

Bookaar Solar Farm

Bushfire Risk Assessment Report & Mitigation Plan

August 2021



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Table of Contents

Table of Contents	3
Glossary of Terms & Abbreviations.....	5
Executive Summary	7
1 Introduction	8
1.1 Previous Application.....	8
1.2 The Proposal.....	9
2 Methodology.....	13
2.1 Assessment approach	13
2.2 Literature review	13
2.3 Desktop assessment.....	14
2.4 Review of existing conditions.....	14
2.5 Field work.....	14
2.6 Stakeholder consultation	14
2.7 Assessment and Recommendations	14
2.8 Key documents.....	15
3 The Bushfire Environment.....	16
3.1 Bushfires in Australia and Victoria	16
3.2 Bushfires in south-west Victoria	17
4 Bushfire Risk Assessment Framework.....	18
4.1 Benefits.....	19
4.2 Bushfire risk assessment outputs.....	19
5 Statutory Planning Framework	22
5.1 Victorian fire legislation	22
5.2 Regional fire management plans	23
5.3 Victorian Planning Scheme.....	25
5.4 Guidelines for solar farm developments.....	26
6 Existing Site Conditions	27
6.1 Location	27
6.2 Adjoining land use	27
6.3 Topography and major geographical features.....	28
6.4 Bushfire fuel	28
6.5 Weather.....	32
6.6 Fire response considerations	33
7 Fires in solar farms research	39
7.1 Examples of fires in PV solar power	39
7.2 Combustibility of PV solar farm components	40
7.3 Ignition sources during construction.....	41
7.4 Ignition sources during operation	42
7.5 The risk of fire spreading.....	43

7.6	Summary	43
8	Bushfire risk assessment	44
8.1	Bushfire Risk Assessment Matrix	44
8.2	Clause 13.02 assessment.....	47
8.3	CFA Guideline	58
8.4	VCAT Decision.....	58
8.5	Summary	58
9	Mitigation recommendations	59
9.1	Design Response	59
9.2	Recommendations for the construction phase.....	62
9.3	Recommendations for the operational phase	63
9.4	Bushfire Mitigation Operational Schedule (BMOS).....	64
9.5	Bushfire Response Plan	64
10	Conclusion	64
	Appendix A – Preliminary Bushfire Response Plan	66
	Appendix B – Bushfire Mitigation Operational Schedule.....	93
	Appendix C – Compliance with the CFA Guidelines	94
	Appendix D – Vegetation Screen planting and maintenance requirements.....	104
	Appendix E – Peat Assessment.....	106
	Appendix F – Consideration of the VCAT decision	107
	Appendix G – Authors background and experience.....	111

Glossary of Terms & Abbreviations

Within the National Framework of fire risk mitigation, the fire protection industry has placed fire outcomes into four main themes and areas of focus. These areas are:

- **Prevention:** Prevention activities aim to minimise the occurrence of bushfires, particularly those of human origin, occurring during periods of extreme weather conditions.
- **Preparedness:** Preparedness actions are undertaken in anticipation of fires. Effective preparedness arrangements are implemented to improve bushfire response performance.
- **Response:** Bushfires are suppressed and managed to reduce the risk to human life, communities, essential and community infrastructure, industries, the economy and the environment. The protection of human life will be assigned priority over all other considerations.
- **Recovery:** Returning community, economic and business activities to a healthy state that result in a sustainable and economically viable community.

The bushfire risk assessment will largely deal with prevention, preparedness and response.

The following terms, abbreviations and acronyms have been used throughout this report:

Term	Meaning
APZ	Asset Protection Zone – utilises extensive fuel management to provide the highest level of protection to human life, property, key community assets and critical infrastructure. The goal of this aggressive fuel treatment is to reduce radiant heat and ember attack in the event of a bushfire surrounding assets. Can also be referred to as a 'Fire Break'.
AS 3959 – 2018	Australian Standard 3959 – 2018 Construction of Dwellings in Bushfire Prone Areas.
Bushfire	An unplanned fire in vegetation, including grassfires.
Bushfire Attack Level (BAL)	Means the bushfire attack level as defined in AS3959-2009 <i>Construction of Buildings in Bushfire Prone Areas</i> as a “means of measuring the severity of a building’s potential exposure to ember attack, radiant heat and direct flame contact, using increments in radiant heat expressed in kilowatts per metre squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire”.
Bushfire Hazard	Materials that can fuel a fire.
Bushfire Prone Vegetation	Means continuous vegetation including grasses and shrubs but not including maintained lawns, parks and gardens, nature strips, horticultural areas, vineyards and orchards.
Bushfire Risk	The probability of a bushfire starting and spreading, but it can also be used to describe the likelihood of an asset, such as a building, being damaged or destroyed by a bushfire.
CFA	Country Fire Authority Victoria.

Term	Meaning
Crown fire	Burns in the tops of trees ahead of and above intense ground fires. As they are exposed to the wind, where canopy continuity is maintained, they can travel ahead of a ground fire.
Defendable Space	An area of managed vegetation around an asset likely to be at risk from bushfire that protects it from direct flame contact and intense radiant heat, as well as providing an area where firefighters can defend the asset.
FFMVic	Forest Fire Management Victoria.
Fine Fuel	Dead plant matter less than 6mm in diameter.
FRC Pty Ltd	Fire Risk Consultants Pty Ltd, also known as FRC.
Fire Break	See definition for APZ.
Fuel Break	Synonymous with “firebreak”; any natural or constructed change in fuel characteristics, which affects fire behaviour so that fires burning into them can be more readily controlled. Fuel breaks will not stop a major bushfire but provide a fire control line from which to suppress a fire.
Fuel Structure	The quantity and type of fuel at different heights above the ground usually separated into surface, near surface, elevated and bark. Canopy fuels may also be expressed.
Hazard Reduction	Reducing fuel loads in any given area. Generally, by burning, mechanical, manual or chemical means.
Managed Vegetation	Combustible material that is permanently maintained in a minimal fuel state. Generally, mechanically treated in an APZ.
Minimum Fuel Condition	A condition where fine fuels are minimised to the extent that the passage of a fire will be prevented or severely restricted. This generally requires the removal of dead fine fuel and the control of live fuel, breaks in the continuity of any fuel, maintenance of a high moisture content in vegetation, or replacement of vegetation with roads, tracks, paths etc.
OFH	Overall Fuel Hazard (Hines, et al 2010). Classes used to quantify OFH are Low, Moderate, High, Very High and Extreme.
VFRR	Victorian Fire Risk Register.

Executive Summary

Fire Risk Consultants was engaged by Bookaar Renewables Pty. Ltd. (the 'Proponent') to undertake a bushfire risk assessment and provide recommendations on mitigation strategies to manage the bushfire risk at the proposed Bookaar Solar Farm (the 'Proposal') on land at 520 Meningoort Road, Bookaar, Victoria (the Site).

The Site is located approximately 10km north west of the Camperdown town centre within the Corangamite Shire Council footprint.

This report provides a detailed assessment of the bushfire risk across the Site with analysis of fires originating from both within and external to the property. The description and assessment of bushfire risk is not confined to the property, rather it considers the wider landscape bushfire potential.

The primary consideration for all fire mitigation and suppression efforts in Victoria is the preservation of life and property. This analysis will inform the Proponent to make sound decisions regarding bushfire risk management and assist them to prevent, prepare and respond to bushfires.

The assessment summarises the identified risks and makes mitigation recommendations that are intended to provide a greater level of protection to the Proposal, the surrounding property owners, and the community generally. The assessment considers the relevant policies, guidelines and other available information including clause 13.02-1S of the Victorian Planning Scheme, CFA renewable energy guidelines and a previous VCAT decision (Bookaar Renewables Pty Ltd v Corangamite SC [2019] VCAT 1244) regarding a proposed solar farm on the same Site with the same footprint (the 'Previous Application').

Other recommendations in the areas of static water storage, emergency preparedness, training, fire coverage during construction and pre Fire Danger Period works are all made as part of this report. Partitioning the grassland vegetation within the Site with fire access tracks and areas of managed vegetation (low overall fuel hazard) will significantly reduce the ability for a fire to ignite and spread into, through, or from the Site.

The bushfire risk associated with the construction and operation of the Proposal can be mitigated to an acceptable level with the implementation of sound bushfire mitigation strategies. The Proposal does not increase bushfire risk in the landscape or preclude emergency service operations.

1 Introduction

Fire Risk Consultants Pty Ltd ('FRC') has been engaged by Bookaar Renewables Pty Ltd (the 'Proponent') to provide a Bushfire Risk Assessment and Mitigation Plan ('BMP') that will reduce potential impacts of bushfires to life, property and environmental assets resulting from the proposed Bookaar Solar Farm (the 'Proposal') encompassing part of 520 Meningoort Road, Lots 51 and 52 and Res 1 on LP4677 and adjacent parts of Meningoort Road, Bookaar (the 'Site').

Victorian emergency management policy¹ prioritises the protection of human life, including the lives of both community members and of emergency response personnel, above all other considerations, and this has been emphasised throughout this report.

This BMP:

- Prioritises the reduction of risk to communities and the protection of human life in all aspects of the assessment.
- Provides a detailed assessment of the bushfire risk across the Site with analysis of bushfires originating from both within and external to the Site, including the bushfire potential of the broader landscape.
- Identifies the potential fire risk of solar energy infrastructure and associated mitigation strategies.
- Assesses the bushfire hazard at the Site and identifies performance standards for managing fuel loads.
- Identifies strategies to reduce the vulnerability of neighbouring communities to the bushfire risk originating from the Site.
- Identifies planned on-Site firefighting capability, including minimum standards for water supply, firefighting equipment and the training of on-Site workers.
- Assesses the design with the incorporation of identified mitigation treatments.
- Provides information to ensure the workplace health and safety of firefighters and Site personnel when responding to any fires at the Site.
- Demonstrates that the requirements in the CFA Guidelines for Renewable Energy Installations 2019 (the 'CFA Guidelines') are addressed.
- Demonstrates concerns raised in a VCAT hearing regarding a previous proposal for a solar farm at the Site are addressed.
- Demonstrates that, with the adoption of the mitigation measures advocated from this assessment, the Proposal is able to meet the Policy strategies of Clause 13.02-1S of the Corangamite Planning Scheme.

1.1 Previous Application

The Proponent previously applied for a planning permit for up to 700,000 Solar Panels to be installed on the same Site, within the same footprint (the 'Previous Application'). The Previous Application was the subject of an unsuccessful 2019 Victorian Civil and Administrative Tribunal decision (the 'VCAT decision'; *Bookaar Renewables Pty Ltd v Corangamite SC* [2019] VCAT 1244), following refusal of the planning

¹ State Emergency Management Priorities in the *State Emergency Response Plan* page 3-3 <https://www.emv.vic.gov.au/policies/emmv>

permit application by the Corangamite Shire Council. The VCAT decision was due to a lack of information around hydrology and bushfire management. With regard to Bushfire management, the Tribunal stated that a full bushfire assessment should be undertaken as part of the design process, because it *'may impact on the design, layout and operation of the facility'* (para 11.).

In response, the Proponent has decided to submit a fresh application for a solar farm at the Site addressing the deficiencies identified in the VCAT decision. This assessment addresses the bushfire management matters raised in the VCAT decision by incorporating the bushfire risk assessment into the design of the Proposal, and identifying mitigation measures to reduce bushfire risk during the construction and operation of the Proposal. The VCAT decision is discussed in Section 8.4.

1.2 The Proposal

The Proponent is proposing to develop a 200MW solar energy facility (the 'Proposal') at the Site. The Proposal includes the following elements (see the 'Site Plan' which accompanies the 'Planning Report'):

- 'Array Areas', containing Photovoltaic (PV) panels mounted on a single axis tracking system with a maximum height of 4m above natural ground at maximum tilt. The tracking system would be supported by piles driven into the ground. Row spacing is either 12.75 m or 13 m (pile to pile);
- 82 inverters located centrally throughout the Site in pairs at 41 locations across the Site (inverter stations). Inverter stations are located at least 170 m from the Site boundary;
- Below ground cabling connecting the PV panels between trackers and inverters;
- Below ground cabling connecting the inverters to the substation;
- An internal track network of all-weather gravel tracks (4 m), including a perimeter track which forms part of a 10 m wide defendable Asset Protection Zone (APZ) that surrounds the Site;
- Four (4) gated main site access points via Meningoort Road;
- Four (4) gated emergency access points along the western boundary of the Site;
- Eight dedicated water tanks for firefighting (maximum of 3.6m high), located adjacent to each access point;
- A perimeter security fence 2.5 m high (chain mesh);
- Perimeter vegetation screens (20 m wide with 4 rows of trees and maintained to a height of at least 4m), planted on the outside of the security fencing;
- Agricultural style fencing 1.2m high with gate access, around the perimeter of the vegetation screens and around the perimeter of existing vegetation along the Site's western boundary;
- A SCADA system that will gather, monitor and analyse data generated through operating the Proposal;
- On-demand, downward facing lighting (restricted to 4m in height); and

- Sensor triggered CCTV security cameras located around the perimeter of the Site and adjacent to key infrastructure.

Substation Area (1.76 ha):

- Substation connecting the Proposal to the onsite 220KV transmission line, via two (2) new high voltage (HV) 220 kV transmission lines;
- A Control building (up to 5 m high);
- Substation Operations and Maintenance building (up to 5 m high);
- A security fence (chain mesh) up to 2.5 m high, enclosing the Substation;
- A 10 m wide defendable APZ around the perimeter of the Substation; and
- Parking for 5 vehicles.

Battery Area (0.91 ha):

- A series of separate containerised battery units, connected by underground cables to the Substation (approximately 2.5 m high);
- A separate transformer adjacent to each battery; and
- A 10m defendable APZ around the perimeter of the Battery Area.

Operations Buildings Area (0.96 ha):

- A Site office building including amenities with a height of 3.6 m;
- A maintenance building and workshop with a height of 5 m;
- 3 Storage sheds with a height of 4.1 m;
- Car parking for twelve (12) vehicles;
- A septic tank and potable water tank;
- A defendable APZ of 20 m, which allows the area to function as the nominated 'Shelter in Place' location (see Bushfire Risk Assessment and Mitigation Plan).

In addition to the key components outlined above, there will be a temporary construction compound (1.44 ha) to facilitate the construction phase of the Proposal. The construction compound would include:

- Temporary construction offices (up to 5 m high);
- Car and bus parking areas for construction vehicles (51 workers cars, 5 mini vans; and additional parking space provided for delivery vehicles and construction machinery);

- Staff amenity block including portable toilets, showers and a kitchen, designed for peak staff numbers during the construction period; and
- Laydown areas.

Once the Proposal is operational, the construction compound will be decommissioned and revegetated.

The Proposal has a lifespan of 30 years. The construction phase would take approximately 12 months and require up to 150 full-time staff. The operational phase would be approximately 28 years and will generate between 8- and 12 full time positions nationally, with six positions likely to be based locally. Decommissioning is expected to take 12 months and would require a similar workforce to the construction period. Following decommissioning all infrastructure associated with the solar farm would be removed from the Site.

In the context of bushfire risk, the introduction of a Solar Farm into any landscape can generate issues both perceived and actual. Whilst this report addresses a range of requirements for this type of proposal, based on consideration of the Proposal as described above and illustrated in Figure 1 below, the key risk areas that have been identified are:

- Ensuring the safety of staff, contractors and visitors in the event of a bushfire threatening the Site.
- Limiting bushfires from entering the Site.
- Preventing fires from starting.
- Limiting or eliminating the potential for fires to exit the Site.
- Protecting infrastructure from the effects of bushfire.

Figure 1, provides a Site Plan for the Proposal (a scale version of the 'Site Plan' is provided in the application material supporting the Planning Report).

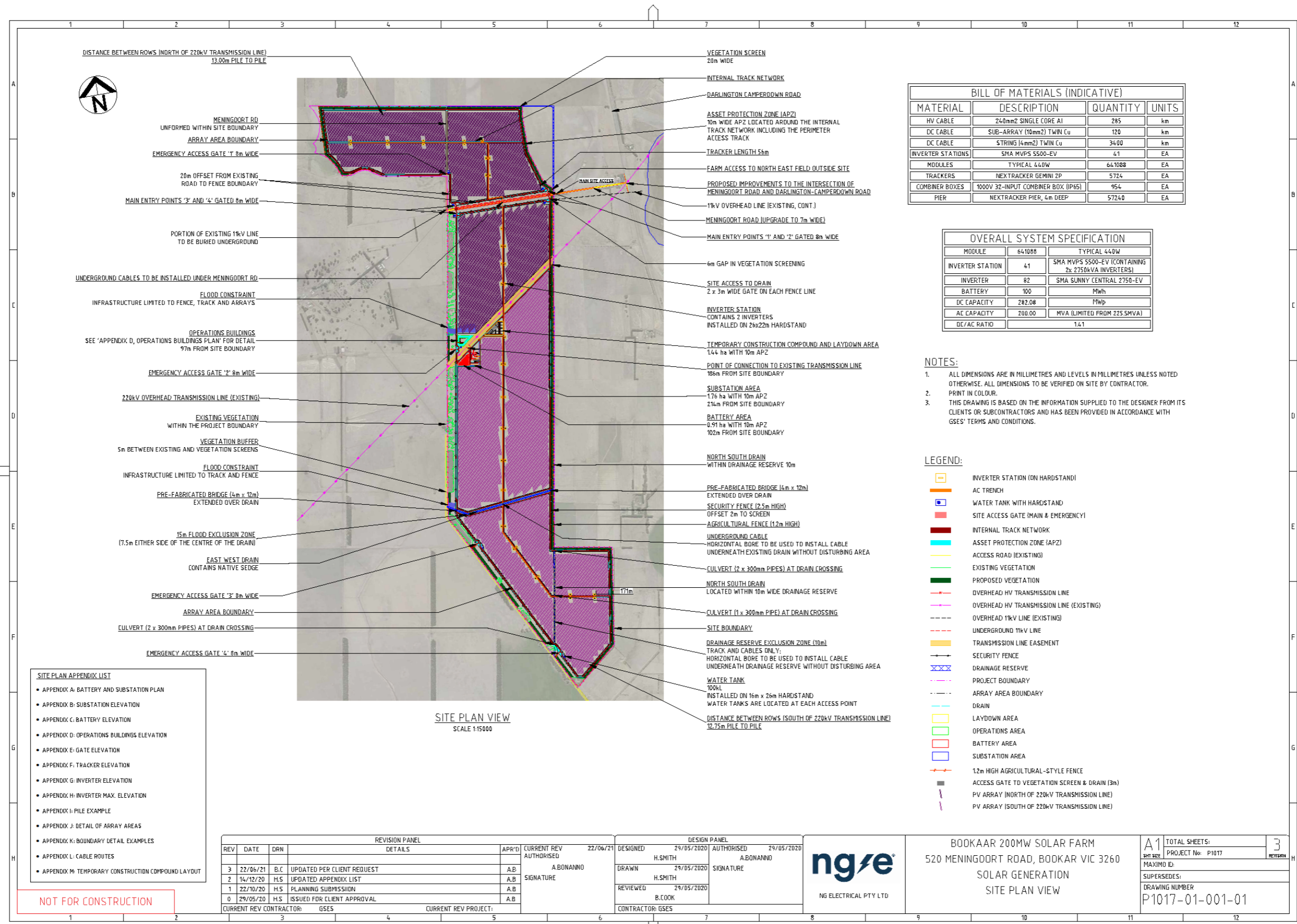


Figure 1 - Proposed Bookaar Solar Farm – Site plan (See the 'Site Plan' that accompanies the planning application for a scaled version)

2 Methodology

This section outlines the methodology followed by FRC for the assessment.

2.1 Assessment approach

The following was taken into account throughout the assessment:

- Reduction of the bushfire risk and protection of the community and the health and safety of firefighters as a priority.
- The role and responsibilities of key stakeholder agencies.
- Factors that affect bushfire risk including existing levels of risk at the Site and in the surrounding areas, and the elements of the Proposal that may change bushfire risk.
- Accepted best practice policy and management for bushfire management.

The assessment involved the following steps:

- Literature reviews.
- Desktop assessment.
- Review of existing conditions at the Site and associated risk factors.
- Field work including both on ground and aerial assessments.
- Stakeholder consultation and review.
- Assessment of Bushfire Risk.
- Assessment against the CFA Guidelines, and the Department of Environment, Land, Water and Planning 'Solar Energy Facilities, Design and Development Guideline' (the DELWP Guideline).
- Consideration of the VCAT decision.
- Assessment against Clause 13.02-1S of the Corangamite Planning Scheme.
- Development of mitigation recommendations for the design, construction and operation of the Proposal.

Each of these steps is summarised below.

2.2 Literature review

FRC undertook the following literature review:

- Review of the application history and the VCAT decision relating to the Previous Application.
- Review of key policy and planning documents for fire management in south-west Victoria.
- Review of the legislative and planning framework regarding the assessment of fire risk for proposed solar farm developments.
- Review of international literature relating to fires in solar farms.
- Review of the Peat assessment carried out to support this Bushfire assessment.
- Review of the bushfire risk including bushfire history, fire management plans, etc in south-west Victoria and at the Site.

2.3 Desktop assessment

FRC then carried out a desktop-based assessment to determine:

- Design factors for solar farm installations to mitigate the risk of installation fire.
- Fuel, weather and topographic factors affecting fire behaviour at the Site's location and in the wider landscape.
- The general fire risk in south-west Victoria and for the Site.

2.4 Review of existing conditions

FRC assessed the following characteristics of the Site and surrounding area:

- Landscape features and land use.
- Communities, property and other values vulnerable to the fire risk.
- Possible ignition sources.
- CFA firefighting resources in the area.

2.5 Field work

FRC personnel carried out a Site visit to assess:

- The Site context, particularly with respect to potentially vulnerable nearby communities.
- Adjoining land use.
- Fuel hazard of the Site and neighbouring properties (through ground investigations, and a drone survey capturing high resolution landscape images).
- Topography.
- Access and egress.
- Water supply on Site and in the surrounding area.

2.6 Stakeholder consultation

A variety of stakeholders have been engaged to gather information to inform this bushfire risk assessment. The stakeholders have represented the following organisations:

- CFA.
- Corangamite Shire Council.
- The property owner's representative (Farm Manager).
- Bookaar Renewables Pty Ltd.

2.7 Assessment and Recommendations

Using the information collected through the literature review, the desktops assessment, Site visits, and discussion with key stakeholders, FRC carried out a Bushfire Risk Assessment and a Clause 13.02 Assessment.

The development of mitigation recommendations to reduce the level of risk to a satisfactory level and ensure that CFA and other standards are achieved by the Proposal are key outputs of the assessment process. Mitigation recommendations include the development of a Bushfire Response Plan (BRP,

provided as Appendix A), and a Bushfire Mitigation Operational Schedule (BMOS, provided as Appendix B).

Overall, the assessment methodology has been designed to ensure that potential bushfire risk has been evaluated at all stages of the lifecycle of the Proposal with potential mitigation measures identified and incorporated into the final design to ensure that the introduction of the Proposal will not increase bushfire risk at the Site or in the surrounding area.

2.8 Key documents

The design has been informed by the following key documents:

- The CFA Renewable Energy Guidelines. The CFA Guidelines outline the minimum requirements for the development of renewable energy facilities including Solar Farms and is the Guidance referred to by the Department of Environment Land Water and Planning in its Guideline '*Solar Energy Facilities, Design and Development Guideline, July 2019*'.
- The VCAT decision (Bookaar Renewables Pty Ltd v Corangamite SC [2019] VCAT 1244) for the Previous Application. While the VCAT decision pertained to the Previous Application on the Site, it raised issues relating to Bushfire Risk Assessment and contained advice on what a future bushfire risk assessment for a proposal at the Site should include.
- 'Solar Energy Facilities, Design and Development Guideline' (the DELWP Guideline).

3 The Bushfire Environment

3.1 Bushfires in Australia and Victoria

Australia is one of the most fire prone areas in the world. Victoria has a history of catastrophic bushfires such as Black Friday (1939), Ash Wednesday (1983), Central Victorian grassfires (1985), Alpine Fire (2003), Great Divide Fire (2006) and recently, Black Saturday (2009).

Victoria’s high bushfire risk is the result of several factors that increase the likelihood and consequences of fire. These factors include large areas of the state comprising highly flammable dry eucalypt forest, native and introduced grassland, protracted droughts and an increasing population in bushfire-prone areas.

The spread of a bushfire is a direct result of the weather, fuel hazard (including dryness, quantity and arrangement of the fuel) and the topography in which the fire is burning. Fuel is the only factor it is possible to modify.

Bushfires can occur from October through to April, but historically the most devastating have occurred in January and February. Extreme fire conditions typically follow a dry winter and spring.

The 2019 / 2020 season was significant in Victoria with many bushfires impacting the eastern half of the State. Damaging fires to life and property in East Gippsland and North East Victoria killed 5 people and destroyed over 300 homes.

