policy 3.7 Bushfire*. Government of Western Australia.

Western Australian Planning Commission (WAPC). (2024b). *Planning for Bushfire Guidelines*. Government of Western Australia.

Datasets Used

Department of Fire and Emergency Services (DFES). (2024). Map of Bush Fire Prone Areas (OBRM-001). Retrieved on 09/09/2025 from: http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx.

Department of Primary Industries and Regional Development (DPIRD). (2019). 2 metre contours (DPIRD-072).

Retrieved on 09/09/2025 from https://catalogue.data.wa.gov.au/dataset/dpird-2-metre-contours.

Appendix A
Vehicular Access Technical Requirements (WAPC, 2024b)

Technical requirements	Perimeter Roads		Public Roads		Emergency Access Way[3]		Fire Service Access Route[3]		Battle-Axe and Private Driveways[1]	
Map of Bush Fire Prone Areas Designation	Area 2	Area 1	Area 2	Area 1	Area 2	Area 1	Area 2	Area 1	Area 2	Area 1
Minimum horizontal clearance (m)	12	8	See note 5		10	6	10	6	6	
Minimum vertical clearance (m)	4.5									
Minimum weight capacity (t)	15									
Maximum grade unsealed road2	See note 5		See note 5		1:10 (10% or 6 degrees)					
Maximum grade sealed road[2, 4]					1:7 (14.3% or 8 degrees)					
Maximum average grade sealed road					1:10 (10% or 6 degrees)					
Minimum inner radius of road curves (m)					8.5					

NOTES

1. Driveways and battle-axe legs to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision where not required to comply with the widths in this Appendix or the Guidelines.

2. Dips must have no more than a 1 in 8 (12.5% - 7.1 degrees) entry and exit angle.

3. To have crossfalls between 3 per cent and 6 per cent.

4. For sealed roads only the maximum grade of no more than 1 in 5 (20 per cent) (11.3 degrees) for no more than 50 metres is permissible, except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed.

As outlined in the Institute of Public Works Engineering Australasia (IPWEA) subdivision guidelines, Liveable Neighbourhoods, Austroads Standards Main Roads standard, supplement, policy or guideline and/or any applicable or relevant local government standard or policy.

Appendix B
Method 2 BAL Calculations