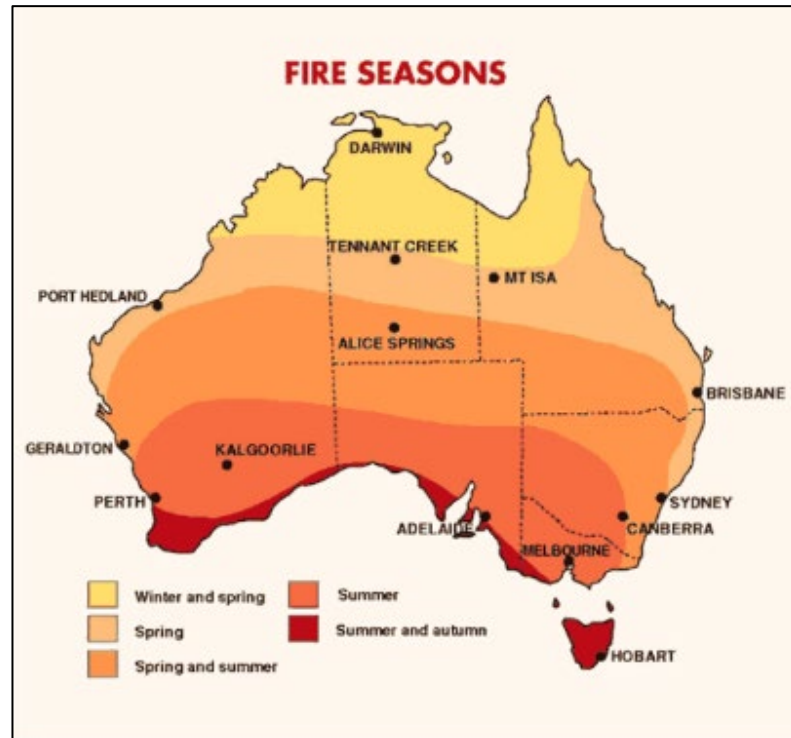


Figure 2 - Bushfire Seasons in Australia. Source: Australian Government BOM

3.2 Bushfires in south-west Victoria

Over the last 100 years there have been several significant fires in the Western District of Victoria and south west Victoria generally.

A significant threat to the Corangamite Shire community, every Fire Danger Period is the potential for fast-moving grassfires.

On the 17th and 18th March 2018, a series of fast-moving grassfires in western Victoria destroyed 26 residences, 66 outbuildings and burned approximately 24,000 hectares of grassland. The destruction included numerous sheep and cattle. Fortunately, no lives were lost².

A typical fire pattern in south west Victoria can result in a fire moving quickly under the influence of strong, gusty north westerly winds. The fire can rapidly change direction when the subsequent south westerly wind change arrives.

Fires that start under these conditions can reach a very high intensity, even in areas of relatively low fuel loads and can be difficult to control until the weather conditions abate.

² 2018 South West Fires – Community Report – Emergency Management Victoria (2018):
https://www.emv.vic.gov.au/Sites/default/files/embridge_cache/emshare/original/public/2020/01/1e/0719672d5/2018-South-West-Fires-Community-Report.pdf

4 Bushfire Risk Assessment Framework

The bushfire risk assessment process involves identifying, analysing, evaluating and treating the identified risks. Bushfire risk assessment is a function of the likelihood of an adverse event occurring and the consequence of the event. The bushfire risk assessment assists developers and property owners to understand potential risks and to develop mitigation actions.

The bushfires scenarios that have been assessed in developing this report include:

- A fire occurring on the solar farm and spreading internally within the Site.
- A fire occurring on the solar farm and spreading externally impacting neighbouring properties.
- A fire occurring on adjacent lands and entering the Site.

The overall risk assessment process requires a consistent approach and follows AS/NZS ISO 31000:2009 as incorporated into the *National Emergency Risk Assessment Guidelines (NERAG)*:

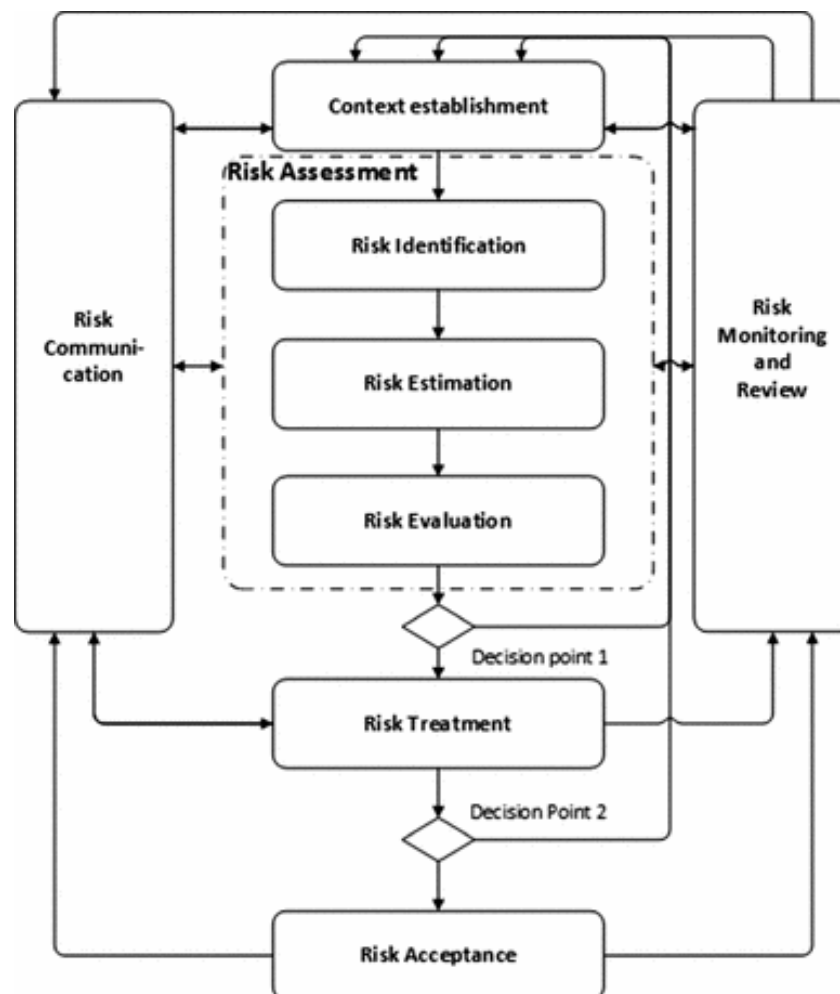


Figure 3 - Overview of AS/NZS ISO 31000-2009 risk assessment process

The bushfire risk assessment process results in a number of outputs that will assist the Proponent with managing bushfire risk at the Site. These outputs guide recommendations to manage the risk from bushfires during the whole lifecycle of a project. Outputs include:

- Clause 13.02-15 hazard identification, landscape assessment and strategy response.
- Bushfire risk assessment matrix.
- Preliminary Bushfire Response Plan.

- Bushfire mitigation operational schedule.

4.1 Benefits

Benefits of the bushfire risk assessment process for the Proposal include:

- Adoption of the protection of life as the highest priority.
- Identification of the existing bushfire risks on the Site.
- An opportunity to work collaboratively with other stakeholders to reduce bushfire risk across the broader landscape.
- Justification of the investment in resources, systems and processes to lower the consequence of bushfires impacting on the Bookaar Solar Farm.
- Determination of a suitable nominated Shelter-in-Place location.
- Development of a Preliminary Bushfire Response Plan to support the Emergency Management Plan for the Site.

4.2 Bushfire risk assessment outputs

4.2.1 Bushfire Risk Assessment Matrix

The Bushfire Risk Assessment Matrix uses all available information to define the likelihood and consequence of bushfire at the Site.

The matrix uses the following definitions:

- **Likelihood** is the chance that something might happen (level of probability). The assessment of likelihood includes reviewing the potential fire frequency and ability for the fire run to reach the Site and nominated Shelter-in-Place building. The outputs of the likelihood assessment are expressed as Almost Certain, Possible, Likely or Unlikely.
- **Consequence** determines the level of impact and for the risk assessment we have defined it as the threat and vulnerability of the Site.
- **Threat** is the bushfire threat to the particular asset by assessing it as the Bushfire Attack Level (BAL) for the Site and Shelter-in-Place area.
- **Vulnerability** relates to the vulnerability of the Site, and is divided into five levels:
 - The asset, landscaping, plantings and maintenance.
 - Access and egress for evacuation and emergency services.
 - Water supply including presence of an adequate / specified water supply and pumping equipment.
 - Building suitability to resist ember attack / preparedness against fire.
 - Human behaviours to respond including policies, procedures and plans.

A level of bushfire risk is already present in the landscape and practical actions to reduce this risk are defined.

Some strategies to reduce bushfire risk are not within the control of the Proponent. For example, the vulnerability of the Bookaar community to bushfire³. The DHHS *Vulnerable people in emergencies policy*⁴ encourages planning for vulnerable people and funded agencies have a responsibility to support them to undertake this planning.

The role of the Proposal in protecting the Bookaar community and its vulnerable community members is limited to:

- Ensuring the Proposal does not increase the fire risk to the community beyond the inherent risks already present in the landscape.
- Ensuring that the Proposal design, construction and operation prioritises the prevention of fires at the Site and, in the event a fire does start, from leaving the Site.

4.2.2 Clause 13.02-1S – Bushfire Planning

Clause 13.02 of the Victorian Planning Provisions is clear that the primacy of life is the key focus of the Victorian Planning Scheme.

The objectives for Settlement Planning as outlined within the Clause 13.02 policy includes:

- Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959:2018 Construction of buildings in bushfire-prone areas (Standards Australia, 2018) where human life can be better protected from the effects of bushfire.
- Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.
- Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reducing bushfire risk overall.
- Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and Site scale, including the potential for neighbourhood-scale destruction.

Addressing this clause is a requirement of the Planning Scheme and allows the assessment of the Proposal against clearly defined strategies.

4.2.3 Preliminary Bushfire Response Plan

A preliminary Bushfire Response Plan (the ‘preliminary BRP’) has been developed as a guiding document to aid the Proposal in its preparedness and response for a bushfire emergency.

The preliminary BRP identifies the roles and responsibilities of employees, and the actions and arrangements that should occur to assist in the management of the fire emergency response.

This document is intended to be shared with stakeholders and response agencies (such as CFA, FFMVic, Police and Ambulance Victoria) to assist with planning and responding to bushfires.

The document will be updated to become the Bushfire Response Plan (BRP) ahead of the construction of the Proposal. It will be updated annually and will form a sub plan of the Proposal’s Emergency Management Plan. The preliminary BRP is included as Appendix A to this report.

³ The *Otway District Strategic Fire Management Plan* identified that there were four people in the Bookaar area who, due to age of disability, would require assistance in the event of an emergency.

⁴ <https://providers.dhhs.vic.gov.au/vulnerable-people-emergencies-policy>

4.2.4 Bushfire Mitigation Operational Schedule (BMOS)

A key part of any bushfire risk assessment and mitigation plan is the annual implementation of a designated works plan to take active steps to reduce bushfire risk. The Bushfire Mitigation Operational Schedule (BMOS) has been developed as part of this assessment and details the annual mitigation works to be performed at the Site. It will form a sub plan to the Environmental Management Plan.

The BMOS is reviewed annually, in time for recommendations to be considered and actioned for the following bushfire season. If implemented prior to each fire season, the BMOS can significantly reduce bushfire risk. It is included as Appendix B to this report.

The implementation of the BMOS is critical as it relies on the reduced level of risk that the BMOS achieves. If the BMOS is not implemented prior to the commencement of the Fire Danger Period, the BRP may not be effective as it assumes a different risk level than what is present.

4.2.5 Stakeholder consultation

FRC engaged with representatives from Corangamite Shire Council and CFA to discuss the Proposal and assessment process and seek feedback.

Organisation	Summary of discussion
CFA State Infrastructure and Dangerous Goods Department	<p>Initial consultation occurred on 8th May 2020 with additional information supplied via email on 9th June 2020 regarding:</p> <ul style="list-style-type: none"> • Deficiencies of the Previous Application with respect to Bushfire Risk Assessment. • Application of CFA Guidelines. • Advice on when the Proponent should consult the Proposal with local the CFA. • Vegetation screening principles. • Design elements, for example, 'non-combustible mulch', internal track layout and design, and APZs; • Development and use of a Bushfire Mitigation Operational Works Schedule (BMOS). • Location and numbers of water tanks. • Emergency Access Points and general Solar Farm layout. • Guidance on when to seek dangerous goods advice. • Advice on the spacing of the battery facility. <p>Following the initial feedback from CFA, elements of the design were altered including improved track layout and the creation of guidelines to support the development and management of the Vegetation Screens.</p> <p>The draft report was supplied to CFA along with the BMOS and PBRP on 13th September 2020 with feedback indicating:</p> <ul style="list-style-type: none"> • CFA believe that the document was very well put together and considered. • Seeking further clarification on the remote monitoring arrangements, safer location arrangements and isolation capabilities across the Site. <p>In response to CFA's feedback, additional information has been provided within the report.</p>
Corangamite Shire Council Planning Department	<p>On 8th May 2020, briefed on Fire Risk Consultants engagement and the project scope. General discussion on:</p> <ul style="list-style-type: none"> • Numbers of water tanks. • Emergency Access Points and general Solar Farm layout.

- The Previous Application with respect to Bushfire Risk Assessment.
- The planning framework for Solar Farm facilities, the role of Council and the role of the Victorian State Government.
- Development and use of a Bushfire Mitigation Operational Schedule (BMOS).
- Application of CFA Guidelines.

Council also stated that fire was an emotive issue in the local community.

Council expressed a desire to look at the draft report before formal planning application.

5 Statutory Planning Framework

This section outlines the regulatory and planning context for bushfire management in the vicinity of the Proposal.

In Victoria, bushfire safety is considered a shared responsibility between the fire services, the Victorian and local Government, communities and individuals. All parties are responsible for preparing prior to the fire danger period in order to protect themselves, their interests and their neighbours from the impact and effect of bushfires.

5.1 Victorian fire legislation

The *Emergency Management Act 1986* and *Emergency Management Act 2013* provide the emergency management framework for Victoria.

The *Country Fire Authority Act 1958* (the 'CFA Act') relates to fire prevention and suppression in the county area of Victoria (private property outside the metropolitan fire district). The CFA is responsible for the suppression of fire in this area. The CFA Act applies to fires and fuel management on the Site.

The CFA Act provides for the CFA to declare the Fire Danger Period (FDP) in individual municipalities and Total Fire Ban by weather districts. These declarations impose restrictions on the lighting of fires and activities that may cause a fire. The Act also authorises municipalities to issue fire prevention notices to landholders for fire hazard removal.

Section 43 of the CFA Act states

'it is the duty of every municipal council and public authority to take all practical steps (including burning) to prevent the occurrence of fires on, and minimise the danger of the spread of fires on and from – any land vested in it or under its control or management: and any road under its care and management'.

Each municipality that has a bushfire risk appoints a Municipal Fire Prevention Officer, authorised by the CFA Act to issue Fire Prevention Notices on owners or occupiers of private properties to complete fire management works. A Municipal Fire Prevention Officer may enter private land to remove fire hazards if they are not treated within the time frame or manner stipulated on the Fire Prevention Notice. The Municipal Fire Prevention Officer is responsible for issuing permits to burn during the Fire Danger Period.

The CFA Act indicates that the onus is on individual owners and occupiers of land to ensure their properties are free of fire hazards that may put the lives and property of other people at risk.

The CFA has produced guidance which covers the development of utility scale solar farms and is outlined in Section 5.4.1 below.

5.2 Regional fire management plans

The *Emergency Management Act 1986* and *Emergency Management Act 2013* provide the emergency management framework for Victoria. The Victorian Government is currently reviewing these arrangements and changes have been proposed to the emergency management structure and planning processes at the State, Regional and Municipal levels.

Currently, Regional Emergency Management Planning Committees prepare Regional Emergency Management Plans and Municipal Emergency Management Planning Committees prepare Municipal Emergency Management Plans. These cover all emergencies.

Where fire is a risk in the area, these committees establish Regional Strategic Fire Management Planning Committees and Municipal Fire Management Planning Committees as subcommittees to prepare integrated Regional Strategic Fire Management Plans and Municipal Fire Management Plans respectively. These committees engage all agencies with a role in fire management and develop a plan that outlines responsibilities.

The *Corangamite Municipal Emergency Management Plan 2017-20⁵* covers the Site and surrounding area. This plan identifies bushfire as an extreme risk to people, economy, environment and infrastructure across the entire municipality.

5.2.1 Otway District Strategic Fire Management Plan

The Corangamite Shire is included within the Strategic Fire Management Plan⁶ for the Otway District. The plan is the result of collaboration between three municipalities that cover the Otway Ranges and surrounds.

The purpose of the plan is to enhance integration, coordination and effectiveness of fire risk reduction and community fire safety activities across the three shires and across all fire management agencies, groups and communities. It aims to reduce the risk to life and community values from the threat of fire, and facilitate the development of resilient and fire adapted communities which have an increased capacity to recover from fire.

Detailed risk analysis across the District was undertaken in the preparation of the plan. Bushfire modelling of 10,000 simulated fires were assessed to determine a broad range of fire interactions including the frequency that modelled fires reached each town in the district and the potential scale of the impact. From this work, bushfire risk across several criteria for all localities in the District were ranked, including:

- The influence of landscape topography and vegetation on the potential for unusual fire behaviour and intense ember drops on each town (termed drop-zone).
- Access and proximity of each town to a large, open and permanently low-fuel space for last resort bushfire shelter – often a wide accessible beach.
- The relative need each town has for assistance due to age (younger or older) and disability.
- The relative degree to which tourism is a feature of each town, understanding that tourists are likely to be more vulnerable and large visitor numbers can pose additional risk – e.g. traffic issues.

⁵ <https://www.corangamite.vic.gov.au/Property/Emergency/Our-Emergency-Plans-and-Strategies>

⁶ <https://www.corangamite.vic.gov.au/Property/Emergency/Our-Emergency-Plans-and-Strategies>

Bookaar is identified in a lower risk category when compared against other locations in the Corangamite Shire area. This was mainly due to the low overall risk of a bushfire in the area.

The key risk factors related to the vulnerability of the community, specifically:

- Lack of access to a low fuel area as a last resort bushfire shelter.
- The presence of four people in the area (at the time of the assessment) with a need for assistance in the event of an emergency, due to age or disability.

While the plan identifies there has been little fire history in the local area surrounding the Site, it does identify fire history in similar grassland landscapes across the Western District of Victoria.

5.2.2 Strategic Bushfire Management Plan – Barwon Otway

*Safer Together*⁷: *A new approach to reducing the risk of bushfire in Victoria* (Victorian Government 2015) outlines the approach to reducing bushfire risk in Victoria through land, fire and emergency management agencies working with communities to manage fuel.

The Safer Together project has completed an assessment of bushfire risk and published this in the report *Strategic Bushfire Management Plan – Barwon Otway (2015)*⁸. The report identifies priority communities at risk from bushfire. All priority communities are located adjacent to or within the forested areas to the south and east of the Otway Ranges footprint.

The area surrounding the Site has been categorised as a low priority risk in the Plan. Further, the community and has not been identified as a priority community as the primary risk is from grass fires. While grass fires can destroy property and cause significant loss of life, they are more able to be managed in the prevention phase through fuel management.

⁷<https://www.safertogether.vic.gov.au/>

⁸https://www.safertogether.vic.gov.au/_data/assets/pdf_file/0022/128542/DELWP0016D_BMP15_BarwonOtway_web_v2.pdf

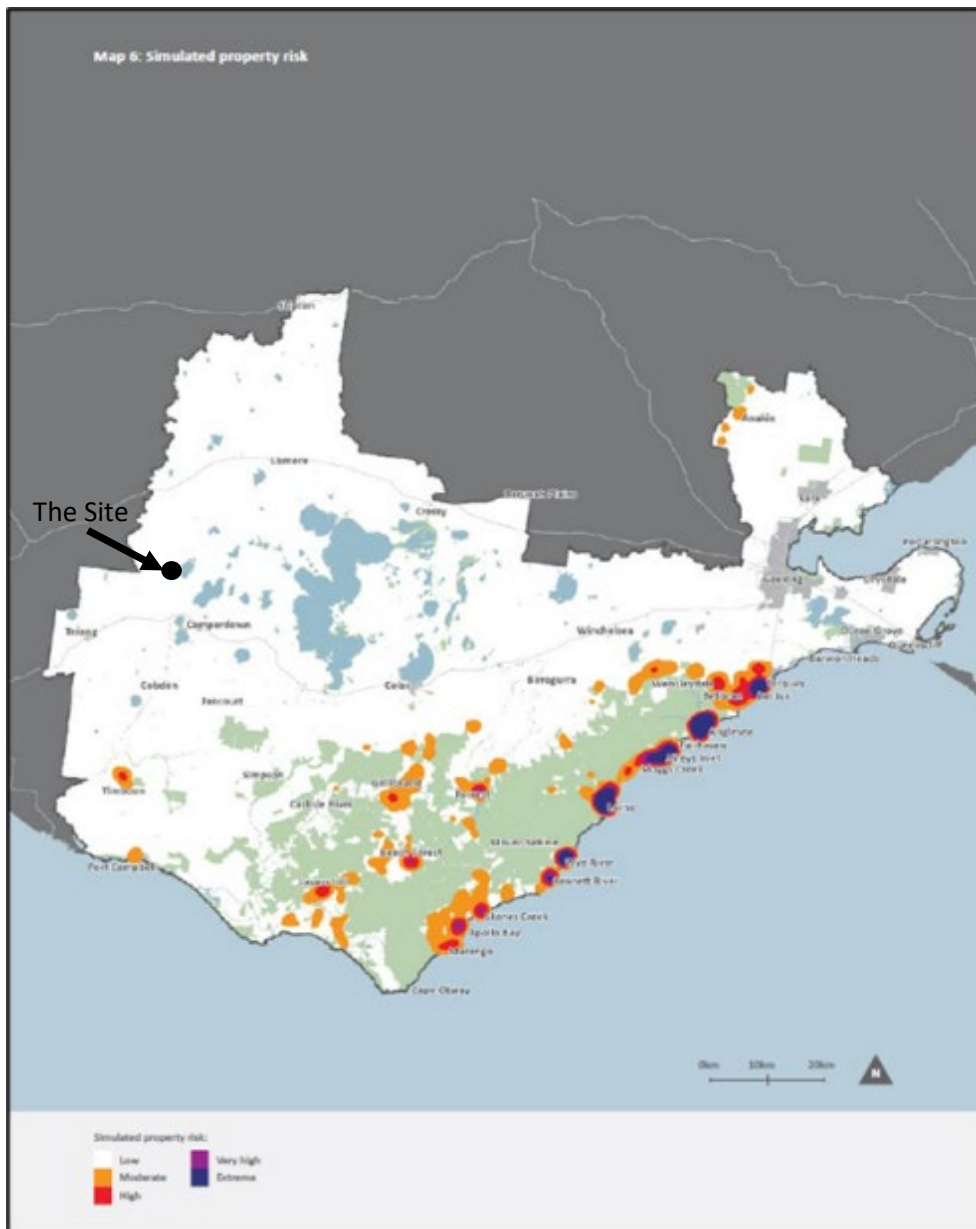


Figure 4 - Excerpt from *Strategic Bushfire Management Plan – Barwon Otway* showing approximate Site location

5.3 Victorian Planning Scheme

The Corangamite Planning Scheme sets out policy objectives and strategies for managing bushfire risk in Victoria. This includes Clause 13.02-1s 'Bushfire Planning', which includes strategies to identify, assess and manage bushfire hazards.

The objective of Clause 13.02-1s is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. Clause 13.02-1s arrangements are aimed at reducing the future risk associated with land use developments and reducing the risk to the community created by previous land use decisions. As noted in Section 4, an assessment of the Proposal against Clause 13.02 is a core component of this BMP and is provided in Section 8.

5.4 Guidelines for solar farm developments

5.4.1 DELWP Guideline

The Department of Environment Land Water and Planning (DELWP) has developed the *Solar Energy Facilities – Design & Development Guideline August 2019* (the 'DELWP Guideline') as the primary guide to assist solar farm developers in the planning, development and operation of these facilities across Victoria.

The DELWP Guideline provides an overview of the policy, legislative and statutory planning arrangements for solar energy facility projects in Victoria. In relation to 'Bushfire Management', it states that '*building a solar energy facility should not increase the risk of bushfire in the area*' (25).

In terms of the assessment process, the DELWP Guideline states '*within rural and regional areas, a proponent should consult the CFA's Guidelines for renewable energy installations for information about bushfire risk management and other risk management matters*'.

The DELWP Guideline also identifies *Clause 13.02-1 Bushfire Planning* as the Policy that sets out the strategies and objectives to manage bushfire risk within Victoria.

This BMP has been developed with due consideration of the CFA Guideline and Clause 13.02. Furthermore, by integrating bushfire assessment into the design of this Proposal, it is demonstrated in Section 8 that the development of the Proposal would not increase the level of bushfire risk in the surrounding area.

5.4.2 CFA Guideline

CFA has updated its publication *Guideline for Renewable Energy Installation, February 2019* (the 'CFA Guideline'), to provide the renewable energy industry guidance on the planning, construction and operation of renewable energy facilities.

The CFA Guideline does not provide information in relation to the risk posed by solar farms. Rather, it provides guidance on the treatments that should be implemented to reduce the risk posed to firefighters, the community and the asset generally. It can be implied from the CFA Guideline that there are risks associated with bushfires entering a Solar Farm site, and risks from the potential for fires to originate within a solar farm and impact on neighbouring properties. This CFA Guideline has been used to inform design, construction and operational mitigation solutions for the Proposal. An overview of the Proposal's consideration of the CFA Guideline is provided at Section 8.3, while a detailed analysis of the Proposal's adherence to it is provided in Appendix C.

6 Existing Site Conditions

Site conditions in the context of bushfire include a variety of elements. These need to be assessed individually to develop a detailed understanding of the bushfire risk associated with the Site.

6.1 Location

The Site is located approximately 8 kilometres north west of Camperdown. It is located off Meningoort Rd off Darlington Camperdown Road. Lake Bookaar is located to the east of the Site with Mt Meningoort to its west.

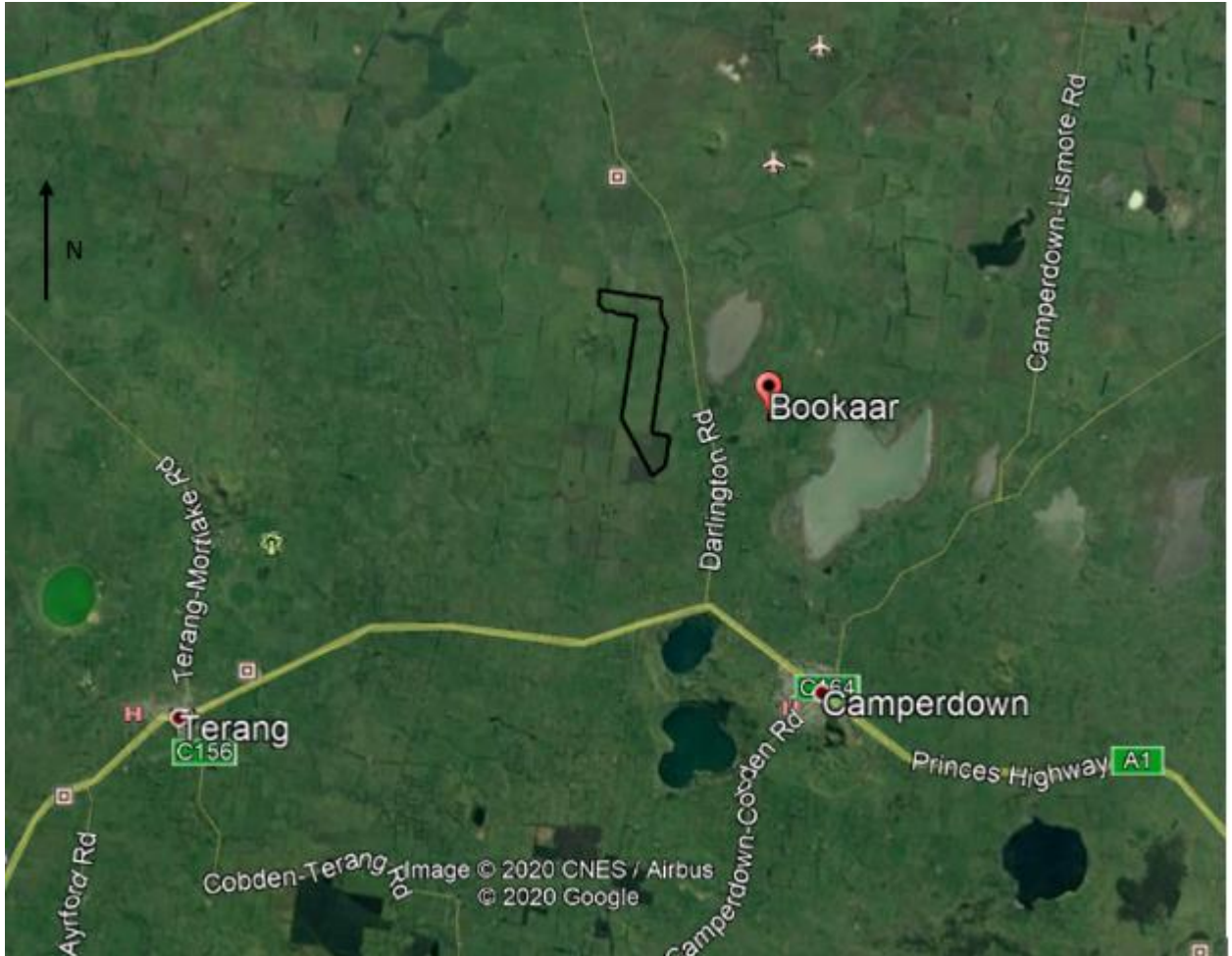


Figure 5 - Location of the Site

6.2 Adjoining land use

The land surrounding the Site for several kilometres is zoned 'Farming Zone (Schedule 1)' under the Planning Scheme. This land is primarily utilised for farming purposes with scattered dwellings and farming related infrastructure on these properties.

Farming operations will strongly influence the bushfire risk within the local area as various practices will result in higher or lower levels of fuel. It can be assumed that the risk will fluctuate through the fire danger period depending on the practices undertaken.

6.3 Topography and major geographical features

6.3.1 Topography and bushfires

Topography describes the nature of the land surface in terms of slope, steepness, aspect, elevation and landscape pattern. Changes in topography can cause dramatic changes in fire behaviour.

Fires travel upslope much faster than they travel on flat land with corresponding reductions in speed downslope. North facing slopes are drier than south facing slopes, and consequently fuels on north facing slopes can ignite and burn more easily than those on south facing slopes. Areas upslope of an approaching fire are considered highly dangerous.

6.3.2 Site topography and other features

There are minor changes in elevation across the Site (ranging from approximately 140m – 149m above sea level), however from the perspective of Bushfire Risk the Site can be described as flat. The Bushfire Management Overlay and AS 3959 classify slope in 5 degree classifications. The Site is within the 0 – 5 degrees category.

The Site is located near to the foot of Mount Meningoort (approximately 220 metres in height), which could influence the behavior of a bushfire burning from the north west by increasing its speed as it burns up its north face. However, the bushfire would also slow down as it burns down the south face. Due to the location of Mount Meningoort relative to the Site, changes in bushfire behaviour resulting from its topography are not expected to impact on the Proposal.

On the eastern side of Darlington Road is Lake Bookaar, which is a permanent salt lake. This will reduce the potential for bushfire from an easterly direction.

6.4 Bushfire fuel

6.4.1 Fuel hazard

Fuel hazard is assessed by combining all fuel sources. These fuel sources are categorised into four layers with differing effects on fire behaviour. The layers are:

Surface fine fuels (less than 6mm in thickness): leaves, bark, small twigs and other fine fuels lying on the ground. These fuels provide the horizontal continuity that allow a bushfire to spread.

Near surface fine fuels (less than 6mm in thickness): grasses, low shrubs, bracken etc. up to about .5 m above the ground surface. Fuels in this layer will burn when the surface fuel layer burns and will increase bushfire intensity.

Elevated fuels: larger shrubs and small saplings with most of the fuel closer to the top of this layer and a clear gap between them and the surface fuels. These interact with the surface fine fuels and near surface fine fuels to further increase bushfire intensity. They also contribute to the vertical continuity of fire that allows fire to 'climb' into the tree canopy with the potential to then become a 'crown fire'⁹.

Bark fuels: includes flammable bark on trees, saplings and large bushes from ground level to the canopy. Loose fibrous bark on stringy-bark eucalypts and candle bark on some gums can generate large amounts of embers which can start spot fires ahead of the main fire front.

⁹ A 'crown fire' burns in the tops of trees ahead of and above intense ground fires. As they are exposed to the wind, where canopy continuity is maintained, they can travel ahead of a ground fire.

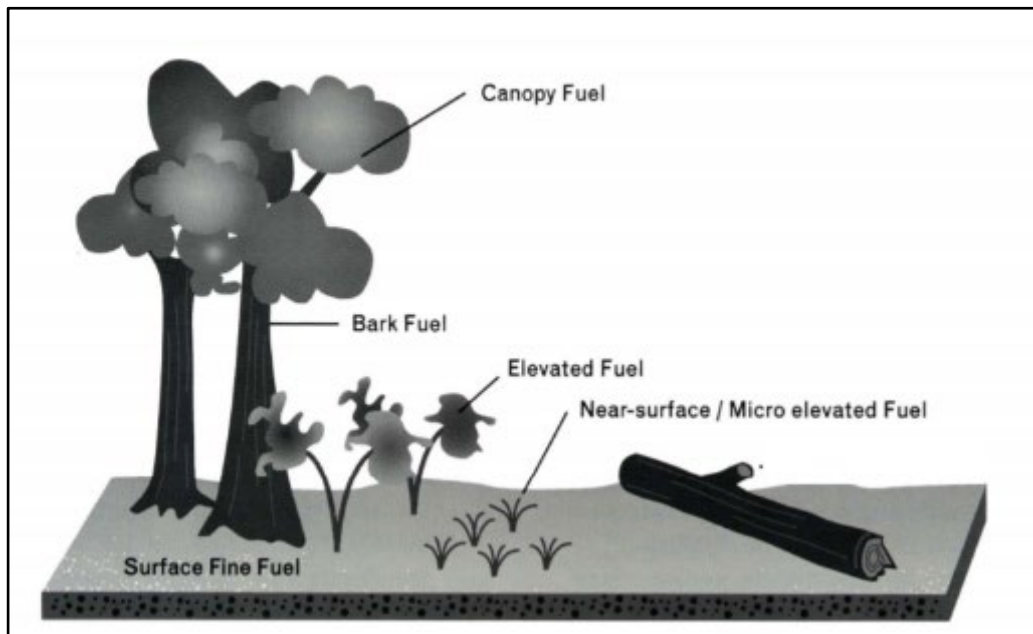


Figure 6 - Forest layers affecting bushfire behaviour

6.4.2 Fuel on the Site and surrounding area

The dominant vegetation on and surrounding the Site is agricultural grassland and crops. This fuel type is classified as fine fuel as outlined in the previous section. The bushfire risk is lower in this environment when compared to a forested environment where there is ample elevated bark or fuels that can generate extreme bushfire behaviour.

During the Site inspection, there was clear evidence of existing bushfire mitigation works in the surrounding area that are undertaken by Regional Roads Victoria, Corangamite Shire Council and adjoining landowners. These works will aid in reducing the bushfire risk in the local area and it is expected that they will continue to occur in the future. The majority of these mitigation works relate to roadside vegetation management.

The Site is currently utilised for farming activities. Along the perimeter of the Site, there are patches of trees that have been planted to provide protection for stock from the wind. Some of these patches are approximately 35 – 45 metres wide. Figure 7 shows the location of the various patches that are deemed to be relevant to bushfire risk, including other areas identified on adjoining land that may influence bushfire behaviour in close proximity to the Site.

Patches of vegetation in the landscape, depending on their overall structure, can influence bushfire behaviour. Tolhurst & Cheney (1999)¹⁰ outline how fine fuels (<6mm in diameter) contribute to the bulk of flames. For heavier fuels to ignite, they usually require fine fuels to be present.

The establishment of shelter belts or windbreaks in the landscape can result in the increase of fine fuels as described above. However, in most cases, either allowing stock to graze within the shelterbelt or actively managing the fine fuels under the tree canopy can mitigate this risk. The patches of vegetation that are on the Site (Patch A, C, D, E and F) are periodically used by stock which graze under the tree

¹⁰ Tolhurst K.G. & Cheney N.P., 1999, *Synopsis of the Knowledge Used in Prescribed Burning in Victoria*, Department of Natural Resources and Environment.

canopy, therefore the fuel loads are currently low. The remaining patches (B, G and H) on adjoining land are away from the Site and would only have limited effect on a bushfire approaching the Site.



Figure 7 - Vegetation patches in relation to the Site boundary.

Reference	Approximate size	Perimeter	Distance to the Site
Patch A	0.27 Ha	274 metres	On the Site
Patch B	1.15 Ha	631 metres	19 metres
Patch C	1.27 Ha	715 metres	On the Site
Patch D	1.97 Ha	877 metres	On the Site
Patch E	0.78 Ha	444 metres	On the Site
Patch F	1 Ha	493 metres	On the Site
Patch G	1.88 Ha	920 metres	62 metres
Patch H	3.94 Ha	1,034 metres	95 metres

Tolhurst & Cheney (1999) state the need for an intense surface fire occurring to support a crown fire in eucalypt forests. As there is limited to no surface vegetation within the shelterbelts, it is highly unlikely for crown fires to occur.

AS3959:2018 is the Australian standard that outlines a risk assessment process to determine the appropriate level of construction for a building. It is noted that whilst this development is primarily not about constructing buildings, the standard is relevant to indicate the level of risk. The Standard allows for all bushfire fuel present in Australia to be classified into one of seven fuel types. Fuel present within

the Site can be classified as Class G Grassland under Table 2.3 of AS 3959:2018. While grass fires spread rapidly, they do not generate the level of ember attack or radiant heat that could be expected from fires in forested areas.

The existing shelterbelts and the areas of the Site perimeter that contain several existing trees do not meet the criteria outlined within AS 3959 – 2018 as being high risk vegetation. Figure 8 shows the shelterbelts along the western boundary of the Site. Whilst these patches are more than 20 metres in width, they are considered low risk vegetation due to the management of the ground fuel and the small size of the patches.

The Proposal outlines the creation of Vegetation Screens (see Figure 1) around the majority of the perimeter of the Site. The areas set aside for the Vegetation Screens will be no more than 20 metres wide. To allow for the canopy to not extend beyond the perimeter of the 20 metre width, the plantings will be set back 2.5m from the sides of the screen (see the 'Landscape Plan', Appendix C of the 'Landscape and Visual Impact Statement'). Within AS 3959, clause 2.2.3.3 (d) outlines what can be considered excluded vegetation:

Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the Site or each other, or other areas of vegetation being classified vegetation.

The Vegetation Screen will be developed with guiding principles to ensure the screen will, in combination with other mitigation methods, not increase fuel loads to the extent where overall bushfire risk is increased. Appendix D provides these principles and this topic is addressed further in Section 9 (Mitigation).



Figure 8 - Examples of shelter belt tree plantings on the property

The management of ground fuels, in particular fine fuels along the ground is a key mitigation strategy for the Proposal both within the shelterbelts, the newly created Vegetation Screens, and across the entire Site. All onsite patches noted above (A, C, D, E and F) and the new Vegetation Screens will be maintained to reduce fine fuels in accordance with the following principles (described in Appendix D):

- Removal of dead vegetation in the Vegetation Screens before the fire danger period.

- Maintenance of grass to 100mm or less in the Vegetation Screens during the fire danger period.
- Removal of branches within 2m of the ground.

To further reduce the risk, where these patches connect, a 5m gap between the canopies of the proposed Vegetation Screen and the existing shelterbelts will be maintained.

6.4.3 Peat fuel

Peat in Western Victoria is defined as a brown deposit resembling soil, formed by the partial decomposition of organic matter. It poses significant issues for fire suppression and can burn for many months after the initial main fire has been extinguished. Peat fires in Victoria normally occur when a Site containing peat is burnt during a bushfire event.

Ongoing issues with peat fire management include:

- Continued poor air quality in the area through smoke and fumes from the burning peat.
- An ongoing risk to firefighters of extended fire suppression operations.
- Loss of productive farming land due to the peat burning fertile soils away.
- Issues with water quality.

Extensive testing of the Site for peat deposits has been conducted by the Proponent. No peat soils have been found on Site therefore the risk of a peat fire within the Site is negligible. It is acknowledged that there could be peat deposits surrounding the Site, in particular in low lying areas, however any Peat fire in the surrounding area would not impact directly on the Site, other than in the event that the smoke generated could affect staff and operations. The Peat Assessment is Appendix E to this report.

6.5 Weather

The main weather factors affecting fire behaviour are long-term climate trends and daily weather conditions such as temperature, relative humidity, wind speed and any wind direction changes.

The Site is subject to the same seasonal climate conditions as the rest of the Western District.

Data from the Bureau of Meteorology indicates this area is typical of south east Australia in that the months of January and February are traditionally very hot and dry. The area is also prone to cold winters and numerous frost events during June, July and August.

On high fire risk days, the combination of strong winds (generally north westerly winds preceding a cold front, followed by south westerly winds after the passage of a cold front), high temperatures and low humidity increase the likelihood of bushfires, resulting in high fire intensity and unpredictable fire behaviour.

Bushfires starting on days of Extreme or Code Red fire danger rating will be unpredictable and very difficult to contain.

The nearest active Bureau of Meteorology automatic weather station is at Mortlake, approximately 27 km to the west of the Site. The data sourced from this weather station indicates the potential for very high temperatures in the months of December, January, February and March. The data also indicates that on average, there are 31 days a year above 30° Celsius. There are nearly 11 days per year above 35° Celsius. It also demonstrates that high winds can be experienced in this area with the average maximum wind gust speed being 113 km/h.

Weather data observed from the Mortlake Weather Station is shown in Figure 8.

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
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Mean maximum temperature (Degrees C) for years 1991 to 2020	26.3	26.4	24.1	20.1	16.3	13.5	13	13.9	15.8	18.3	20.9	23.7	19.4
Highest temperature (Degrees C) for years 1991 to 2020	44.9	46	41.1	36.9	27.9	23.2	19.1	23.4	27.9	35.8	38.3	44	46
Mean number of days >= 30 Degrees C for years 1991 to 2020	7.8	8.3	5.7	0.9	0	0	0	0	0	0.6	2.6	5.1	31
Mean number of days >= 35 Degrees C for years 1991 to 2020	4.2	3.2	1.2	0	0	0	0	0	0	0	0.4	1.7	10.7
Mean number of days >= 40 Degrees C for years 1991 to 2020	0.9	0.5	0.2	0	0	0	0	0	0	0	0	0.2	1.8
Mean minimum temperature (Degrees C) for years 1991 to 2020	10.9	11.6	10	7.9	6.7	4.9	4.6	4.8	5.6	6.4	8	9.3	7.6
Mean rainfall (mm) for years 1994 to 2020	32.9	33.1	31.5	44.2	56.9	52.3	63.6	66.2	56.7	49.8	48.2	40.2	576.4
Maximum wind gust speed (km/h) for years 2003 to 2020	91	89	93	102	80	87	100	106	113	93	102	98	113
Mean 9am temperature (Degrees C) for years 1991 to 2010	16.9	16.7	14.7	13.1	10.3	8	7.5	8.6	10.7	12.5	13.9	15.7	12.4
Mean 9am wind speed (km/h) for years 1991 to 2010	17.2	15.9	13.6	15.2	14.5	14.9	16.4	18.7	20.2	20.1	18.3	18.5	17
Mean 3pm temperature (Degrees C) for years 1991 to 2010	23.7	24.4	22	18.5	15.1	12.4	11.9	12.7	14.2	16.3	19.1	21.3	17.6
Mean 3pm wind speed (km/h) for years 1991 to 2010	22.7	21.7	21.3	20.1	19.6	20.9	21.8	23.8	24.1	22.9	21.9	22.6	22

Figure 9 - Historical weather conditions at Mortlake AWS (Source: Bureau of Meteorology)

6.6 Fire response considerations

6.6.1 Bushfire history

There are no recorded bushfires immediately adjacent to or surrounding (within 2km) the Site, however there may have been grassfires in the surrounding landscape that were not recorded on the government fire history database¹¹.

It is acknowledged that a grass fire on an elevated fire danger day could perform similarly to other major fires that have been recorded in the wider area.

Figure 9 outlines the available fire history in the area surrounding the Site.

¹¹ Sourced from MapShareVic: <https://mapshare.vic.gov.au/MapShareVic/index.html?viewer=MapShareVic.PublicSite&locale=en-AU>

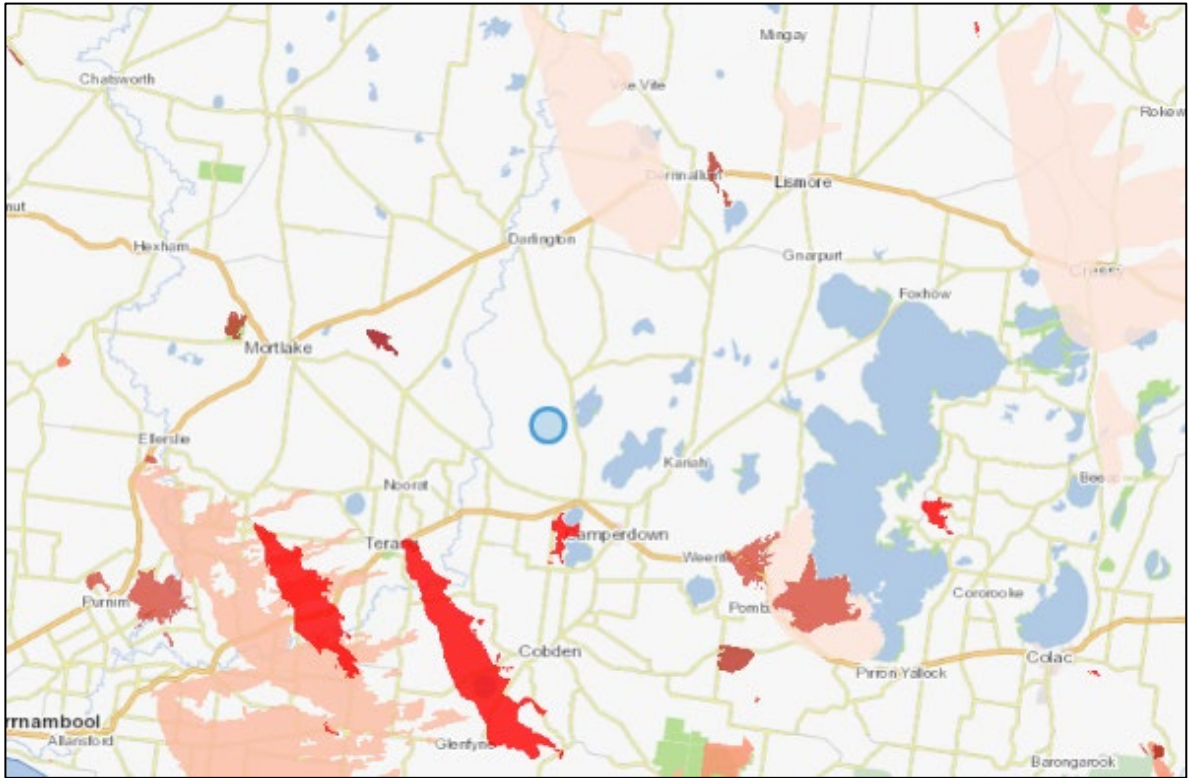


Figure 10 - Fire history surrounding the Proposal (approximate location indicated by blue circle). Previous fire runs and impacted area indicated by the different pink, red, and dark red shades.

6.6.2 Sources of ignition

For a fire to occur there must be an ignition source.

Bushfires can originate from both human activity and natural causes. Lightning is the predominant natural source of fire ignitions in Australia, accounting for about half of all ignitions.

Fires of human origin currently account for the remainder and these are classified as accidental or deliberate. Deliberately lit fires can be the result of arson or may be designed to achieve a financially beneficial outcome. Some farming practices use fire to manage vegetation recovery or control unwanted pest species.

The Otway District Strategic Fire Management Plan's analysis of ignitions in the district shows that anthropogenic ignitions (caused by humans) account for some 95% of all ignitions in the District and were correlated with locations of higher population density.

Given the low population density and fire history of the Bookaar area, the potential for fire ignitions in the area is extremely low.

Based on the analysis of previous fire history, stakeholder engagement and the author's experience, the following ignition sources are deemed possible:

1. Arson
2. Faulty machinery including farming vehicles and road vehicles
3. Lightning

6.6.3 CFA firefighting capability and capacity

CFA has an extensive network of fire stations containing firefighting appliances. Figure 10 shows the location of the nearest fire stations to the Site. Whilst the closest CFA fire station is at Bookaar, the response to any fire event at the Site or potentially threatening the Site will be from a number of CFA brigades.

CFA utilises a response model that ensures predetermined dispatch arrangements are in place to respond the closest firefighting appliances to any location. This allows for a rapid escalation and the dispatch of numerous firefighting appliances from different brigades without delay.

Bookaar Fire Station is approximately 3.5 km from the Site and is the closest fire station with a 'tanker' (bushfire firefighting appliance). Camperdown Fire Station, is approximately 10 km from the Site and is the closest fire station with a 'pumper' (urban firefighting appliance), however as noted above the CFA response may comprise of assets from other stations in the area.

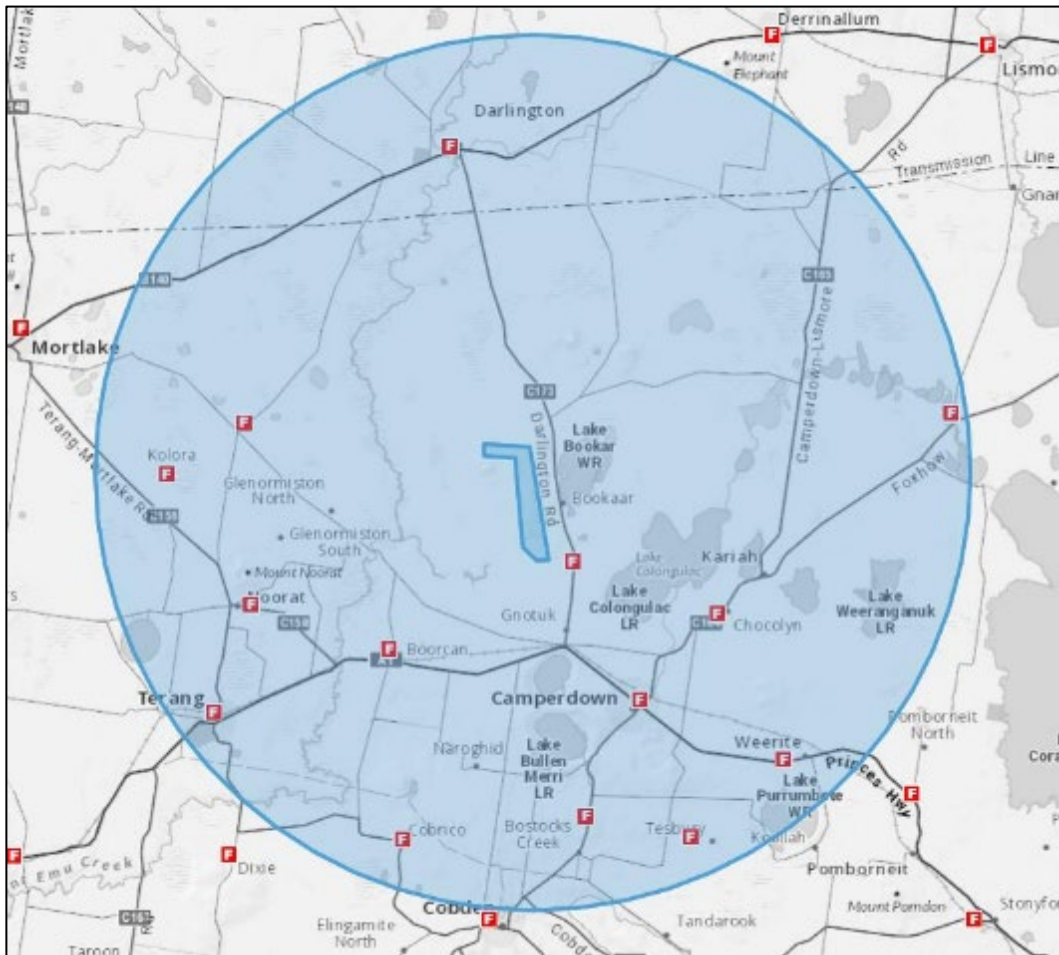


Figure 11 - Location of CFA fire stations within 20 km of the Site.

All brigades surrounding the Site are made up of volunteer firefighters. Response times to the Site will be governed by current fire activity in the district, volunteer availability and the condition of the road network, although a tanker responding from the Bookaar Fire Station could reach the Site quickly.

In support of fires involving Solar Panels, CFA have published an Operations Bulletin and Safety First Alert (internal publications) that are relevant to fires involving solar panel fires. Both these documents provide guidance to their firefighters on the safety aspects of fires involving Solar Panels and suggest firefighting strategies to manage and extinguish these types of fires. The documents outline the risks associated with PV systems and provide recommendations to firefighters on how to manage these risks. Although geared towards residential PV systems, the key message from these documents is to remind firefighters to assume the PV arrays and battery storage systems are electrically live, until otherwise advised.

As indicated in Section 7 and supported by the CFA internal publications, the importance of Site management regularly engaging with local CFA Brigades is acknowledged, and this requirement will be outlined within the Preliminary Bushfire Response Plan (see Section 9).

6.6.4 Site access and egress

An effective road and track network can:

- improve firefighter response times, which increases the likelihood of a fire being suppressed in minimal time and to a minimal area.
- improve firefighter safety, by providing a safer platform from which firefighters can prepare for and fight fires.

- provide greater protection for assets.
- improve the evacuation speed of an area, if required.

Site access and egress must take into account:

- Suitability for heavy (emergency) vehicles all year round.
- Access during periods of potential congestion.
- Ability for vehicles to turn around.
- Ability of heavy vehicles to access static water supplies.

The Proposal has been designed with the following considerations:

- Provision of suitable access and egress for emergency vehicles to and from the Site utilising different routes.
- Provision of suitable access and egress to the local road network, which is sufficient to allow a person to travel away from the bushfire threat on a planned route in the event of a fire.
- Provision of a suitable internal track network with prefabricated bridges and culverts over drain lines, including a perimeter track, that allows access throughout the Site on multiple access routes (see Figure 1).
- Maintenance of the internal track network will ensure it will always be suitable for emergency vehicle use.

All roads surrounding the Site are suitable for access with CFA tankers, being either two-wheel drive (2WD) or four-wheel drive (4WD) units. Primary vehicular access to the Site will be via the northern part of Meningoort Road off Darlington Road (Darlington Road is a sealed road and is in good condition). As noted in the Proposal Description, to facilitate Site access the intersection of Meningoort Rd and Darlington Road will be upgraded with an additional turning lane and Meningoort Rd will be widened to 7m.

Meningoort Rd, via Blind Creek Rd to the south, also borders the Site to the west and south and will facilitate access during emergencies through the emergency access points along the Site's western boundary (see Figure 1).

Figure 12 below shows emergency access and egress routes to the Proposal within the context of local CFA stations. The Main access points can also be utilised in an emergency and the figure demonstrates that the Site is well positioned to take advantage of different routes to and from the Proposal.

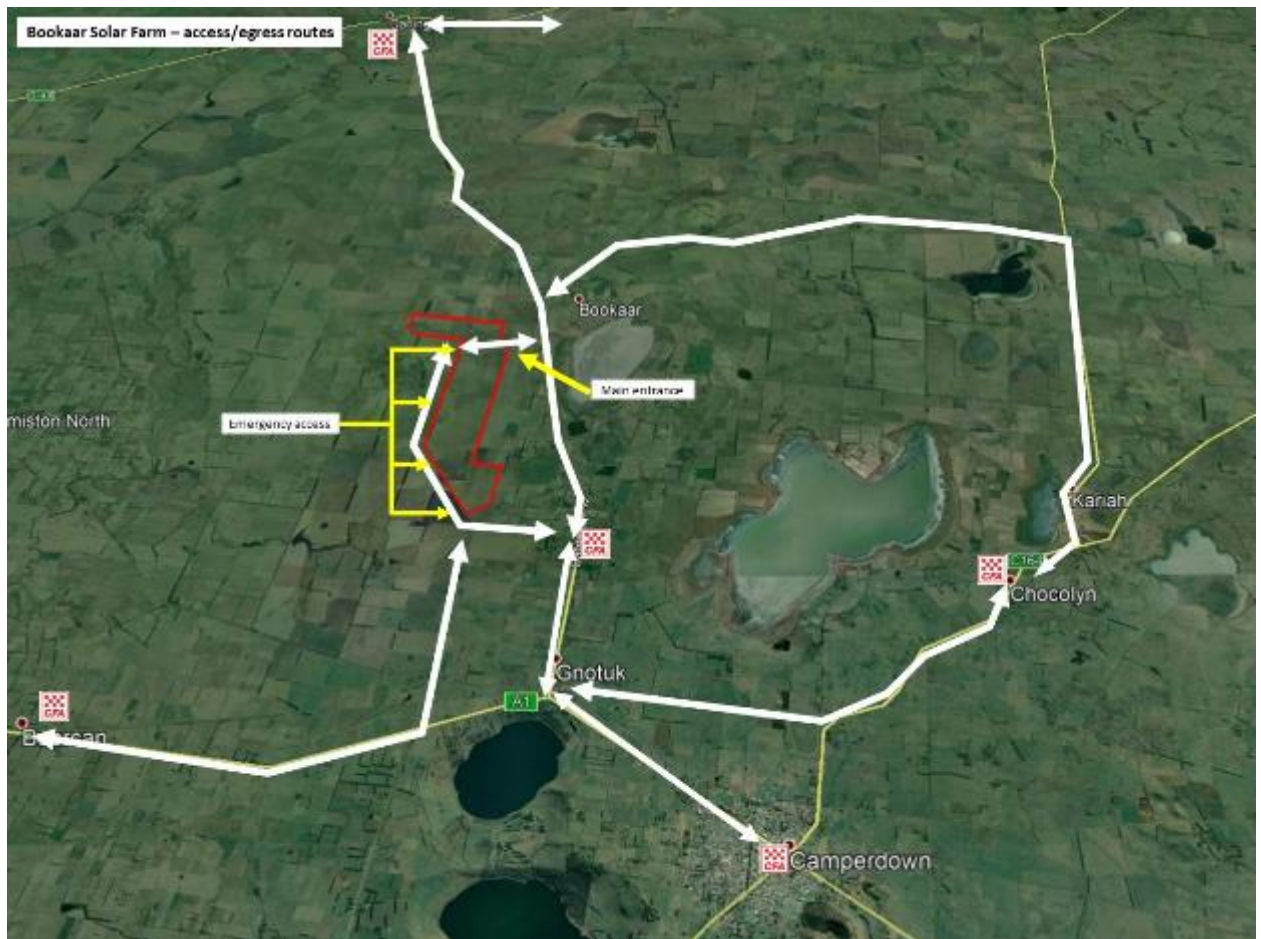


Figure 12 - Proposed access and egress routes from and to the Proposal (see Figure 1 for detail of access and egress points and the layout of the internal track network)

6.6.5 Firefighting water supply

The availability of water is critical to enable fires to be suppressed. Static water supplies that reduce the time taken for firefighters to travel to and from a fire is the best solution and enables efficient fire suppression.

There is an existing dam on the Site that will be filled in during the construction phase. In the area immediately surrounding the Site, there is no other water supply available for fire trucks to access. There are larger water bodies surrounding the Site that may be suitable for firefighting aircraft to draw water from.

As there is no suitable firefighting water supply on Site, static water supplies will be provided. This is outlined in Section 9.

7 Fires in solar farms research

A part of the assessment process, a review of literature relating to fires within Photovoltaic (PV) solar farms has been undertaken. The review has considered the following topics:

- Examples of fires in solar farms.
- The flammability of major components.
- Ignition risks during construction and decommissioning.
- Risk to firefighters.
- The risk of fire spread within a solar farm.

It should be noted that there is limited information regarding fires in solar farms, and even less information relating to incidents within solar farms in Australia. A comprehensive literature review by BRE (2017)¹² suggested that the reasons for this could be two-fold: firstly, the number of overall incidents *is* low; and secondly, there could be a number of unreported incidents.

This implies that any such unreported incidents are likely to have been controlled effectively, without resulting in significant damage to buildings, or harm to people. As media and social interest in this issue is high, it is considered that, in Australia, major incidents would result in the reporting of such events.

Where appropriate, media sources of fire events have been used along with information relating to the fire risk of Photovoltaic (PV) solar systems in general, to aid an understanding of fire risk within solar farms.

Note, information on Concentrated Solar Power (CSP), which generates electricity by using mirrors or lenses to concentrate a large area of sunlight onto a receivers and is fundamentally different to PV Solar, has not been considered.

7.1 Examples of fires in PV solar power

A small number of fires involving PV solar farms has been identified through the literature review. BRE (2017)¹³ identified five examples of incidents not deemed to be serious in a UK based review, and (relevant to this assessment), three more recent examples (a fire in Queensland solar farm¹⁴ and two in California^{15,16}) have been identified and are discussed below¹⁷.

A key factor in the Queensland and Californian fires is that the fires were able to spread across the ground surface, and required firefighters to extinguish the fire. This indicates that there was sufficient vegetation remaining on the ground to support fire spread. The fire at Brigalow in Queensland, Australia and at Topaz Solar Farm in California, USA are examples of where this occurred. In the Brigalow fire in Queensland, it was reported that damage had occurred to the Solar Panels. This could be an indicator that the vegetation under the panels was not maintained and was sufficient to generate enough radiant heat to ignite plastics and cabling associated with the panels (see 7.2 below). While the article on the

¹² Building Research Establishment (BRE) National Solar Centre, 2017. *Fire and Solar PV System – Investigations and Evidence*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/630639/fire-solar-pv-systems-investigations-evidence.pdf. Accessed on 02 August 2020.

¹³ *Ibid.*

¹⁴ <https://reneweconomy.com.au/brigalow-solar-farm-caught-up-in-queensland-bush-fires-50604/>

¹⁵ <https://www.bloomberg.com/news/articles/2019-06-19/-avian-incident-knocks-out-84-of-massive-california-solar-farm>

¹⁶ <https://www.sanluisobispo.com/news/local/article39055539.html>

¹⁷ The examples provided do not necessarily constitute a full list, but were deemed to be most relevant to this assessment process.

Topaz Solar Farm fire stated that the solar panels didn't burn¹⁸. This is a strong indicator that whilst the vegetation under the panels was sufficient to support fire spread, it was not sufficient to generate enough radiant heat to damage the underside of the panels or other infrastructure.

7.1.1 Lessons learnt from Solar Farm fires

Despite the lack of case history in the public domain with regard to fires within solar farms, it can be determined that:

1. The instance of fires in photovoltaic (PV) solar farms is low overall.
2. A key issue is whether a fire has access to vegetation surrounding and underneath the panels. Vegetation that is left unmanaged could support fire spread along the underside of the solar panels.

Therefore, and with particular regard to the spread out and low lying nature of PV solar farms, it is clear that vegetation management is a key component in helping to reduce levels of fire risk within a solar farm site boundary. The treatment of vegetation in the context of the Proposal is discussed in Sections 8 and 9.

7.2 Combustibility of PV solar farm components

The majority of a solar farm by area is comprised of the arrays (the panels and their supporting tracking system, see Figure 1). The panels are considered to have a low level of combustibility¹⁹ due to their high volume of glass (approximately 76% by weight)²⁰. Indeed, as stated by the NC Clean Energy Technology Center:

...concern over solar fire hazards should be limited because only a small portion of materials in the panels are flammable, and those components cannot self-support a significant fire. Flammable components of PV panels include the thin layers of polymer encapsulates surrounding the PV cells, polymer backsheets (framed panels only), plastic junction boxes on rear of panel, and insulation on wiring. The rest of the panel is composed of non-flammable components, notably including one or two layers of protective glass that make up over three quarters of the panel's weight²¹.

Provided that there is a limited heat source under the panel (which can be achieved through vegetation management), their low combustibility means that fires at a solar farm are not likely to be supported by fuels associated with the Panels themselves.

Supporting the Solar Panels is the tracking system which is typically comprised of galvanized steel (NexTracker, 2020²²) and therefore has very low combustibility. The tracking system is in turn supported on galvanized steel piles which are driven into the ground.

¹⁸ <https://www.sanluisobispo.com/news/local/article39055539.html>.

¹⁹ TUV Rheinland Energie und Umwelt GmbH, 2015. Assessing fire risks in photovoltaic systems and developing safety concepts for risk minimization. Available at: https://www.energy.gov/sites/prod/files/2018/10/f56/PV%20Fire%20Safety%20Fire%20Guideline_Translation_V04%2020180614_FINAL.pdf. Accessed on 02 August 2020.

²⁰ IRENA, 2016. *End of Life Management. Solar Photovoltaic Panels*. Available at: https://www.irena.org/DocumentDownloads/Publications/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf. Accessed on 13 August 2020.

²¹ NC Clean Energy Technology Center, 2017. *Health and Safety Impacts of Solar Photovoltaics*, NC State University. Available at: https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2017/10/Health-and-Safety-Impacts-of-Solar-Photovoltaics-2017_white-paper-1.pdf. Accessed on 02 August 2020.

²² Nextracker, 2020. Gemini Data Sheet. Available at: https://cdn2.hubspot.net/hubfs/1856748/Datasheets%202020/nxt_nx_gemini_datasheet.pdf. Accessed on 13 August 2020.

Cables within the array area may be exposed to flame contact if a fire were to spread within the solar farm beneath the panels, again emphasising the importance of vegetation management. Due to this risk, it is recommended that the design should consider the following features:

- Cables should be installed underground where practical; and/or
- Above ground cables and circuitry should be installed as high as practicable.

The design of the Proposal includes DC wiring between panels that runs along the tracker at panel height. Wiring between individual trackers, from the trackers to the inverters, and from the inverters to the substation is designed to be installed underground. These measures significantly reduce fire risk associated with cabling.

It is noted that all electrical equipment must comply with relevant construction standards and design; installation of electrical equipment such as junction boxes, inverters, transformer and electrical cabling is to be in accordance with AS 3000:2007 'Wiring Rules'.

Other main components of the Proposal are the inverters, the substation and battery area, and the operations buildings.

The inverters, substation components, and battery units are critical electrical infrastructure that support the operation of a Solar Farm which must comply with the relevant Australian Standards. Design consideration should be given to worker and firefighter safety through sufficient access and egress and by ensuring that each component can be isolated both electrically and physically (considered in Section 8). To support the safety of Solar Farm Workers, all buildings will be constructed to comply with the National Construction Code. The Operation Buildings Area is discussed in more detail in Section 8.2.

7.3 Ignition sources during construction

Activities associated with construction that may cause or increase the risk of bushfire include²³:

- Smoking and careless disposal of cigarettes on Site.
- Hot works activities such as welding, soldering, grinding and use of a blow torch.
- Use of petrol-powered tools.
- Operating a petrol, LPG or diesel-powered motor vehicle over land containing combustible material.
- Operating plant fitted with power hydraulics on land containing combustible material.
- Electrical faults during testing and commissioning.
- Unsafe storage of chemicals or hazardous materials.

These risks should be mitigated appropriately through the implementation of management strategies during construction and are discussed in Section 9.

²³ See the web article 'Fire Safety on Construction Sites' which provides an overview of the types of activities that could cause fires on construction sites. Available at: <https://backtobasics.edu.au/2020/02/fire-safety-on-construction-sites/>. Accessed on 13 August 2020.

7.4 Ignition sources during operation

As PV solar farms are electrical in nature there is inherent fire risk from electrical faults. The majority of research identifies electrical faults as the key cause of fires involving Solar Panels^{24,25,26}. This could occur in solar farms through short circuits and arc faults caused by:

- Incorrect connecting of the inter module connectors.
- Corroded inter module connectors caused from incorrect storage of modules on Site.
- Electrical connections on isolators / DC combiners.
- Miss match of inter module connectors causing insufficient electrical connections.

The issues listed above can be the result of incorrect installation and should be diagnosed during the DC testing phases of the installation, or during ongoing operational maintenance and testing.

It is conceivable that arc faults could melt components in wiring within or adjacent to the panels, and if conditions were suitable, ignite grass fuels under or surrounding installations. As noted, this is unlikely if active vegetation management is in place.

The use of remote sensing systems through the Scada system would reduce this risk further and enable a quick response to fire ignitions, with the intention of preventing the instance of fire ignitions leading to an uncontrolled fire. Whilst these systems are not specifically for the purpose of detecting fires, they do detect rises in temperature and automatically notify the appropriate personnel.

7.4.1 Risks to firefighters

Specific risks to firefighters from a fire in a solar farm involve:

- Inhalation of potentially toxic fumes and smoke from burning plastic components, such as cables and polymers within the panel²⁷.
- Electrocutation - solar panels would be energised under any natural or artificial light conditions²⁸ (the risk of electrocutation can be exacerbated by the use of water in firefighting).

The burning of plastic components, such as cables and polymers within the panels will produce hazardous gasses and therefore may require breathing apparatus. However, as noted the volume of these materials within the panels is low (approximately 10% of the overall panel weight²⁹), and provided that vegetation is maintained effectively, a grass fire within the array area is unlikely to support a fire involving the panels themselves, which are raised above the ground.

Measurement of smoke gas concentrations from burning PV panels found that the thresholds for CO and CO₂ were significantly exceeded, whereas other products were not present in quantities that require attention³⁰. While CO and CO₂ are present in smoke generated from burning PV panels, this

²⁴ TUV Rheinland Energie and Umwelt GmbH, 2015. *Assessing fire risks in photovoltaic systems and developing safety concepts for risk minimization*. Available at: https://www.energy.gov/sites/prod/files/2018/10/f56/PV%20Fire%20Safety%20Fire%20Guideline_Translation_V04%2020180614_FINAL.pdf. Accessed on 02 August 2020.

²⁵ Allianz Risk Consulting. (2012). *Understanding the Fire Hazards of Photovoltaic Systems*. Allianz Global Corporate & Specialty.

²⁶ Sipe, J. (2016) *Development of Fire Mitigation Solutions for Photovoltaic (PV) Systems Installed on Building Roofs*, NFPA (2016).

²⁷ Allianz Risk Consulting. (2012). *Understanding the Fire Hazards of Photovoltaic Systems*. Allianz Global Corporate & Specialty.

²⁸ Backstrom, R., & Dini, D. (2011). *Firefighter safety and photovoltaic installations research project*. Underwriters Laboratories Inc.

²⁹ IRENA, 2016. *End of Life Management. Solar Photovoltaic Panels*. Available at: https://www.irena.org/DocumentDownloads/Publications/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf. Accessed on 13 August 2020.

³⁰ TUV Rheinland Energie and Umwelt GmbH, 2015. *Assessing fire risks in photovoltaic systems and developing safety concepts for risk minimization*.

would be unlikely to create issues for firefighters who will have the ability to approach the fire from multiple directions (see Figure 1), thereby avoiding the smoke plume. For people further away from the fire, the mixing effect enabled by the local wind conditions will likely reduce the concentration levels below what is considered safe levels.

In relation to the potential for electrocution, the general advice given to firefighters for large solar farms is to treat them the same as any other power generation facility³¹. For these types of facilities, first responders should create robust pre-plans in conjunction with Site management and not enter secured high voltage areas (inclusive of the array areas), without clear guidance from the power generation plant operators.

In summary, acknowledging that a fire within a solar facility may present unique risks for fire fighters, it is critical for the Site operators to work with the local Fire Service to ensure that local firefighters are aware of the risks at Solar Farms in general and of any particular site specific risks. During Site familiarisation activities, firefighters should be made aware of the importance of not accessing the Site until they can be escorted or until the risk has been fully assessed.

7.5 The risk of fire spreading

The spread of fire in or out of a solar farm directly relates to the fire behaviour factors: fuel, weather and topography on the site and on neighbouring properties. These factors are discussed in relation to the Site through Section 6, and then through the assessment at Section 8.

While topography and weather are consistent across a landscape, management of a solar farm provides an opportunity to reduce fuel on the Site and lower the intensity of a potential fire. Professor Blakers, director of ANU's center for sustainable energy systems noted that:

'Where the grass is managed in the solar farm, so that it had less grass than surrounding areas, but enough to avoid dust obscuring the sunlight, solar farms lowered the chance of fire spreading'³².

With reduced fuel, fires are less likely to ignite within the installation and, any fires that do ignite would burn more slowly, taking longer to reach lower maximum intensities. Therefore, increasing the opportunity for successful fire suppression through the provision of static water supplies, a well-designed internal track network, and ongoing vegetation management will reduce the potential for spread within the property or into neighbouring properties. The idea described above, that a well-managed solar farm may actually reduce fire risk at the site and in the surrounding area is consistent with the conclusions of the assessment of the Proposal (Section 8).

7.6 Summary

The occurrence of fires within Solar Farms is low. This is demonstrated in part by the lack of material discussing Solar Farm fires, and that potentially unreported incidents are likely to have had effectively managed outcomes if they were not reported.

The research outlines that there are a number of management actions that can be taken during the design, construction and operation of a solar farm to mitigate bushfire risk and fire risk generally. In the context of the Proposal, the key opportunity to limit the potential for fires to spread is through the management of ground fuels, in particular under the Solar Panels. Other management actions discussed

³¹ SFPE (2014). https://www.sfpe.org/page/2014_Q3_4/Harnessing-the-Sun-Solar-Power-and-Fire-Protection-Engineering.htm

³² <https://www.canberratimes.com.au/story/6152076/solar-farms-will-cut-bushfire-risk/>

in the following sections compliment this action, and result in an overall reduction in the level of fuel at the Site.

Firefighting strategies should include the importance of engaging with the on-site staff prior to undertaking any suppression efforts to ensure the system is isolated, and the risk of electrocution is clearly understood. It is the authors experience that this is consistent with how fire agencies manage other power generation Sites regardless of the size. Site management should support the development of Pre Plans when requested.

The research has identified that Solar Farms, when appropriately managed, can be considered low risk. In the event of a fire, there are numerous risks and challenges expected, however, with appropriate mitigation actions (discussed in Section 9), this risk can be effectively managed.

8 Bushfire risk assessment

This Section provides a bushfire risk assessment for the Proposal against relevant policy, guidelines and other information. The outcomes of these assessments are utilised to develop mitigation recommendations for the design, construction and operational phases of the Proposal. These are outlined in Section 9.

8.1 Bushfire Risk Assessment Matrix

The following bushfire risk assessment considers the potential impact of the Proposal on the workers based at the Site, neighbors and farm workers in the surrounding areas.

RISK TO	Cause	Likelihood	Justification	Consequence	Justification	Risk Rating	Strategy to Lower Risk
LIFE							
Bookaar Solar Farm onsite staff & contractors.	Loss of life /injury due to entrapment in the Solar Farm in a major fire event	Possible	<p>Fire behaviour could be unpredictable due to the varying fuel quantities and the influence of natural features. Direct attack firefighting may be difficult due to the electrical hazards and may entrap fire-fighters.</p> <p>An internal track network at some locations may lead to confusion.</p> <p>In the event of smoky conditions in the Solar Farm, people's sense of direction could be affected.</p> <p>The level of training may be insufficient for Solar Farm staff and contractors to undertake firefighting duties.</p>	Major	While entrapment may only be possible, if it does occur there is potential for loss of life.	HIGH	<p>Reduce vegetation fuel loads across the Site during the fire danger period.</p> <p>Solar Farm staff complete bushfire behaviour and suppression training including dealing with electrical hazards.</p> <p>A Site induction outlining fire related risks and providing an overview of the emergency management plan to visitors and contractors.</p> <p>Provide detailed maps to people who are not familiar with the Site.</p> <p>All internal tracks to be maintained in a condition to support the movement of people and vehicles around the Site, including adequate signage.</p> <p>Local CFA Brigades to be invited to undertake an annual inspection to become familiar with access and egress to the Site.</p> <p>Solar Farm management to include within the Site emergency management plan details on when the Solar Farm will be closed to non-essential personnel. Consideration to be given to downsizing the number of personnel on Code Red days.</p> <p>During the Fire Danger Period, all employees and contractors have firefighting equipment (9 litre water fire extinguisher or knapsack) installed within their vehicles along with communications devices.</p> <p>Fire extinguishers to be provided to the office and other work areas.</p> <p>Provide sufficient water supply strategically across the Site for the purposes of supporting any firefighting requirements.</p>

RISK TO	Cause	Likelihood	Justification	Consequence	Justification	Risk Rating	Strategy to Lower Risk
LIFE							
Neighbours: Surrounding the Solar Farm primarily located on adjoining farms.	Loss of life/injury due to smoke or fire escaping the Solar Farm	Possible	There is a risk that a bushfire may start in the Solar Farm and spread into adjoining land and threaten surrounding homes. Due to the age of some adjoining properties, they are unlikely to achieve any level of bushfire safety construction.	Major	Fatalities possible under elevated Fire Danger Indices if residents leave too late or if properties are unprepared.	HIGH	Reduce vegetation fuel loads across the Site during the fire danger period. Solar Farm management to engage with CFA to encourage residents to prepare Bushfire Survival Plans as per CFA standard practice and prepare themselves for bushfire. Solar Farm management share information with adjoining landowners to help ensure they are aware of pre-summer fire prevention and preparedness activities. The track layout for the Solar Farm should be designed to limit bushfire spread and support suppression activities. A perimeter road should provide separation between the Solar Farm activities and the adjoining land. On-Site risk reduction strategies including no smoking, limitations on hot works during elevated fire danger days and other measures to reduce the potential for a fire to start on the property.

This bushfire risk assessment has resulted in a high risk rating for the onsite staff, contractors and neighbours. The bushfire risk assessment has identified the importance and requirement to implement strategies to mitigate or lower the risk. These strategies are discussed in full in Section 9 of this report.

8.2 Clause 13.02 assessment

The assessment against Clause 13.02-1S of the Corangamite Planning Scheme requires the analysis of the bushfire risk across the landscape, the development of bushfire scenarios, and to then address the strategies outlined within the Policy.

8.2.1 Bushfire hazard identification and assessment

Clause 13.02 suggests the assessment of landscape risk be undertaken at multiple levels. For the purpose of this assessment, both 1 km and 20 km landscape assessments have been completed.

Both assessments (illustrated in Figures 12 and 13) have identified the traditional bushfire risks that would be present in the western districts of Victoria. As described previously, the influence of the north westerly winds followed by the south westerly wind change often influences major fires in this area. This can be seen clearly in Figure 10 where the major fires within south west Victoria have been as a result of an initial north westerly followed by the south westerly wind change.

The assessment considered the type of vegetation, topography and any other landscape features that may affect fire behavior.

1 kilometre landscape assessment

Figure 13 illustrates potential fire scenarios for the area within 1 km of the Site. Because grass is the predominant vegetation in this area, fast running grass fires would be the most likely bushfire type that would impact on the Proposal. Because of the wind patterns typical of high fire danger days, the primary threat would be from the north west (prior to the wind change) or south west (following the wind change).

At the 1 km level, the potential for a fire to impact on the Site from the east, starting along Camperdown Darlington Road or nearby and traveling towards the Solar Farm, is also present. Grassfires tend to not be as damaging under an easterly influence as this usually coincides with high levels of humidity and cooler temperatures.

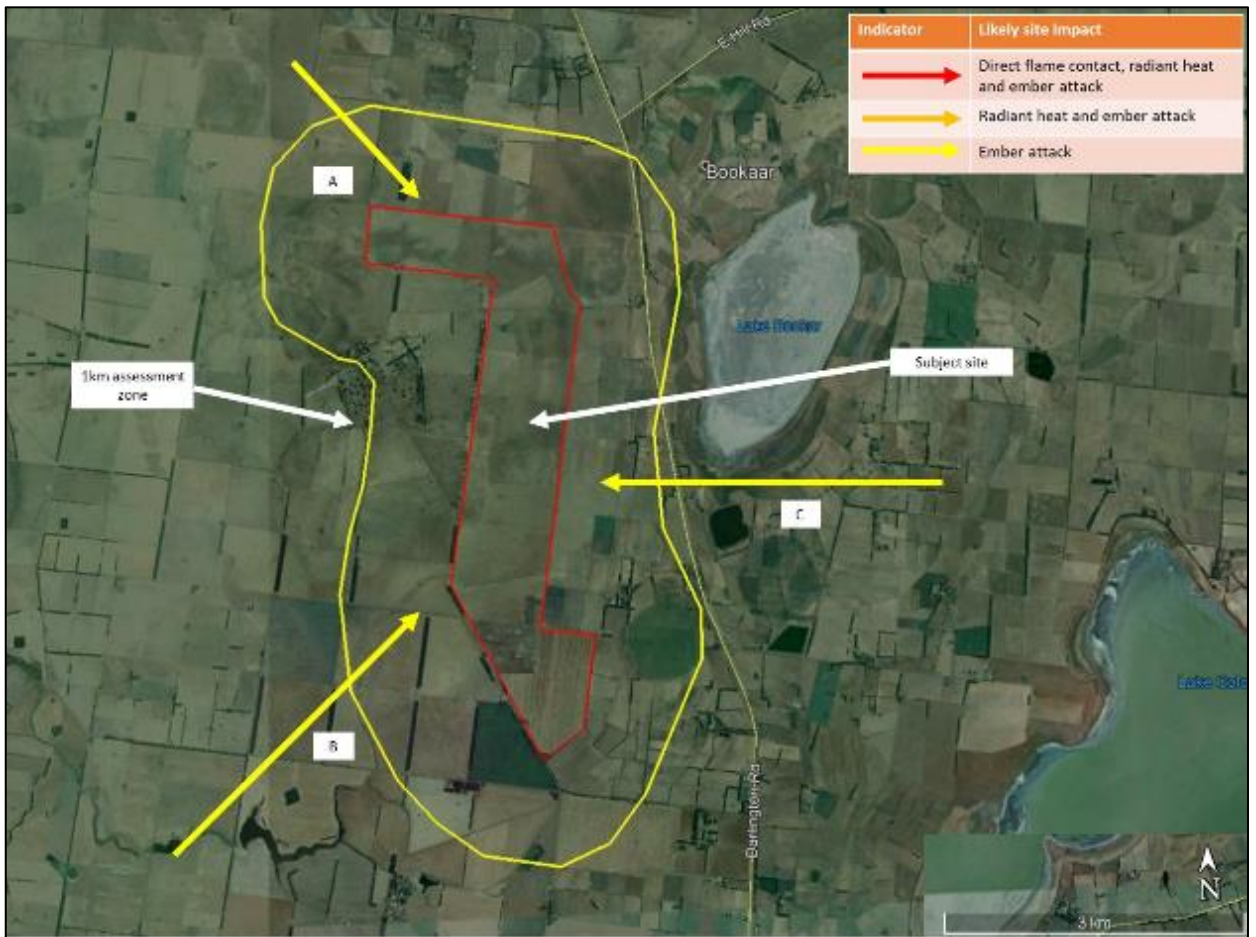


Figure 13 – 1 kilometre landscape assessment

Using aerial imagery provided from the drone survey to confirm the landscape to the north and north west of the Site, figure 14 shows the typical vegetation that will affect bushfire behavior within 1km of the Site. This supports the landscape assessment that confirms that the likely bushfire attack is from embers. In addition to this, due to the flat nature of the landscape, grassfires will be influenced by vegetation changes with limited influence by slope or aspect.

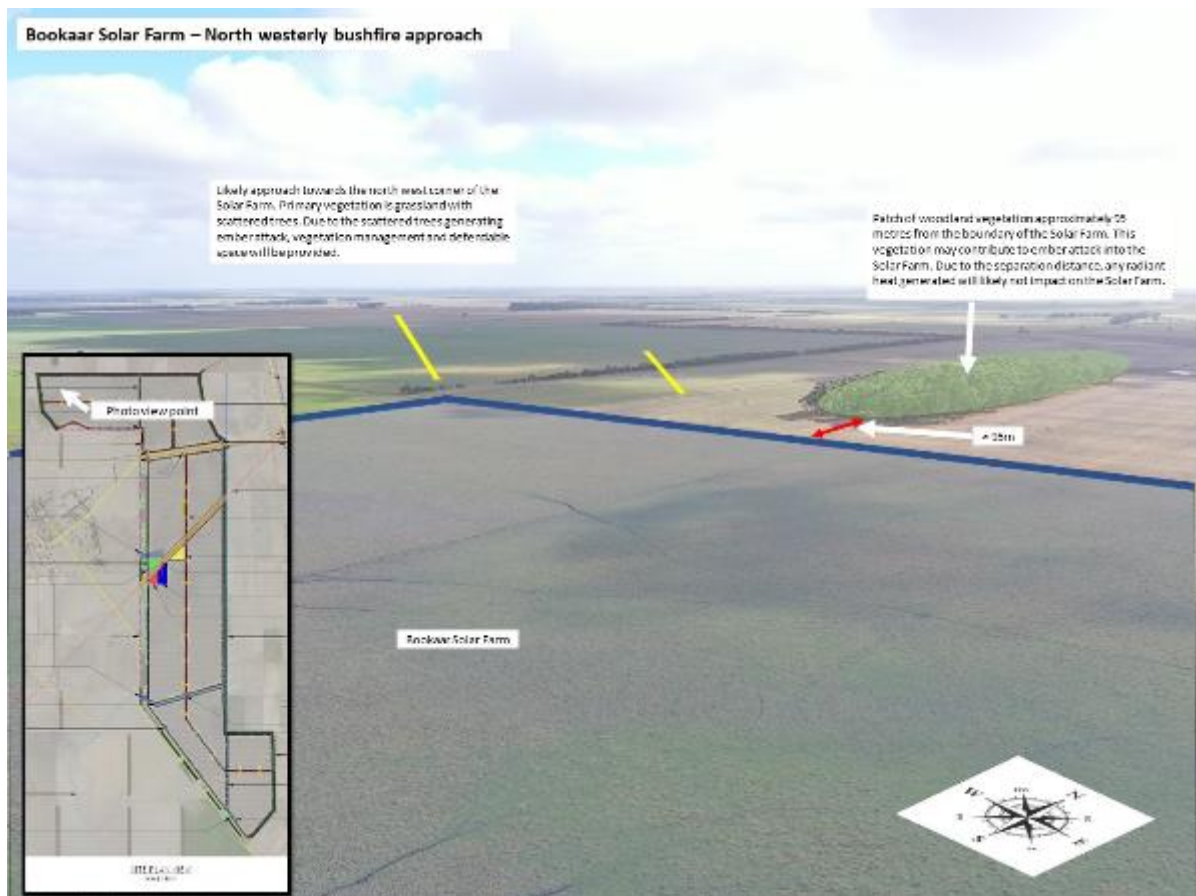


Figure 14 - north westerly approach

Due to the numerous variables including wind strength, fuel loads and other factors it is difficult to predict a timeframe for the (within 1km) bushfire to impact on the Solar Farm. Therefore, in times of high fire danger, there is a requirement for staff to monitor the surrounding landscape for fires to ensure they can respond quickly, as noted in the Preliminary Bushfire Response Plan.

20 kilometre landscape assessment

Figure 14 illustrates potential fire scenarios for the area up to 20 km from the Site. It is most likely that a bushfire threatening the Site will come from either the north west or south west.

When burning under a strong north westerly influence in this region, a fire tends to burn in a very narrow front but spreads rapidly. When the south westerly change occurs, the eastern flank will become a wide fire front and travel to the north east, and can become very difficult to control. Fire conditions can also become very erratic before, during and after the wind change.

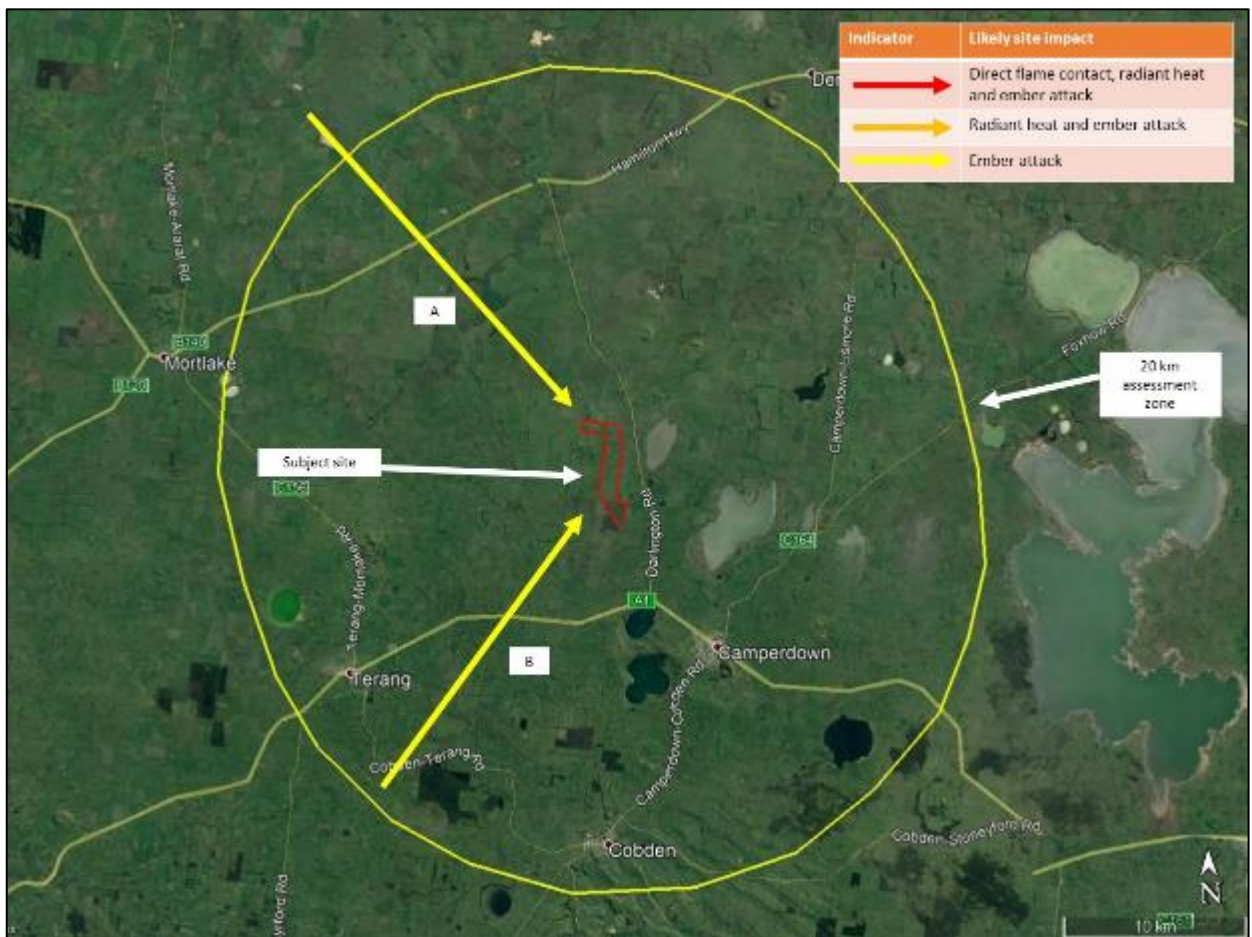


Figure 15 - 20-kilometre landscape assessment

Variability of fire behaviour

Fire behaviour can be highly variable depending on a range of factors. These include temperature, wind direction and strength, vegetation type and topography. As wind strength and direction can change rapidly, the ability to predict bushfire behaviour is often difficult.

During periods of extreme fire conditions, it is expected that bushfires could travel through the surrounding landscape rapidly. Consequently, the Solar Farm design process has considered this potential risk and introduced mitigation strategies into the design, construction and ongoing operation of the Proposal. These are discussed in more detail below and in Section 9, which provides a comprehensive list of mitigation developed for the Proposal.

Landscape assessment outcome

The area surrounding the Site is dominated by grasslands, which can support fast running bushfires but not usually of a high intensity when compared to forested environments. The advantage of grasslands is that vegetation continuity can be interrupted through the installation of fuel reduced areas including roads and managed zones.

The assessment is also consistent with the Otway District Strategic Fire Management Plan and the Strategic Bushfire Management Plan – Barwon Otway Region (outlined in sections 5.2.1 and 5.2.1) in that the area is a lower risk for bushfires when compared to other parts of the Barwon Otway Region.

The development of an effectively managed Solar Farm in this type of landscape will likely reduce the risk to the surrounding areas through active management of grassland on the Site. The Proposal, being a managed area of 588 ha, will effectively provide a firebreak within the landscape that is large enough to positively influence (i.e. reduce) bushfire behaviour.

Bushfire hazard assessment

Using the outcomes of the landscape assessment, the following table outlines different fire scenarios and identifies mitigation considerations to offset these scenarios. As noted, mitigation strategies for each stage of the Proposal, are discussed in full in Section 9.

Bushfire hazard type	Description	Likely scenario/s	Mitigation Considerations
Landscape conditions - Bushfire originating within 20km of the Site	The landscape hazard up to 20 kilometres from the Site identifies the presence of grass land associated with farming activities. This land is a mix of cropping and other farming activities.	<p>Roadways, operating machinery at farms and small communities can all be considered areas where fires can start.</p> <p>The likely scenario is a bushfire that starts to the north west of the Site and impacts on the Site from the north west or south west. The bushfire will spread rapidly through the grassland.</p> <p>At lower fire danger conditions, roads and other cleared areas will likely slow the fires spread. These areas are less likely to slow the fire at higher fire danger levels.</p> <p>Due to the presence of trees on road sides and in adjoining farmland, embers may be generated which could start spot fires within the Proposal.</p>	<p>Perimeter tracks within an APZ will reduce the potential for a bushfire to enter or exit the Site to be established and maintained throughout the Proposal's lifetime.</p> <p>A Bushfire Response Plan to be developed and implemented to guide the actions taken by Solar Farm staff and how they interact with emergency service agencies.</p> <p>Provision of firefighting water supply at strategic locations within the Site that enables both onsite firefighting capability and external firefighting resources to access static water.</p> <p>Onsite vegetation management to reduce the potential for embers to start spot fires within the Proposal.</p>

Bushfire hazard type	Description	Likely scenario/s	Mitigation Considerations
Local conditions - Bushfire originating within 1km of the Site	<p>Within one kilometre of the Site the dominant vegetation is grassland. There are patches of shelterbelts and wind breaks of varying sizes along the western boundary of the Site and on adjoining properties.</p> <p>There is a main road to the east of the Site. Operating machinery is likely to be present in the local area.</p> <p>There is evidence that roadside vegetation in the local area is managed.</p>	<p>A bushfire starting within close proximity is likely to impact on the Solar Farm with a very narrow fire front if still burning under a north westerly influence.</p> <p>A bushfire that is burning to the west of the Site and is influenced by a south westerly change could impact on the Site in multiple areas.</p> <p>Due to the presence of trees on road sides and in adjoining farmland, these could generate embers if the ground fuel around them is not maintained.</p> <p>Fires starting along roadsides adjoining the property may also support fire spread into the Solar Farm, in particular this could occur along the Darlington Road. As this is located to the east of the property the fire may not reach the Site and is likely to be a low intensity bushfire.</p>	<p>Perimeter tracks within an APZ will reduce the potential for a bushfire to enter or exit the Site to be established and maintained throughout the Proposal's lifetime.</p> <p>On days of elevated fire danger, ensure staff are aware of the importance of early notification to emergency services of a bushfire in the local area.</p> <p>Reduce high risk activities on days where the bushfire risk is elevated.</p> <p>In this scenario, evacuation may no longer be an option for those who are located at the Proposal. The design should incorporate a cleared area that can be considered a 'safer location'.</p> <p>Bushfire response plan to be developed and implemented to guide the actions taken by Solar Farm staff and how they interact with emergency service agencies.</p> <p>Due to the potential rapid approach of the bushfire, a dedicated firefighting water supply along with the ability for trained staff to extinguish small fires should be provided.</p>

Bushfire hazard type	Description	Likely scenario/s	Mitigation Considerations
Neighbourhood conditions – bushfires originating within 400 metres of the Site	Within close proximity to the Site, roadside vegetation exists which is primarily grassland with areas of trees.	<p>The most likely scenario is a fire starting as a result of faulty machinery on adjoining property.</p> <p>Fires starting along roadsides adjoining the property may also support fire spread into the Solar Farm, in particular this could occur along the Meningoort and Blind Creek Roads. As this is located to the east of the property the fire may not reach the Site and is likely to be a low intensity bushfire.</p> <p>The most likely scenario is a fire starting as a result of faulty machinery on adjoining property.</p>	<p>Perimeter tracks within an APZ will reduce the potential for a bushfire to enter or exit the Site to be established and maintained throughout the Proposal’s lifetime.</p> <p>On days of elevated fire danger, ensure staff are aware of the importance of early notification to emergency services of a bushfire in the local area.</p> <p>In this scenario, evacuation may no longer be an option for those who are located at the Proposal. The design should incorporate a cleared area that can be considered a ‘safer location’. This area will be clearly marked on the Site plan, include appropriate signage and protocols on the use and maintenance of the area outlined within the Bushfire Response Plan.</p> <p>Due to the rapid approach of the bushfire, a dedicated firefighting water supply along with the ability for trained staff to extinguish small fires should be provided.</p>

Bushfire hazard type	Description	Likely scenario/s	Mitigation Considerations
The Site of the Proposal	<p>The Site is currently grassland and utilised for farming activities. If construction occurs during the Fire Danger Period, consideration will need to be given to managing vegetation.</p> <p>Ongoing, vegetation will be present under the Solar Panels and along roadsides including a Vegetation Screen.</p>	<p>During the construction phase, fires could start and spread if the vegetation is not managed during this period.</p> <p>The presence of vehicles on the Site during construction and operation may cause an ignition in vegetation.</p> <p>Post construction, fires could travel through vegetation that has accumulated under the Solar Panels or along roadsides.</p> <p>Due to the electrically charged equipment on the site, the potential for ignitions is increased as discussed in Section 7.2.</p>	<p>Ensure that for construction that occurs during the fire danger period, vegetation management is a priority activity. Implement a hot works system and consider limiting other high-risk activities including smoking.</p> <p>During the construction phase and prior to the installation of the permanent water tanks ensure firefighting water is made available during the fire danger period.</p> <p>On days of elevated fire danger, ensure staff are aware of the importance of early notification to emergency services of a bushfire in the local area.</p> <p>Internal track network to be established to allow for the movement of firefighting resources. Internal track network to act as internal fire breaks in conjunction with APZs, as well as creating multiple compartments within the solar farm.</p> <p>Due to the rapid approach of the bushfire, a dedicated firefighting water supply along with the ability for trained staff to extinguish small fires should be provided.</p> <p>Ensure that vegetation screens are planted in accordance with risk reduction principles (outlined in Appendix D). Adhering to these principles will ensure the Vegetation Screens do not contribute to the overall bushfire risk through the ability for bushfires to get into the tree canopy and generate embers.</p> <p>Management of the vegetation (< 100mm) under the panels and in other cleared areas during the fire danger period. In particular, do not allow vegetation accumulation (> 100mm) to occur at the base of the solar panel support structures.</p> <p>All electrical infrastructure should meet relevant Australian standards, be installed correctly, and tested for faults through commissioning and as part of regular maintenance.</p>

The bushfire hazard assessment has outlined the likely scenarios in relation to the proposed Site, including the potential for bushfires to impact on the Site. The mitigation considerations have identified a range of options that will limit the impact of these bushfires on the Site and the surrounding area. The adoption of the mitigation considerations will ensure that there is no increase in bushfire risk following the development of the Site.

8.2.2 Clause 13.02-1S strategy response

The response to the Clause 13.02-1S strategies has been developed based on the assessments above and is provided in the following table:

	Strategy	Response
1	Prioritising the protection of human life over all other policy considerations.	<p>The Proposal is recognised as being within an existing bushfire risk area and therefore its design and proposed mitigation measures as a whole prioritise the protection of human life at all times: Specific examples include but are not limited to:</p> <ul style="list-style-type: none"> • The construction and maintenance of an asset protection zone around the entire Site. This will greatly reduce or eliminate the potential for a fire to spread from the Solar Farm into adjoining land. • The provision of a ‘shelter in place’ location that can be utilised by staff and visitors in an emergency. • Where possible, the use of technology solutions to support remote operation to reduce the number of employees onsite during ‘extreme’ and ‘code red’ fire risk days will be implemented. • The development of a Bushfire Response Plan (Appendix A) and Bushfire Mitigation Operational Schedule (Appendix B). Adherence to these plans throughout all stages of the Proposal’s lifecycle will ensure that ongoing fire risk over time continues to be reduced.
2	Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.	<p>It is acknowledged that the Proposal is being located in an existing bushfire risk area and additional mitigation measures are required to ensure life safety is not compromised. These measures include:</p> <ul style="list-style-type: none"> • Development of a Preliminary Bushfire Response Plan (Appendix A) that guides staff responses to elevated fire danger conditions including response procedures, mitigation obligations and emergency control organisation arrangements. • Construction and maintenance of a track network that provides multiple options to exit the development area during a bushfire. • Asset Protection Zones constructed and maintained around buildings and other infrastructure. • Implementation of a vegetation management program to maintain fuel loads across the entire Site. • Monitoring of the local area during elevated fire danger conditions to detect bushfires early. • A strong focus on eliminating high risk activities (e.g. hot works) during elevated fire danger conditions. • The creation of a ‘safer location’ that is within the Site and easily accessed.
3	Reducing the vulnerability of	The Proposal design has considered the risk to the community and will be implementing a range ongoing mitigation treatments to manage this risk.

<p>communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning process.</p>	<p>The key focus is to reduce the potential for the Proposal to increase the bushfire risk through:</p> <ul style="list-style-type: none"> • Installing and maintaining asset protection zones around the entire Site (including a perimeter road), and around key infrastructure within the Site. • Managing vegetation throughout the array area during the Fire Danger Period to limit the ability for fires to start and spread. • Restriction on high risk operations during elevated fire danger conditions including hot works permit system, management of smoking and limitations on the use of grinders and welders. Limiting smoking and other naked flame activities within the Site.
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Within Clause 13.02-1S, Settlement Planning objectives are outlined and how the development proposes to meet these is outlined in the following table.

Settlement Planning Objective	Project response	Achieved
<p>Directing population growth and development to low risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009)</p>	<p>With the provision of the perimeter road, and the management of fuel within the Solar Farm, when assessed against AS 3959 using vegetation type of grassland and slope as flat land, the separation distance between the surrounding grassland vegetation, and the Solar Farm infrastructure is required to be 19 metres. The Solar Farm infrastructure is set back at least 20 metres from the perimeter fence. In a number of locations, the separation distance far exceeds the 19 metre requirement.</p> <p>It is acknowledged that a Vegetation Screen is being established along much of the perimeter of the Site. However, providing this area is actively managed in accordance with the principles outlined in Appendix D, the additional risk to the Site as a result of the screen is low.</p>	<p>✓</p>
<p>Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.</p>	<p>The Proposal is providing access roads and asset protection zones across the entire Site. These access roads connect to public roads and provide multiple opportunities to access and egress the Site. This will provide workers with the ability to travel safely to locations that would achieve a BAL-LOW rating on the Site. With the predominant vegetation type on the adjoining land as grassland, the distance required to a BAL Low location is 50 metres. The vegetation type of grassland on adjoining properties and the managed vegetation on the Site means that there are numerous areas that could be classified as BAL-LOW. However, a 'safer location', has been incorporated into the design of the Proposal. The safer location is at the Operations Buildings area which is provided with a 20 metre asset protection zone, in addition to other mitigation treatments including roads, other infrastructure and vegetation management on the entire Site.</p>	<p>✓</p>

<p>Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.</p>	<p>With the implementation of the bushfire mitigation recommendations into the Solar Farm design, the bushfire risk will not increase. The design of the Solar Farm is strongly focused on preventing fires from entering the Site and limiting the spread of fire from the Proposal. The main mitigation treatments that work together to achieve this are:</p> <ul style="list-style-type: none"> • Perimeter track within a firebreak/APZ. • Managed vegetation. • Compartmentalisation of the solar farm through an extensive internal track network. • APZs surrounding all key infrastructure. 	<p>✓</p>
<p>Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reducing bushfire risk overall.</p>	<p>The Solar Farm will reduce the potential for a bushfire to spread across the landscape due to the reduced vegetation compared to current Site conditions. A number of bushfire protection measures will be implemented including:</p> <ul style="list-style-type: none"> • Vegetation management. • Internal road network including a perimeter road. • Restriction on high risk operations during elevated fire danger conditions including hot works permit system, management of smoking and limitations on the use of grinders and welders. 	<p>✓</p>
<p>Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and Site scale, including the potential for neighbourhood-scale destruction.</p>	<p>Based on the detailed assessment contained in Section 8.2.1, along with the mitigation recommendations developed to reduce the identified risk (see Section 9), this Proposal does not increase the hazard compared to the current situation. The development of the Site will reduce the risk to the local area as the Site will now include an internal track network including a perimeter track, managed APZs and a large area of managed vegetation under and around the Solar Panels.</p>	<p>✓</p>
<p>Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.</p>	<p>As the Proposal does not increase risk across the landscape, identification of alternative low risk areas is not required.</p>	<p>✓</p>
<p>Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).</p>	<p>With the provision of APZs, buildings within the Substation area and the Operations Buildings Area, which are required to comply with AS3959, will not be exposed to radiant heat in excess of a BAL 12.5 rating under AS 3959.</p>	<p>✓</p>

This section details how the Proposal responds to the strategies and objectives of Clause 13.02-1S. The Policy is focused on the protection of life and ensuring that new developments do not increase bushfire risk both on site, and in the surrounding area. The outcome of the assessment outlines that the development of the Proposal can occur in this location and in this landscape. The development will likely

reduce the risk to the surrounding area through the creation of a large area (588 ha) where existing grassland vegetation will be managed during the Fire Danger Period to less than 100mm reducing the ability of a fire to spread into, or out of, the Site.

8.3 CFA Guideline

The CFA Guideline for renewable energy installations provides guidance for a range of infrastructure including Solar Farms. The CFA Guideline indicates a level of risk that is present depending on the type of installation and suggests minimum standards that a solar farm development should consider along with suggestions for undertaking the design response to Bushfire Risk, including CFA consultation. As noted in Section 4.2.5, the CFA has been consulted as part of the design and assessment process, with consideration of CFA comments incorporated into the design. Appendix C provides a detailed analysis demonstrating that the Proposal is compliant with the CFA standards noted in the CFA Guideline.

8.4 VCAT Decision

The design process of the new Proposal has accounted for the points raised in the VCAT decision on Bushfire Risk. First and foremost, the Proposal has been designed in response to a comprehensive bushfire assessment, demonstrating that the Site is appropriate for the development of a Solar Farm from a bushfire risk perspective.

In paragraph 244 of the VCAT decision, the Tribunal notes that *'the CFA expects a Fire Management Plan to be part of the Emergency Management Plan'*. The Preliminary Bushfire Response Plan has been developed to fulfil this requirement, and will support the Emergency Management Plan for the Proposal. Other issues relating to bushfire risk noted in the VCAT decision are addressed in Appendix F.

8.5 Summary

The bushfire risk assessment concludes that, while unlikely, the Proposal Site could potentially be threatened by fire (as a result of actions by staff, visitors and residents on the property), deliberate ignition (arson) or lightning.

A fire on the property and in the surrounding landscape will be fueled predominantly by grassland vegetation. The mainly flat topography will have minimal influence on bushfire behaviour in the surrounding landscape. The existing shelterbelts along with the proposed Vegetation Screens do not increase the overall bushfire risk, providing these areas are maintained in accordance with the design principles provided in Appendix D.

Grassland fuels are very responsive to any changes in weather factors particularly wind speed and direction changes. The greatest risk scenario relates to a day of high fire danger, where north west winds and a south west wind change are forecast. On these days a fire that starts on land surrounding the Site will quickly reach high intensity and be difficult to suppress. A fire that starts on the Site will be restricted in spreading due to the low fuel loads.

Where a fire ignites outside of the property, the continuous grasslands surrounding the property and wider area may cause the fire to approach the Site as a large grassfire.

The introduction of the Proposal into the landscape does not increase the bushfire risk that is currently present, providing appropriate mitigation measures are incorporated into the design, construction and operation. Mitigation solutions determined by the assessment are considered in detail in the following section.

9 Mitigation recommendations

Implementation of the following mitigation recommendations will ensure the risk from bushfire is managed to an acceptable level and that no increase in bushfire risk across the landscape is experienced throughout the Proposal's lifetime. Once implemented, the mitigation measures will significantly reduce the ability for a bushfire to ignite and spread into, through, or from the Site. The alteration of the current vegetation through the creation of managed grassland on the 588 ha Site will mean that the Site has the potential to reduce bushfire behaviour in the landscape.

9.1 Design Response

Following the detailed analysis, a design solution has been developed and adopted by the Proponent.

1. Perimeter fire break (Asset Protection Zone, 'APZ') of 10 metres around the entire Site. The APZ will be non-combustible.
2. A 20m wide gap will be managed between the Solar Panels and the Security fence around the entire Site. The Perimeter firebreak (Asset Protection Zone) will be within this space, with the Vegetation Screens on the outside of a security fence.
3. Site track network, consisting of a perimeter and internal tracks, 4 m wide all-weather construction, and capable of supporting emergency and or firefighting vehicle movement around the Site. All internal tracks will be within 10m wide APZs. There will be overtaking lanes at least every 600 metres. The internal road network has been designed with a central spine with regular side roads connecting to the perimeter road. This design ensures that there are multiple ways to each part of the Site, and that the Site is partitioned into multiple sections.
4. Provision of eight access points surrounding the Site to provide for emergency vehicle access. These locations have been identified to align with the existing public road network whilst enabling effective access to all parts of the Solar Farm. Whilst the access locations are influenced by adjoining land and access to public roads, they have been spaced to ensure that multiple access points at various locations are available. All of the access points connect to the internal track network and provide multiple options to traverse the Site.
5. Asset Protection Zone of 20 metres surrounding the operational buildings.
6. Asset Protection Zones of 10m wide around the substation and battery storage area.
7. Provision of a 7m minimum APZ surrounding inverter stations.
8. Provision of a 'safer location' as an area to be utilised in the event of a bushfire threatening the Site. The safer area is the main Operations Buildings area. An emergency access point has been located next to this area, and the internal road network from this location provides several routes to the main access points. The area is approximately .96 ha and provided with a 20 metre APZ around its entire perimeter. The protocols for the use of the 'safer location' is outlined within the BRP.
9. Provision of eight firefighting water supply tanks, each with 100,000 litres of water. The water tanks are located adjacent to Site access points that can be readily utilised during an Emergency and have been designed to comply with CFA requirements for access and signage. To determine the amount of water required for firefighting purposes, it has been assumed that two CFA Strike Teams (10 firefighting appliances with 3,000 litres water capacity each) were present at the same time undertaking firefighting activities for the duration of the peak fire danger period (approximately 6 – 8 hours). This water supply is also available for onsite workers to utilise for firefighting purposes.

10. Provision of emergency information containers at each entrance to the Site for use by firefighters.
11. Solar arrays have been designed at spacing greater than 6m wide, allowing access within rows if required, and in accordance with the CFA Guidance. Row spacing will also allow for ease of vegetation maintenance as is discussed in the operational mitigation section below.
12. The battery facility has been positioned adjacent to an emergency access with routes to other parts of the Site so as to be directly accessible to emergency responders.
13. Vegetation Screens will be developed that conform to the principles in Appendix D to prevent the vegetation creating a bushfire risk. Where the Vegetation Screen is located near an existing Shelterbelt, a 5 metre canopy separation will be provided.
14. A Bushfire Response Plan that outlines the procedures to respond to bushfires either on or threatening the Site. This also includes the management of risk including hot works permits and limiting Site access on elevated fire danger days.
15. A Bushfire Mitigation Operational Schedule that outlines the ongoing works required to manage the bushfire risk on the Site including the management of grass to a maximum of 100 mm during the Fire Danger Period.
16. A Solar Farm management system (SCADA) provided that will detect various fluctuations and provide early notification of faults.
17. Installation of CCTV cameras surrounding the Site to monitor activity at the access points and surrounding area. These CCTV cameras will provide Site management the ability to actively monitor the Site and should a fire occur gather information on a fire to report to the emergency services if required.
18. 24/7 on call capability to respond to emergencies or faults.

The measures listed above have been incorporated into the Site Plan, and Figures 17 and 18 highlight the main design features relating to bushfire risk mitigation. The full design is provided in Figure 1 and a scaled version supports the Planning Application (the 'Site Plan').



Figure 16 - Overview of management of bushfire risk along the north west Site boundary

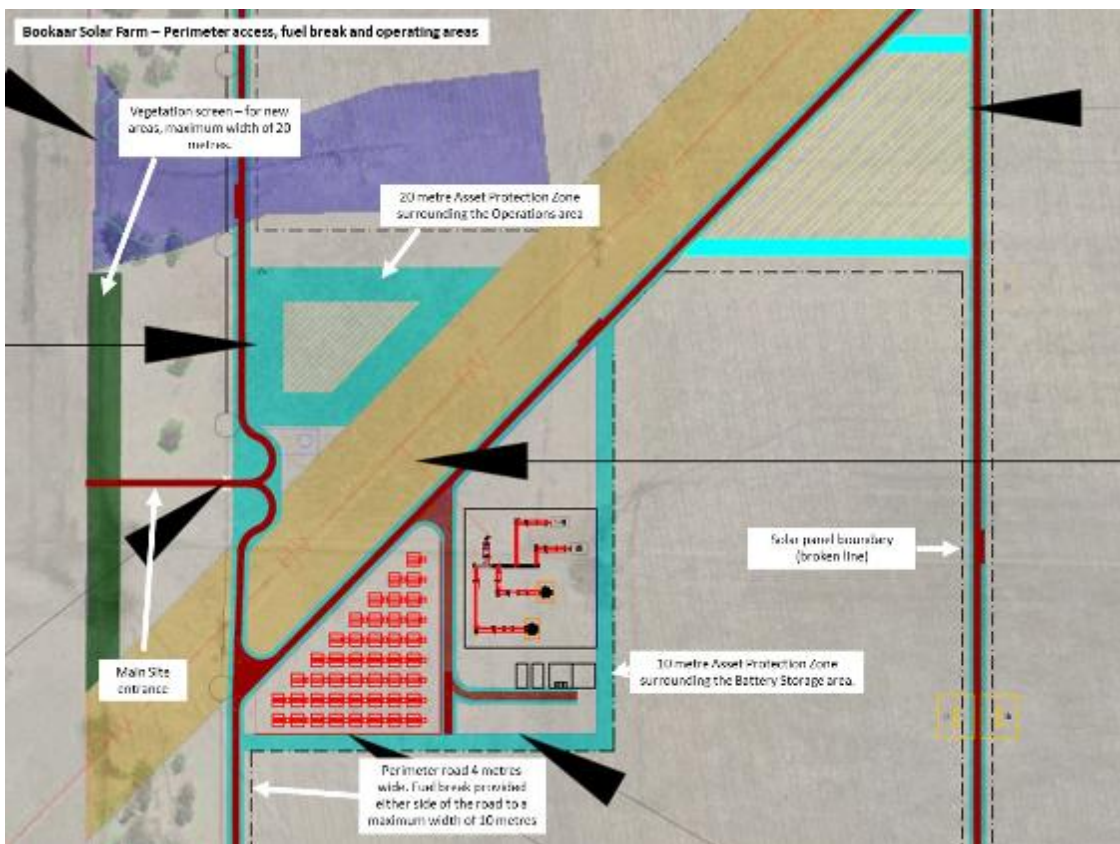


Figure 17 - Example of bushfire mitigation measures at the Substation and Operations Buildings location

9.2 Recommendations for the construction phase

Below are mitigation recommendations for the construction phase of the Proposal. These have been developed based on the Bushfire Risk Assessment, the assessment under clause 13.02, and the requirements of the CFA Renewable Energy Guidelines.

1. The Site's policies and procedures must ensure that all activities undertaken during the Fire Danger Period are appropriate under the Corangamite Shire bylaws and CFA legislation.
2. Ensure the maintenance of grassland within the solar farm area is kept at a nominal height of <100mm during the Fire Danger Period.
3. Ensure all staff, contractors and Site visitors undergo a site induction informing them of the Site layout, fire response procedures that follow identified legislative requirements, policies and procedures.
4. Ensure that all works undertaken during the fire danger season have appropriate permits.
5. Establish a primary contact person for the community to contact Bookaar Solar Farm with fire concerns, questions or issues.
6. At regular intervals, engage with the local CFA Fire Brigade and inform them of the status of the construction and provide an opportunity to undertake Site familiarisation visits as required.
7. Ensure all contractors:
 - a. Are appropriately briefed and understand their legal obligations in relation to managing bushfire risks.
 - b. Have appropriate procedures, safe work practices, contingency plans, and Material Safety Data Sheets (MSDS) for the operation of all equipment, chemicals, and flammable materials that may contribute to bushfires.
 - c. Have appropriate "initial" suppression equipment available on Site, this may include two 4WD vehicles fitted with 'Slip On' units that contain a water tank and firefighting pump. Additional equipment including fire extinguishers, hoses and branches to be provided.
8. Provide appropriate bushfire training for contractors and staff.
9. Ensure all building construction is in line with the relevant legislation including AS3959.
10. Ensure appropriate bunding in areas where there is potential for flammable fuels and oils to leak, including the battery area.
11. Consider appropriate signage to be placed throughout the Site to guide visitors and emergency services personnel during emergencies.
12. Install emergency information containers at all entry points that includes information required by CFA's Renewable Energy Guidelines.
13. Ensure onsite staff are familiar with and adhere to the Bushfire Response Plan. See Section 9.5 below.
14. Ensure on site staff are familiar with the Bushfire Mitigation Operation Schedule (BMOS). See section 9.4 below.
15. Establish emergency assembly areas as part of the Site's Bushfire Response Plan.
16. Carryout a commissioning programme for electrical equipment that includes checking for faults and incorrect installation.

9.3 Recommendations for the operational phase

Below are mitigation recommendations for the operational phase of the Proposal. These have been developed based on the Bushfire Risk Assessment, the assessment under clause 13.02, and the requirements of the CFA Renewable Energy Guidelines.

1. The Site's policies and procedures must ensure that all activities undertaken during the Fire Danger Period are appropriate under the Corangamite Shire bylaws and CFA legislation.
2. Implement fire detection systems, inbuilt fire protection systems, remote alarms and notification systems within the energy storage facility.
3. Implement remote shut down possibilities of solar farm operations during high bushfire risk days, actual bushfires or during times of electrical fault.
4. Undertake regular inspections and maintain records of all solar installations, substations, electrical infrastructure (including lines within easements).
5. Implement the Bushfire Mitigation Operational Schedule to ensure all annual fire danger season preparedness activities and prevention works are completed before the annual Fire Danger Period (see Section 9.4 below).
6. Ensure on site staff are familiar with and adhere to the Bushfire Response Plan (see Section 9.5 below).
7. On site firefighting capability consisting of two first attack vehicles. The first attack firefighting capability will see the installation of 'slip on' units onto the rear of two 4WD vehicles (utes) during the fire danger period, that will consist of a water tank and pump. Appropriate fire extinguishers, hoses and branches will be provided.
8. Fire extinguishers to be provided to the office and other work areas.
9. Ensure staff and contractors are trained to use the firefighting equipment and have appropriate personal protective clothing.
10. Ensure the maintenance of grassland within the solar farm area is kept at a nominal height of <100mm during the Fire Danger Period.
11. Ensure all access roads and tracks are maintained to meet CFA standards for emergency vehicle access, including adequate signage.
12. Ensure Vegetation screens on Site are managed with bushfire risk considered. Species selected and planted should not increase the fire risk and the maintenance of screening should adhere to the guidance found in Appendix D.
13. Maintain the eight firefighting water tanks during the operation of the solar farm and ensure they are capable of being filled within 24 hours post use.
14. Liaise with the local CFA Brigades and Groups to familiarise them with the Proposal's operations and infrastructure including an annual invitation to become familiar with access and egress of the Site. Ensure the CFA are aware of the contents of the emergency information containers and why this is important to review prior to accessing the Site.
15. Solar Farm management to engage with CFA to encourage residents to prepare Bushfire Survival Plans as per CFA standard practice and prepare themselves for bushfire.
16. Solar Farm management share information with adjoining landowners to help ensure they are aware of pre-summer fire prevention and preparedness activities.

9.4 Bushfire Mitigation Operational Schedule (BMOS)

The risk assessment identified that the ongoing management of bushfire risk is critical. The Bushfire Mitigation Operational Schedule (BMOS) is the plan that outlines the specific activities required to be completed before and during the annual Fire Danger Period. It would be expected for this plan to be incorporated into the Site's management plans. The introduction of a Solar Farm requires the ongoing management of risk and the BMOS provides the process to achieve this. The BMOS is provided in Appendix B.

The primary focus of the BMOS is the management of vegetation on the Site. The management of vegetation will limit the ability for a fire to enter or leave the Site, or escalate within it.

The BMOS also outlines the method of managing the Vegetation Screen that is proposed to be created along the boundary with other private land and in some locations along the roadside.

9.5 Bushfire Response Plan

The Bookaar Solar Farm Bushfire Response Plan (BRP) outlines the roles of staff and how to respond to a bushfire emergency at the Site. The BRP is a key component of the Emergency Management Plan once it is developed.

The aim of this plan is to document preparedness and response requirements for the Bookaar Solar Farm in order to minimise the impact of bushfires in, or threatening the area, so reducing the fire threat to life, property and the environment.

The BRP outlines the background, context and general management arrangements for responding to bushfire emergencies on Site, ranging from a single incident to more complex, major emergencies. It provides a general understanding of the resources and access challenges for responding to emergencies and details general arrangements that can be utilised to support existing processes and procedures for response.

A preliminary BRP is provided in Appendix A.

10 Conclusion

The Bookaar Solar Farm will be constructed approximately 10 kilometres north of Camperdown in south west Victoria. The area is dominated by farming activities, and whilst it has not been impacted by major fires, similar areas in south west Victoria have been impacted by bushfires.

Due to the potential for bushfires to impact on this area, and to meet the requirements of Clause 13.02-1S – Bushfire Planning, the Site and surrounding landscape has been assessed through a desktop assessment and site visit. The assessment considered a number of key documents to ensure that the assessment and mitigation requirements would meet the standards of the CFA's Renewable Energy Guidelines, and would address issues raised in a VCAT decision for a Previous Application at the Site.

Clause 13.02-1S and CFA's Guidelines were the key documents to ensure the location of the Solar Farm was appropriate and the design considered CFA's requirements. To support these assessments, landscape bushfire scenarios were identified, ignition sources on the Site were determined, and a level of risk was ascertained. Mitigation treatments were then recommended for each stage of the Proposal's life, and adopted as part of the Solar Farm design.

The outcome of this bushfire risk assessment is that there is no increase in bushfire risk associated with the development of the Proposal. Whilst the risk of ignitions is greater due to the introduction of electrically charged equipment, the implementation of mitigation recommendations including

vegetation management and perimeter fire breaks will reduce the potential for a fire to escalate on the Site. These treatments will also limit the ability for a bushfire to enter or exit the Site.

In conclusion, the assessment process demonstrates how the Proposal has responded to this bushfire risk assessment, and that the Proposal will not increase the bushfire risk in the surrounding area.

Appendix A – Preliminary Bushfire Response Plan

Preliminary Bushfire Response Plan

Bookaar Solar Farm

520 Meningoort Road, Bookaar

October 2020



Table of Contents

1. INTRODUCTION	70
2. ADMINISTRATION.....	70
2.1 Version control	70
2.2 Plan review	70
2.3 Supporting Information.....	70
2.4 Proponent.....	70
2.5 Responsible person	70
2.6 Equipment.....	71
2.7 Important contact numbers	71
3. OBJECTIVE	71
4. SITE OVERVIEW	71
5. STATE BUSHFIRE ARRANGEMENTS	73
6. BUSHFIRE EMERGENCY CONTROL ORGANISATION (ECO)	74
6.1 Roles and allocated staff	74
6.2 Pre emergency role	74
6.3 Emergency role.....	75
6.4 Post emergency.....	76
7. BUSHFIRE RISK.....	77
7.1 Risk Assessment	77
7.1.1 What is at risk.....	77
7.1.2 Understanding the potential for bushfire at the Site.....	78
7.1.3 Reducing the risk.....	78
7.1.5 Safer location.....	79
8. BUSHFIRE PREVENTION.....	80
9. BUSHFIRE PREPAREDNESS.....	80
9.1 Equipment	81
9.2 Training.....	81
10. BUSHFIRE RESPONSE PROCEDURES	81
10.1 Facility protection/Shelter in Place	81
10.2 Evacuation	81
Appendix 1 – Site Plan.....	83
Appendix 2 – Equipment checklist	84
Appendix 3 – Bushfire preparedness actions.....	85
Appendix 4 – Bushfire response actions	86
Appendix 5 – Can I or Can’t I?	89

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1. INTRODUCTION

This Preliminary Bushfire Response Plan ('PBRP') has been prepared to accompany a planning application for the proposed Bookaar Solar Farm (the 'Proposal'). It provides the basis for the development of stage specific Bushfire Response Plans throughout the lifetime of the Proposal.

The PBRP specifies, at a strategic level, the practical safeguards and controls that will need to be considered in order to manage and prepare for bush fire risk associated with the implementation of the Proposal.

This PBRP has been developed as an outcome of a detailed Bushfire Risk Assessment and Mitigation Plan assessment process for the Proposal. It is governed by the Australian standard AS 3745:2010 – *Planning for emergencies in facilities*.

2. ADMINISTRATION

2.1 Version control

Version	Prepared by	Endorsed by
Final	Mark Potter Fire Risk Consultants mark@fireriskconsultants.com.au	Graeme Taylor Fire Risk Consultants graeme@fireriskconsultants.com.au

2.2 Plan review

The PBRP will be reviewed and updated before the commencement of construction to become the Bushfire Response Plan (the 'BRP').

Thereafter, the BRP will be reviewed annually, before the commencement of any new stage of the Proposal (e.g., construction, operations and decommissioning), and following any change to site protocols or technology that have the potential to affect the accuracy of the BRP. The version control table will be completed annually to demonstrate the BRP has been reviewed and updated as required.

This will be completed by the 1st October each year ahead of the Fire Danger Period.

2.3 Supporting Information

The BRP will be a sub plan of the Emergency Management Plan (EMP) and they should be read together. The BRP should also be read in conjunction with any stage specific Environmental Management Plans and their sub plans as required by the consenting authority, and in conjunction with any documentation that forms the basis of any future consent for the Proposal.

2.4 Proponent

The proponent is Bookaar Renewables Pty. Ltd. (the 'Proponent').

2.5 Responsible person

The Responsible Person for the development, maintenance and exercising of the BRP is the Site Manager for the Bookaar Solar Farm. The Responsible Person is also accountable for ensuring the Emergency Planning Committee meets annually and reviews this BRP.

2.6 Equipment

A range of equipment will be required to support the implementation of the BRP before, during or after an emergency. Appendix 1, 'Equipment Checklist', provides a list that should be regularly checked to ensure it is available during fire events. This list should be reviewed before the BRP is finalised.

2.7 Important contact numbers

Emergencies	000
VicEmergency Hotline	1800 226 226
Burn-off notification	1800 668 511
CFA – District 6	5232 5600
Powercor Australia (Electricity)	13 22 06
Ausnet Services (Gas)	13 67 07

3. OBJECTIVE

The objectives of this document are to:

- Demonstrate that the Proposal, in response to a detailed bushfire risk analysis and mitigation plan, will commit to strong bushfire response capabilities and procedures in place throughout its lifetime;
- Provide the basis for the development and continual update of the BRP, for each of the construction, operation, and decommissioning stages of the Proposal;
- Provide the organisational structure required to be in place for the Proposal to prevent, prepare for and respond to bushfire emergencies; and
- Provide an overview of the measures required to be taken by the Proposal to prevent, prepare, and respond to bushfire at the Site.

The structure of this document is in accordance with the Australian Standard AS 3745:2010 – *Planning for emergencies in facilities* and will be authorised by the Emergency Planning Committee (EPC). The EPC are required to be in place by AS 3745:2010 and is responsible for developing the plans for managing emergencies on the Site.

4. SITE OVERVIEW

Site name	Bookaar Solar Farm
Site address	520 Meningoort Road, Bookaar. The 'Site' refers to the land the Solar Farm occupies and includes parts of adjacent land.
Description of facility	The facility is a Solar Farm covering approximately 588 hectares. It also includes battery storage and other infrastructure that supports the operation of the Solar Farm and the distribution of electricity to the network.
Site Plan	A Site Plan is provided at Appendix 1. The Site Plan is to be updated with a 'construction ready' Site Plan before for the first version of the BRP.

Site and surrounds	A plan showing the Site and its locality is provided in Figure 1 below.
Key contact person	To be updated for the first version of the BRP.
Fire Danger Rating district	South West
Development Consent	Key documents that provide and support any future consent for the Proposal will form part of the overall Emergency Response Plan's supporting documentation.
Bushfire Risk Assessment and Mitigation Plan	The Bushfire Risk Assessment and Mitigation Plan (BMP) supports the development application for the Proposal. It informs the Proposal's design, construction and operational response to bushfire risk. The BMP, along with the BRP, and Bushfire Mitigation Operational Schedule, should be read by the responsible person, all members of the Bushfire Emergency Control Organisation (see Section 5), and all local staff employed during the operational period.
Remote monitoring system	The site has a SCADA system that monitors the entire Site. This will allow remote monitoring of the Site. For the safety of staff and visitors, the following can be remotely isolated: <ul style="list-style-type: none"> • Inverters • Substation • Battery installation

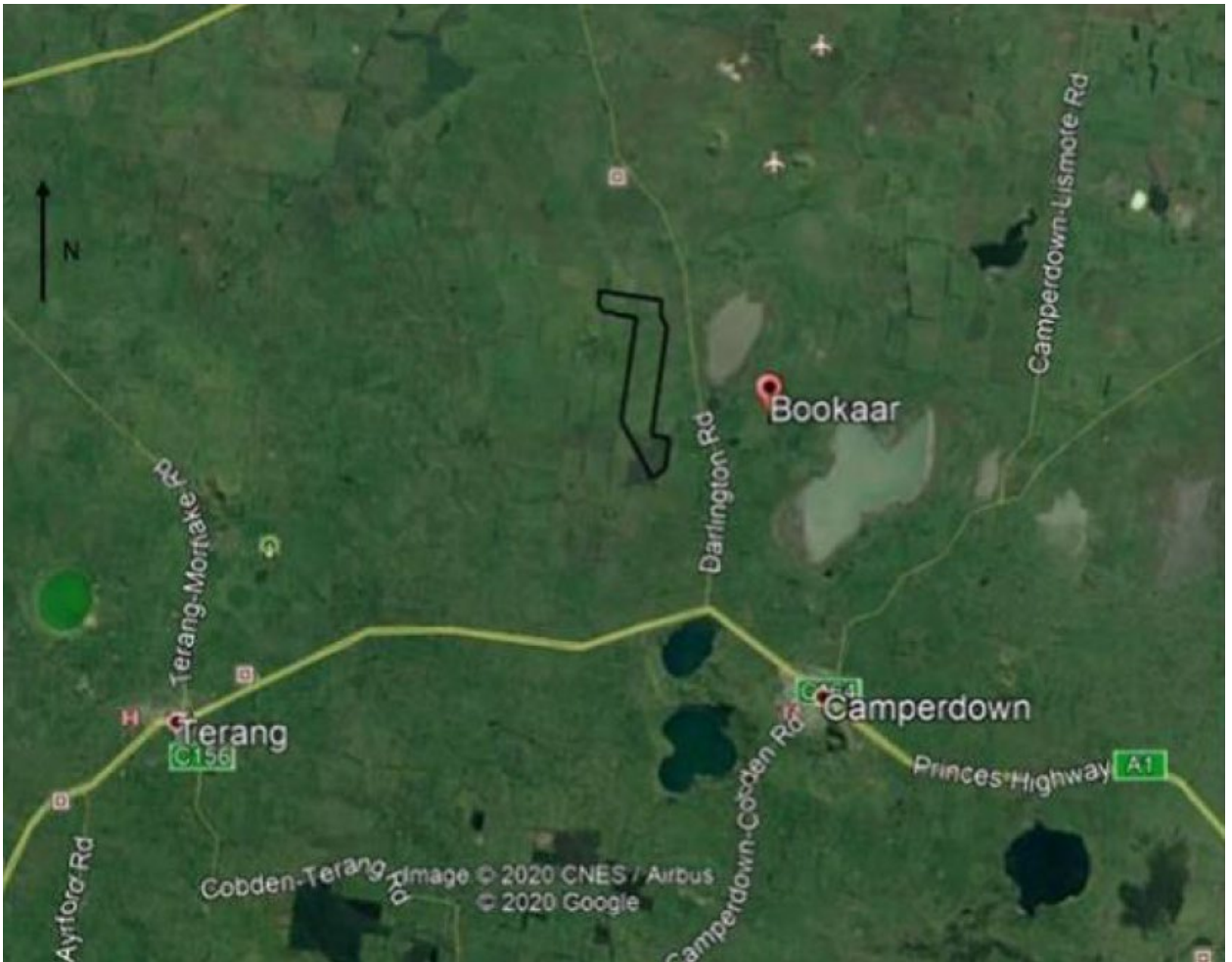


Figure 18 - Site and surrounds

5. STATE BUSHFIRE ARRANGEMENTS

Within Victoria, there are bushfire management arrangements in place to support the community to respond effectively. There are a number of terms utilised when informing the community of the potential or current bushfire risk. These can be classified as:

Term	Description
Fire Danger Ratings	Fire Danger Ratings provides an indication of the severity of a bushfire if one started. For up to date Fire Danger Rating predictions visit https://www.cfa.vic.gov.au/warnings-restrictions/total-fire-bans-and-ratings . Figure 2 outlines the fire danger ratings within Victoria.
Total Fire Bans	A Total Fire Ban is declared by CFA on days when fires are likely to spread rapidly and could be difficult to control. There are restrictions on days of Total Fire Ban to prevent fires from starting. Information on the status of a Total Fire Ban can be found at https://www.cfa.vic.gov.au/warnings-restrictions/total-fire-bans-and-ratings .
Warnings	Warnings provide information on a fire that has started and suggests actions to implement. For up to date warnings visit http://emergency.vic.gov.au/respond/ .



Figure 19 - Fire Danger Ratings within Victoria

6. BUSHFIRE EMERGENCY CONTROL ORGANISATION (ECO)

Any emergency requires an effective management structure to ensure that the main priority is the safety of the occupants of the facility. Based on the type of facility and the bushfire risk present, an ECO structure has been established.

ECO members have roles before, during and after emergencies and are required to ensure the Chief Warden is informed of the completion or non completion of each of these tasks.

6.1 Roles and allocated staff

The number of staff at the Bookaar Solar Farm will fluctuate regularly, and will differ significantly within the construction and decommissioning stages, and between the construction/decommissioning stages and the operational stage. Stage specific versions of the BRP should take into account the number of people expected to be at Site during the relevant period. Nevertheless, it is recommended that the organisational structure below be enacted through all stages. The structure will ensure that at all times staff and visitors are on Site, a Chief or Deputy Chief Warden is present.

Note that only one person will perform the role of Chief Warden at any one time. The same person may be listed against each role but can only perform one role at a time.

Title	Names	Contact number
Chief Warden x 2	TBA	TBA
Deputy Chief Warden x 4	TBA	TBA
Wardens x 6	TBA	TBA

Bushfire Emergency Control Organisation Organisational structure

6.2 Pre emergency role

Title	Role
Chief Warden	<ul style="list-style-type: none"> Take control of all preparedness and response functions and ensure people are allocated other ECO roles. Maintain a list of trained staff. Conduct induction training for new staff so that they are aware of their responsibilities under the BRP.

	<ul style="list-style-type: none"> • Conduct regular exercises as will be outlined in the Emergency Management Plan. Exercises could include mock evacuation drills and drills on the operation of communication systems. • Ensure the procedures are relevant to the Proposal stage, and have been reviewed by the ECO. • Ensure that ECO staff are wearing appropriate identification. • Maintain the Vic Emergency App on their mobile phone and ensure it is set to receive alerts of fires in the local area.
Deputy Chief Warden	<ul style="list-style-type: none"> • During the response phase of an emergency, support the Chief Warden in the delivery of their duties.
Wardens	<ul style="list-style-type: none"> • Carry out safety assessments close to their location including but not limited to: <ul style="list-style-type: none"> ○ Management of combustible materials including rubbish and excessive vegetation. ○ Ensure smoking occurs in suitably designated areas only. ○ Ensure access/egress points are unobstructed. ○ Ensure firefighting equipment is accessible and has been checked. • Regularly check in with the Chief Warden to gather information on the current status of bushfires surrounding the facility. • Maintain awareness of increased wind, temperature and/or smoke that may increase the bushfire risk. • In the event that a bushfire or plume of smoke is witnessed, immediately notify the Chief Warden.

6.3 Emergency role

Title	Role
Chief Warden	<ul style="list-style-type: none"> • Respond and take control. • Ascertain the nature of the bushfire emergency and implement appropriate action. • Ensure that the emergency services are notified. • Ensure that the Wardens are aware of the bushfire emergency. • Determine if the response is to evacuate or shelter in place. Initiate relevant response procedure. • Ensure any site visitors are kept fully informed and aware of the emergency. • If the facility is occupied during a bushfire emergency, ensure the emergency services are aware of the location of the facility, the number of occupants, if shelter in place or evacuation is occurring and any other relevant information. • Brief emergency services personnel upon arrival. • If shelter in place is being undertaken, ensure Wardens are providing appropriate support to any visitors that may be on the Site.
Deputy Chief Warden	<ul style="list-style-type: none"> • During the response phase of an emergency, support the Chief Warden in the delivery of their duties.
Wardens	<ul style="list-style-type: none"> • Upon being notified of the bushfire emergency, immediately report to the Chief Warden in person or via phone to receive direction. • When notified by the Chief Warden, commence implementing the procedures as they relate to either shelter in place or evacuation. • Upon completion of allocated tasks, inform the Chief Warden.

- If required, undertake fire suppression or preparedness activities including wetting down areas, extinguishing fires, etc.

6.4 Post emergency

Title	Role
Chief Warden	<ul style="list-style-type: none"> • When the emergency has been declared safe by the emergency services, inform the Wardens as required. • If shelter in place was undertaken, facilitate the orderly evacuation of the Site. Ensure liaison with emergency services has occurred to advise the safest route from the venue. • Organise a debrief with the ECO members and where appropriate with emergency service organisation representative/s.
Deputy Chief Warden	<ul style="list-style-type: none"> • During the recovery phase of an emergency, support the Chief Warden in the delivery of their duties.
Wardens	<ul style="list-style-type: none"> • Seek direction from the Chief Warden. • Participate in any post emergency debrief actions.

7. BUSHFIRE RISK

7.1 Risk Assessment

The Site is a Solar Farm and will incorporate a range of equipment including solar panels, a battery facility and other infrastructure. The Site is surrounded by farming properties. As people are required to construct, operate and maintain the facility, the highest risk is to people. This plan should be read in conjunction with the BMP which outlines in full the bushfire risk assessment for the Proposal. This assessment is summarised below.

7.1.1 What is at risk

What is at risk from bushfire?	Why is it at risk?
Life	
Visitors	Due to the nature of a solar farm, it is likely that a number of visitors will be onsite: primarily as contractors delivering materials during the construction phase; undertaking maintenance and deliveries during operations; and for other activities. Visitors may not have a detailed understanding of the solar farm layout, and the location of high-risk areas.
Staff	<p>During the Construction period, the Proposal will have up to approximately 150 staff at the Site. Although these staff will be fully trained in Emergency Response procedures, and have an in-depth knowledge of the risks associated with the operation of machinery onsite and any specific risks relating to the construction of the Proposal, they would be under immediate threat from a fire that starts on the Site.</p> <p>Once the Solar Farm becomes operational, it will likely have up to six staff present during normal working hours. Although these staff will have an in-depth knowledge of the risk associated with the electrical equipment, and the track layout, they would be under immediate threat from a fire that starts on the Site.</p>
Neighbours	In the event a bushfire starts on the Site, there is the potential for the fire to exit the Site and impact on neighbouring properties. There is a small number of farms and dwellings surrounding the Site that could come under immediate threat.
Property	
Solar Farm including Panels, Battery facility and other structures	The Proposal includes solar panels, inverters, a substation, a battery facility and other infrastructure. These all could be impacted by bushfire, originating either externally or from within the Site. The BMP contains a full description of components as relevant to Bushfire Risk.
Adjoining dwellings and farm buildings	A bushfire that exits the property and travels towards adjoining properties could impact on dwellings and farm buildings. This may include vehicles, stock, etc.

7.1.2 Understanding the potential for bushfire at the Site

The following table identifies scenarios for bushfire that may have the potential to impact on the Proposal. As these scenarios are generic in nature, it is important that any event that may occur within proximity to the Site be individually assessed as to its potential to impact on the Proposal. The Chief Warden is required to have an understanding of basic bushfire awareness to enable the initial assessment of any particular event.

The cause of bushfires within this area include:

1. Accidental - farm machinery malfunction, etc
2. Lightning – in particular dry lightning storms
3. Arson – most likely along the roads surrounding the Site.

Scenario	Description
Bushfire starting within 4 kms of the facility.	<p>A bushfire that starts within a 4 km radius of the Site can potentially affect the Site. If the fire starts upwind of the venue, the bushfire could impact on the facility within a short period of time.</p> <p>As the surrounding area is dominated by farmland, it is likely that bushfires will be caused by humans associated with farming activities. It can be assumed that people will be present when the fire starts and will notify CFA immediately.</p>
Bushfire starting within 10 kms of the facility.	<p>A bushfire starting between 4 – 10 kms from the Site could potentially affect the Site. In particular, under a north westerly or south westerly wind influence.</p> <p>Potential scenarios include grass fires starting as a result of farming activities or fires starting along a roadside from a discarded cigarette or vehicle malfunction.</p>
Bushfire starting on the property.	<p>Bushfires starting on the property would be seen as a lesser risk providing the fuel management arrangements are in place. Whilst there are numerous locations where electrical infrastructure is located, the ongoing maintenance and management of the facility will significantly reduce the risk of a fire starting.</p> <p>If the fire involves a building, or is impacted by strong winds, it could start smaller fires around the facility.</p> <p>The creation of defensible spaces, including a perimeter road as outlined in the Site Plan, will limit the ability for a bushfire to exit the property and impact on adjoining farms.</p>

The most likely bushfire threat to the Site is from a bushfire that is burning under a north westerly or south westerly wind influence through the surrounding grassland. If it is under a north westerly influence it is likely to be a narrow bushfire front. If it is from a south westerly direction following northerly wind influence, the bushfire front is likely to be wide and could impact on multiple areas at the same time.

In adherence to Clause 13.02 of the Planning Scheme, the BMP provides a full landscape based assessment of bushfire risk to the surrounding land, property and the Site from which the above analysis is based.

7.1.3 Reducing the risk

The following measures have been introduced to reduce the risk posed by bushfire:

1. Eight water tanks of 100,000 litres capacity each, with hard standing and suitable access located at the main access/egress points.

2. Eight access points located around the property that provides access and egress during an emergency.
3. A perimeter fire break of a minimum of 10m surrounded by managed vegetation.
4. Inverters with hard standing area and Asset Protection Zones.
5. Spacing of groups of panels at greater than 6m.
6. Suitable APZs around substation/operations buildings and battery storage.
7. Emergency information containers at each entrance that will include copies of the Emergency Management Plan.
8. Provision of a 'safer location' at the Operations Buildings area.
9. During the Fire Danger Period the vegetation on the Site will be maintained to less than 100 mm in length.

The BMP provides a list of all mitigation features of the Proposal and expands on each point above.

7.1.4 Safer location

As the primary risk to the Site is from a grassfire, there will be numerous locations across the solar farm where it can be considered a 'safer location'. Areas where the vegetation has been managed and there are no other combustible materials will be suitable.

The primary 'safer location' will be at the main office and works area. This area is provided with emergency vehicle access and a 20 metre wide asset protection zone. Figure 3 outlines the 'safer location'.

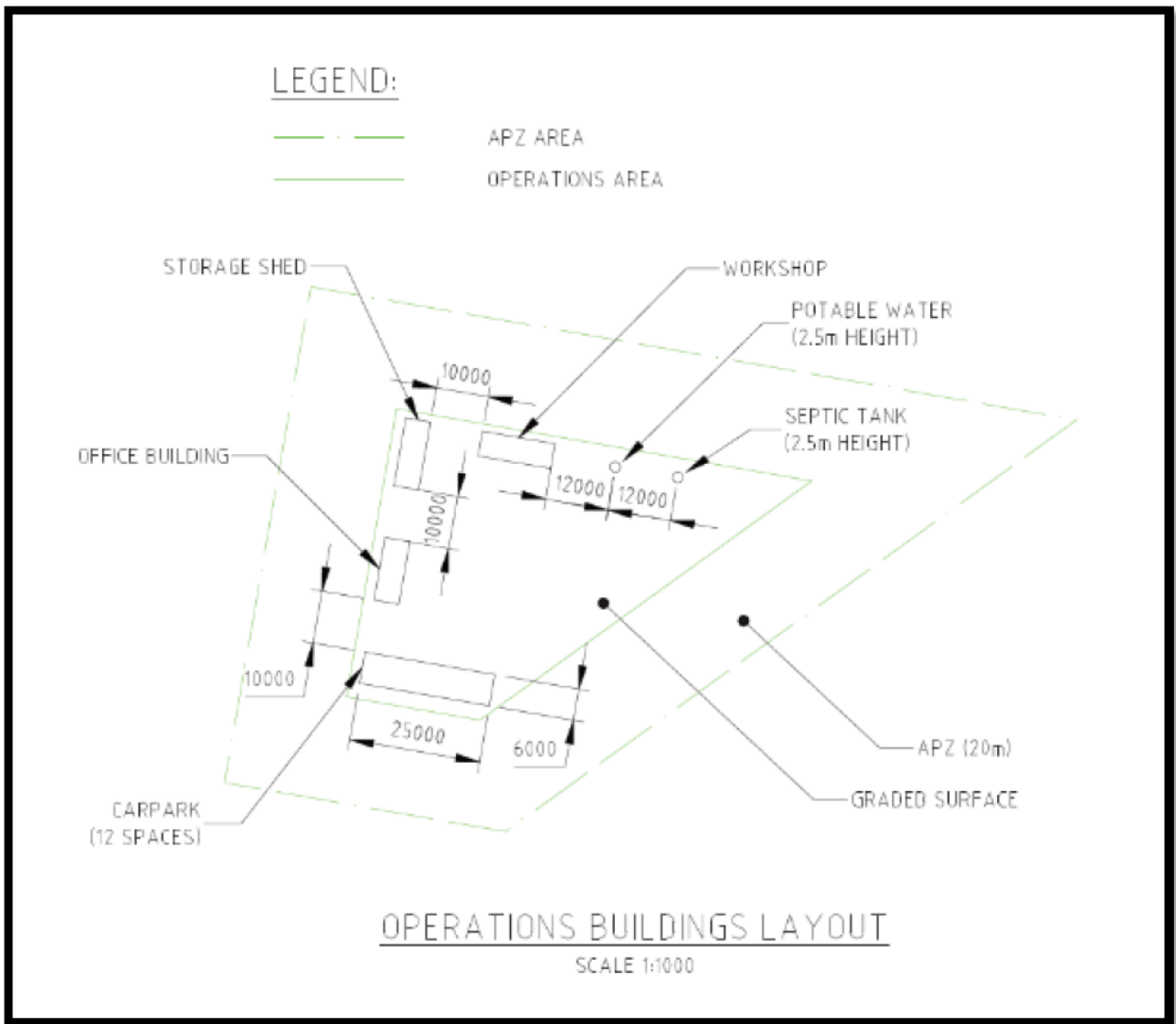


Figure 20 - Outline of 'safer location'

8. BUSHFIRE PREVENTION

Bushfire prevention is a key factor in both reducing the potential for bushfires to ignite on the Site and to also reduce the impact of a bushfire impacting on the Site.

Prevention treatments must be managed during the Fire Danger Period (FDP) as a minimum. The Site is encouraged to commence implementing treatments following their own analysis of the bushfire risk through the Proposal's full lifecycle. This analysis will include assessment of the curing level of the surrounding grassland, the amount of fuels along roadsides and in paddocks.

The minimum prevention activities are outlined within the Bushfire Mitigation Operational Schedule, which also apply to the construction period as far as practical.

9. BUSHFIRE PREPAREDNESS

It is important on days of elevated fire danger that preparedness activities increase depending on the risk level. Appendix 2, 'Bushfire Preparedness Actions', outlines the preparedness activities required to be implemented in the lead up to elevated fire risk periods.

9.1 Equipment

The Site has the following equipment available that is to be maintained and regularly tested during the fire danger period:

- Two Vehicles fitted with a water tank and firefighting pump.
- Static water supply x 8.
- Fire extinguishers within the office and other works areas.
- All plant and heavy equipment and vehicles to carry at least a 9-litre water stored-pressure fire extinguisher, along with communication devices, during the fire danger period.

The type of equipment required may vary between the construction and operational phases. It is critical that this is regularly assessed prior to the commencement of each phase to determine if the most appropriate equipment is available.

9.2 Training

The following training should be undertaken on a regular basis or as required:

- New staff induction programs should include knowledge of this procedure and their role pre, during and post an emergency. If required, this induction should include use of the firefighting pump and fire extinguishers.
- Basic bushfire awareness knowledge with particular focus on how bushfires are influenced by weather and how they may threaten the Site.

10. BUSHFIRE RESPONSE PROCEDURES

In the event of a bushfire, ensure the actions set out in Appendix 3, 'Bushfire Response Actions', are implemented.

It is important that 'primacy of life' is the main focus during any response to a bushfire. If in doubt, always choose the conservative approach that improves life safety.

There are two key response strategies available to the ECO during a bushfire. They are:

1. Facility Protection/Shelter in Place
2. Evacuation.

Each is detailed below.

10.1 Facility protection/Shelter in Place

Due to the location of the Site and the potential for a fast running grassfire to start in the local area, a shelter in place option is available to the ECO. This should be seen as a last resort and only utilised in the event that leaving the property during the bushfire or when the bushfire is approaching is unsafe.

Depending on the forecast conditions, the Chief Warden may also choose to undertake facility protection activities. This may be due to the bushfire starting close to the property and there is not time to enable an evacuation to occur, or the conditions are considered low risk.

10.2 Evacuation

Evacuation is an available option due to the low fuels on the roads surrounding the facility. There are two primary options available when evacuating, both for immediate evacuation of the Site and for the

evacuation route in the wider area. The selection of these will be influenced by the location of the bushfire and the direction it is heading.

Options for immediate evacuation:

Option 1 – exit the Site via one of 4 Emergency Exits on the Site’s western boundary, head south along Meningoort Rd, turn eastwards onto Blind Creek Road to Darlington Camperdown Road.

Option 2 – exit the Site via a main exit gate directly onto the northern part of Meningoort Road, head east to Darlington Camperdown Road.

Options for evacuation in the wider area:

Option 1 – travel north along Darlington Camperdown Road and turn east or west onto the Hamilton Highway, depending on the location of the bushfire.

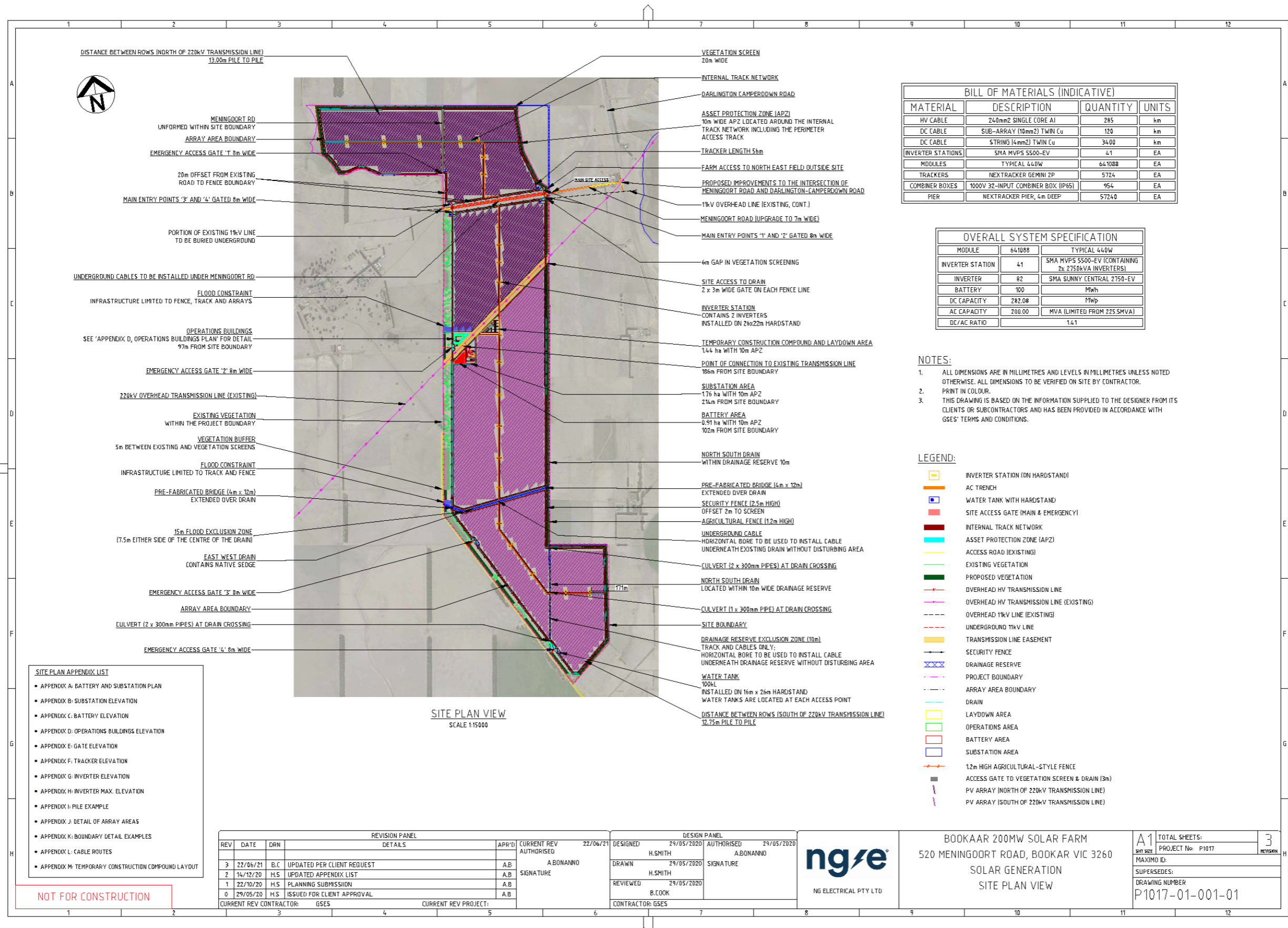
Option 2 – Travel south along Darlington Camperdown Road to Camperdown.

Note: There are other possible routes and staff will be encouraged to learn the layout of the Site and its exits as well as the local road network. The safest option is to travel to Camperdown, but this will be influenced by the location of bushfires.



Figure 21 - Site access/egress options

Appendix 1 – Site Plan



Appendix 2 – Equipment checklist

Position	Equipment	Yes/No
Chief Warden	Torch	
	Reflective vest	
	Notepad and pen	
	Mobile phone	
	Warden contact list	
	UHF radio	
Warden	Torch	
	Reflective vest	
	Mobile phone	
	Contact list	
	UHF radio	
Other	Two 4 x 4 Utes vehicles fitted with tank, pump and associated equipment	
	Fire extinguishers	
	Water tanks	

Appendix 3 – Bushfire preparedness actions

	Very High	Severe	Extreme	Code Red
Before the day	<p>Ensure all equipment is tested and in place.</p> <p>If a Total Fire Ban day is declared ensure all staff and contractors are aware of the 'Can I or Can't I?' requirements in Appendix 4.</p>	<p>Ensure all equipment is tested and in place.</p> <p>If a Total Fire Ban day is declared ensure all staff and contractors are aware of the 'Can I or Can't I?' requirements in Appendix 4.</p>	<p>Ensure all equipment is tested and in place.</p> <p>If a Total Fire Ban day is declared ensure all staff and contractors are aware of the 'Can I or Can't I?' requirements in Appendix 4.</p> <p>Consider reducing staff and contractors to those who are undertaking essential activities only.</p>	<p>Notify all staff, contractors, visitors and any other people/organisations that may attend the Site of the closure on the day that is rated as Code Red.</p> <p>Notify all staff and contractors that only essential activities to be undertaken.</p>
On the day	<p>Monitor the Emergency Vic App regularly and local radio.</p> <p>All staff to be aware of the fire danger and to report any fires to the Chief Warden.</p>	<p>Monitor the Emergency Vic App regularly and local radio.</p> <p>All staff to be aware of the fire danger and to report any fires to the Chief Warden.</p> <p>Ensure staff are regularly checking the surrounding areas for any sign of smoke or fire.</p> <p>Ensure contractors are aware of the increased fire danger and their responsibilities.</p>	<p>Monitor the Emergency Vic App regularly and local radio.</p> <p>All staff to be aware of the fire danger and to report any fires to the Chief Warden.</p> <p>Ensure staff are regularly checking the surrounding areas for any sign of smoke or fire.</p> <p>Appoint a staff member to patrol the perimeter of the facility and immediately report all fires.</p>	<p>For those staff who are onsite, monitor the Emergency Vic App regularly and local radio.</p> <p>Ensure the facility is only accessed by people undertaking essential activities.</p> <p>Place a sign at the gate to prevent any visitors accessing the Site.</p> <p>Appoint a staff member to patrol the perimeter of the facility and immediately report all fires.</p>

Appendix 4 – Bushfire response actions

	Very High	Severe	Extreme	Code Red
A fire starts within 4 kms of the Site.	<p>Call 000 to report the fire.</p> <p>Ensure the Chief Warden and Wardens are aware of the fire.</p> <p>Chief Warden to position a Warden to monitor fire conditions.</p> <p>If the fire is not immediately threatening the venue, consider evacuating all non-essential staff and visitors.</p>	<p>Call 000 to report the fire.</p> <p>Ensure the Chief Warden and Wardens are aware of the fire.</p> <p>Chief Warden to position a Warden to monitor fire conditions.</p> <p>If the fire is not immediately threatening the venue, consider evacuating all non-essential staff and visitors.</p>	<p>Call 000 to report the fire.</p> <p>Ensure the Chief Warden and Wardens are aware of the fire.</p> <p>Chief Warden to position a Warden to monitor fire conditions.</p> <p>If the fire is not immediately threatening the venue, consider evacuating all non-essential staff and visitors.</p> <p>Ensure clear guidance is provided to those evacuating about which direction they leave and obligations to notify the Chief Warden that they have reached their destination.</p>	<p>Call 000 to report the fire.</p> <p>Ensure the Chief Warden and Wardens are aware of the fire.</p> <p>Chief Warden to position a Warden to monitor fire conditions.</p> <p>It is unlikely that there will be time to evacuate safely. Move all staff and visitors to the 'safer location'. Ensure all available firefighting equipment is protecting life first.</p>

	Very High	Severe	Extreme	Code Red
Bushfire starting within 10 kms of the venue.	<p>Maintain an awareness of the fire and if further information is required, contact the VicEmergency Hotline.</p> <p>Ensure the Chief Warden and Wardens are aware of the fire.</p> <p>Chief Warden to position a Warden to monitor fire conditions.</p> <p>If the fire is not immediately threatening the venue, consider evacuating all non-essential staff and visitors.</p>	<p>Maintain an awareness of the fire and if further information is required, contact the VicEmergency Hotline.</p> <p>If the fire is upwind, consider a shelter in place strategy.</p> <p>If the fire is not likely to impact on the Site but is within 4 kms of the Site, consider evacuating the Site.</p> <p>Ensure clear advice is provided to the occupants on which direction they should be taking to leave the venue.</p>	<p>Maintain an awareness of the fire and if further information is required, contact the VicEmergency Hotline.</p> <p>If the fire is upwind, consider a shelter in place strategy.</p> <p>If the fire is not going to immediately impact on the Site but is within 10 kms of the Site, consider evacuating the Site.</p> <p>Ensure clear advice is provided to the occupants on which direction they should be taking to leave the venue.</p>	<p>Maintain an awareness of the fire and if further information is required, contact the VicEmergency Hotline.</p> <p>If the fire is upwind, consider a shelter in place strategy.</p> <p>If the fire is not going to immediately impact on the Site but is within 10 kms of the Site, consider evacuating the Site.</p> <p>Ensure clear advice is provided to the occupants on which direction they should be taking to leave the venue.</p>

	Very High	Severe	Extreme	Code Red
Bushfire starting on the property.	<p>Chief Warden to be notified immediately.</p> <p>Immediately report the fire to 000.</p> <p>If safe to do so, attempt to extinguish the fire using the firefighting equipment.</p> <p>Chief Warden is to identify a safe location and inform the Wardens to move the occupants to this area.</p> <p>If safe to do so, commence evacuating the occupants from the Site.</p> <p>Wardens are to move the occupants away from the fire area to a safer location.</p>	<p>Chief Warden to be notified immediately.</p> <p>Immediately report the fire to 000.</p> <p>If safe to do so, attempt to extinguish the fire using the firefighting equipment.</p> <p>Chief Warden is to identify a safe location and inform the Wardens to move the occupants to this area.</p> <p>If safe to do so, commence evacuating the occupants from the Site.</p> <p>Wardens are to move the occupants away from the fire area to a safer location.</p>	<p>Chief Warden to be notified immediately.</p> <p>Immediately report the fire to 000.</p> <p>If safe to do so, attempt to extinguish the fire using the firefighting equipment.</p> <p>Chief Warden is to identify a safe location and inform the Wardens to move the occupants to this area.</p> <p>If safe to do so, commence evacuating the occupants from the Site.</p> <p>Wardens are to move the occupants away from the fire area to a safer location.</p>	<p>Chief Warden to be notified immediately.</p> <p>Immediately report the fire to 000.</p> <p>If safe to do so, attempt to extinguish the fire using the firefighting equipment.</p> <p>Chief Warden is to identify a safe location and inform the Wardens to move the occupants to this area.</p> <p>If safe to do so, commence evacuating the occupants from the Site.</p> <p>Wardens are to move the occupants away from the fire area to a safer location.</p>

Appendix 5 – Can I or Can't I?

Can I or can't I?

To report a fire
DIAL 000

Updated November 2016

This guide gives you general information about what you can and can't do during declared Fire Danger Periods and on days of Total Fire Ban, when fires in the open air are legally restricted.

CFA declares Fire Danger Periods by municipalities in the country area of Victoria during periods of increased fire risk. Refer to the CFA website cfa.vic.gov.au for further details about your location. In state forests, national parks and on protected public land, fire restrictions are in force all year round. Contact the

Department of Environment, Land, Water and Planning (DELWP) for advice on fire restrictions in these areas. Also, always check with your municipality as some have restrictions in place all year round.

Total Fire Bans are declared by CFA on days when fires are likely to spread rapidly and be difficult to control. The penalties for lighting fires illegally during the Fire Danger Period and on Total Fire Ban Days include large fines and possible imprisonment.

Can I have a barbecue, light a camp fire or light a fire for warmth or comfort?



During Fire Danger Period

No, unless:

- the wind is not more than 10km/h (this can be observed if leaves and small twigs are in constant motion)
- the fire is lit in a **properly-constructed fireplace** or in a trench at least 30 centimetres deep
- the area within a distance of 3 metres from the outer perimeters of the fire and the uppermost point of the fire is clear of flammable material
- the fire does not occupy an area in excess of 1 square metre and the size and dimensions of solid fuel used are the minimum necessary for the purpose
- A person is in attendance at all times while the fire is alight and has the capacity and means to extinguish the fire
- the fire is completely extinguished before the person leaves

Note that the CFA Act 1958 defines, a properly-constructed fireplace as a fireplace that is constructed of stone, metal, concrete or any other non-flammable material that contains the perimeter of the fire. A commercially-produced barbecue is considered a properly-constructed fireplace.

On Total Fire Ban Days



All camp fires, fires for warmth or personal comfort are banned during Total Fire Ban Days. Solid and liquid fuel barbecues and ovens (including hangis) are also banned during Total Fire Ban Days.

No, unless:

- the barbecue uses only gas or electricity and is a permanently fixed structure built of stone, metal, concrete or another non-flammable material designed exclusively for meal preparation, or is designed and commercially manufactured exclusively for meal preparation (including portable barbecues), and when alight is placed in a stable position
- the area within a distance of 3 metres from the outer perimeter of the barbecue is clear of flammable material
- you have either a hose connected to a water supply or a container with at least 10 litres of water for immediate use
- an adult is there at all times when a fire is alight who has the capacity and means to extinguish the fire
- the fire is completely extinguished before the adult leaves.

I run a meal preparation business (eg catering), or am a community/charitable/fundraising or similar organisation. Can I set up and light a fire to operate a barbecue, cooker or hotplate at outdoor functions?



During Fire Danger Period

No, unless:

- The wind is not more than 10km/h (this can be observed if leaves and small twigs are in constant motion)
- The fire is lit in a **properly-constructed fireplace** or in a trench at least 30 centimetres deep
- The area within a distance of 3 metres from the outer perimeters and uppermost point of the fire is clear of flammable material
- The fire does not occupy an area of more than 1 square metre and the size and dimensions of fuel used are the minimum necessary for the purpose
- A person is in attendance at all times while the fire is alight and has the capacity and means to extinguish the fire
- The fire is completely extinguished before the person leaves

If you cannot meet these conditions you will need to apply for a permit from a CFA district office.

On Total Fire Ban Days



No, unless you have a written permit issued by CFA, MFB or DELWP and you comply with the conditions of that permit.

A community organisation, a charitable organisation or an organisation involved in fundraising (for example, a school or sporting group) may apply for permission to light a fire to prepare meals for other people in the course of their business. These permits are issued by, and at the discretion of, local CFA district offices, CFA headquarters, MFB district offices, or the Chief Fire Officer of DELWP in Fire Protected Areas.

Municipal Fire Prevention Officers cannot issue these permits.

mfb.vic.gov.au



cfa.vic.gov.au



Can I or can't I?

To report a fire
DIAL 000

Can I have a spit style rotisserie fired by **heat beads, wood or other solid fuel?**



During Fire Danger Period

No, unless:

- The wind is not more than 10km/h (this can be observed if leaves and small twigs are in constant motion)
- The fire is lit in a **properly-constructed fireplace** or in a trench at least 30 centimetres deep
- The area within a distance of 3 metres from the outer perimeter of the fire and the uppermost point of the fire is clear of flammable material
- The fire does not occupy an area in excess of 1 square metre and the size and dimensions of solid fuel used are the minimum necessary for the purpose
- A person is in attendance at all times while the fire is alight and has the capacity and means to extinguish the fire
- The fire is completely extinguished before the person leaves

On Total Fire Ban Days

No

Solid Fuel barbecues are banned in the open air on Total Fire Ban Days.

Note that the CFA Act 1958 defines, a properly-constructed fireplace as a fireplace that is constructed of stone, metal, concrete or any other non-flammable material that contains the perimeter of the fire. A commercially-produced barbecue is considered a properly-constructed fireplace.



Can I use a **gas-powered wildlife scaring gun?**



During Fire Danger Period

No, unless:

you have a current Schedule 14 permit and comply with each and every condition.

On Total Fire Ban Days

No

Gas-powered scaring guns cannot be used on days of Total Fire Ban.



Can I light a fire in the open air to **burn off grass, stubble, weeds, undergrowth or other vegetation?**



During Fire Danger Period

No, unless:

- you have a written permit issued by a Municipal Fire Prevention Officer or a CFA district office
- you have a written permit issued by a Fire Prevention Officer of a public authority
- you comply with the conditions of that permit
- a person is in attendance at all times while the fire is alight and has the capacity and means to extinguish the fire
- the fire is completely extinguished before the person leaves.

Many councils have local laws that ban burning off on certain days or within certain locations or at certain times within their municipalities. Check with the Municipal Fire Prevention Officer.

On Total Fire Ban Days

No

All fires in the open air for burning off grass, scrub, stubble or rubbish are banned during Total Fire Ban Days.

All permits issued by Municipal Fire Prevention Officers are suspended for the duration of any Total Fire Ban Day.

Any existing fires, including those that were allowed under an exemption or permit for the Fire Danger Period, are prohibited and must be completely extinguished before the Total Fire Ban begins.



Can I **drive a vehicle** in places where the vehicle will be in contact with **crops, grass, stubble, weeds, undergrowth or other vegetation?**

During Fire Danger Period

No, unless:

- the vehicle is fitted with an efficient silencing device (eg muffler) which takes all the exhaust from the engine through the silencing device.

You should avoid driving vehicles through dry vegetation in hot and dry conditions even if it is not a Total Fire Ban Day, because of the risk posed by the hot exhaust system.

On Total Fire Ban Days

No, unless:

- the vehicle is fitted with an efficient silencing device (eg muffler) which takes all the exhaust from the engine through the silencing device.

This should be avoided wherever possible because the risk of starting fires is extremely high and the impact of fire on these days may be much greater.



mfb.vic.gov.au



cfa.vic.gov.au



Can I or can't I?

To report a fire
DIAL 000

Can I use a chainsaw, plant or grass trimmer or lawn mower?



During Fire Danger Period

No, unless:

- the chainsaw, plant or grass trimmer or lawn mower complies with the following when used in vegetation that is not green (that is dry vegetation):
 - free from faults and mechanical defects that could cause an outbreak of fire
 - fitted with an efficient spark arrester
 - have an area of at least 3 metres around the machine cleared of flammable material.

Also, a person must be in attendance at all times the machine is being used, and must carry at least one of the following fire suppression equipment items:

- one knapsack spray pump, in working order, fully charged with water, with a capacity of not less than 9 litres, or
- one water (stored pressure) fire extinguisher, in working order, fully charged with water and maintained at the correct pressure, with a capacity of not less than 9 litres.

Work undertaken in GREEN vegetation is permitted, however CFA suggests maintaining equipment and carrying fire suppression equipment as described above.

On Total Fire Ban Days



This should be avoided wherever possible on Total Fire Ban days because the risk of starting fires is extremely high and the impact of fire on these days may be much greater. If the work is essential, follow the guidelines in the adjacent column for the Fire Danger Period.

Note that the spark arrester, the knapsack spray pump and the water fire extinguisher referred to above must comply with the applicable Australian Standards.

Can I carry out:

- welding, grinding, charring, soldering or gas cutting?
- rail maintenance?
- heating bitumen?
- relocating bees using a bee smoker?
- extracting honey using heat or flame?



During Fire Danger Period

No, unless:

- a fire-resistant shield or guard is in place to stop sparks, hot metal or slag from the fire
- an area at least 1.5 metres from the operation is clear of flammable material or wetted down sufficiently to prevent the spread of fire
- you have a hose connected to a reticulated water supply or water spray knapsack containing at least 9 litres of water
- all cut-offs and hot materials from the operation are placed in fire-proof containers
- a person is in attendance at all times while the fire is alight and has the capacity and means to extinguish the fire
- the fire is completely extinguished before the person leaves.

On Total Fire Ban Days



No

These activities are banned on Total Fire Ban Days:

In limited circumstances, CFA, MFB or DELWP may issue a Section 40 permit on Total Fire Ban Days.

These permits are issued by CFA district offices, CFA headquarters, MFB district or DELWP offices. they cannot be issued by Municipal Fire Prevention Officers.

See the back page for details about how to apply for a Section 40 permit.

mfb.vic.gov.au



cfa.vic.gov.au



Can I or can't I?

To report a fire
DIAL 000

Can I use an incinerator?

During Fire Danger Period

No, unless:

1. You check with council about any local laws that might prescribe conditions or restrict or prohibit incinerator use (eg bans on certain days, in certain areas or during certain times)
2. And the following requirements are met:
 - the fire is effectively restricted within the incinerator
 - the wind is not more than 10km/h (this can be observed if leaves and small twigs are in constant motion)
 - the ground and air space within 3 metres from the outer perimeter of the incinerator are clear of flammable material
 - a supply of water adequate to extinguish the fire is available at all times when the fire is burning
 - a person is in attendance at all times while the fire is alight and has the capacity and means to extinguish the fire
 - the fire is completely extinguished before the person leaves.

On Total Fire Ban Days

No

Using an incinerator is banned on Total Fire Ban Days.



Note that the CFA Act 1958 defines an incinerator as a structure or device which is used, or may be used, for the destruction or disposal of unwanted materials by burning and is:

- constructed from non-flammable material, and
- fitted with a shield or guard of non-flammable material to prevent the emission of sparks, embers or other burning material.

Can I use self-propelled farm machinery, tractors, slashers, earth-moving, excavating or road-making machines propelled by a heat engine within 9 metres of any crops, grass, stubble, weeds, undergrowth or other vegetation?

During Fire Danger Period

No, unless the machinery:

- is free from faults and mechanical defects that could cause an outbreak of fire
- is fitted with a spark arrester in working order, a turbocharger or exhaust aspirated air cleaner
- carries fire suppression equipment comprising either:
 - at least one knapsack spray pump, in working order, fully charged with water, with a capacity of not less than 9 litres, or
 - at least one water (stored pressure) fire extinguisher, in working order, fully charged with water and maintained at the correct pressure, with a capacity of not less than 9 litres.

On Total Fire Ban Days

This should be avoided wherever possible because the risk of starting fires is extremely high and the impact of fire on these days may be much greater.

If the work is essential, follow the guidelines in the adjacent column for Fire Danger Period.



Note that the spark arrester, the knapsack spray pump and the water fire extinguisher referred to above must comply with the applicable Australian Standards.

It is the responsibility of every individual using fire to ensure they comply with the fire restriction laws.

Anyone using fire must ensure that their actions do not cause a fire to spread to other property. Severe penalties apply under the Crimes Act 1958 (Vic) to anyone who intentionally or recklessly lights, maintains or fails to contain a fire and allows it to spread on to other property.

I'm planning a burn-off on my property. How do I notify emergency services?

If you have been issued with a burn-off permit by CFA or a Municipal Fire Prevention Officer, you need to give the Emergency Services Telecommunications Authority (ESTA) prior notification by phoning 1800 668 511 and any other person identified in the permit conditions.

How can I find further information or apply for a permit?

For any clarification or further information about this guide, or to obtain a permit application form, visit cfa.vic.gov.au, contact your local CFA district headquarters or phone (03) 9262 8444. A list of contact numbers for CFA district headquarters is available on the CFA website.

If you need a permit to operate in the Metropolitan Fire District, contact MFB on (03) 9662 2311 or mfb.vic.gov.au.

In many municipalities north-east and east of Melbourne, DELWP fire restrictions also apply within 1.5km of the public land boundary. Check the DELWP website for details.

If you need to apply for a permit, contact DELWP on 136 186 or delwp.vic.gov.au.


mfb.vic.gov.au



cfa.vic.gov.au



Appendix B – Bushfire Mitigation Operational Schedule

Bookaar Solar Farm					
					
BUSHFIRE MITIGATION OPERATIONAL SCHEDULE					
Location: BSF		Date:			Inspecting Staff:
Mitigation Task	Annual timing	Date Completed	Task ID	Responsible department	Comments
Vegetation Management					
Ensure grassland within the solar farm is maintained at <100mm	Sep-Dec		1		
Maintain 19 metres defendable space	Sep-Dec		2		
Removal of vegetation from drainage lines to prevent these lines acting as a wick to other areas.	Sep-Dec		3		
General grounds maintenance around operations building prepared for fire danger season e.g. grass mowed, dead grass removed, leaf litter removed and gardens prepared	Sep-Dec		4		
Maintenance carried out on visual amenity screenings including dead vegetation in the visual screening buffer is to be removed, grass should be maintained at <100mm and tree branches should not be in contact with the ground	Sep-Dec		5		
Dangerous fuels and other items e.g. leaf litter, gas bottles and chemicals removed away from buildings	Sep-Dec		6		
Health Safety and Welfare					
All staff familiar with policies, procedures and their responsibilities during a bushfire emergency	Sep-Dec		7		
Policy and Procedures					
Emergency Management Plan reviewed and updated	Sep-Dec		8		
Bushfire Response Plan reviewed and updated	Sep-Dec		9		
Site familiar with policy for closure on forecast Code Red Fire Danger Days	Sep-Dec		10		
Planning					
Daily fire danger rating is distributed and publicised across the Solar Farm during the FDP	Sep-Dec		11		
Risk assessment for evacuation or shelter in place during Bushfires and other emergencies completed	Sep-Dec		12		
Training					
Staff completed training in Emergency Management	Sep-Dec		13		
Staff attended annual bushfire emergency response drills	Sep-Dec		14		
Managers attended introductory Incident Management training	Sep-Dec		15		
Designated staff have attended Basic Wildfire Awareness course	Sep-Dec		16		
Plant and Equipment					
All bushfire fighting equipment tested, fire water tanks full and operational e.g. fire extinguishers and fire hose reels	Sep-Dec		17		
All bushfire fighting communications and warning systems are tested and operational e.g. alarms, PA, radios, SMS groups, other systems	Sep-Dec		18		
Access and Egress					
CFA Fire fighting appliances have defined emergency access and egress areas including turn around areas (if required)	Sep-Dec		19		
Inspect access roads and tracks (drainage, surface conditions and vegetation) identify and implement maintenance as required	Sep-Dec		20		
Infrastructure					
Inspect gates to ensure locks are in place and functioning	Sep-Dec		21		
Clear gutters, roof surfaces/valleys, external decks and verandas clear of leaf litter/dead plant material accumulation	Sep-Dec		22		
External building components should be free of combustible material and are to be painted and sealed, window and external vent screens serviceable	Sep-Dec		23		

Appendix C – Compliance with the CFA Guidelines

The table below demonstrates how the standards in the CFA Guideline have been achieved through the design response and ongoing mitigation treatments for the Proposal.

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
1. Development of installation		
1.1 The Country Fire Authority (CFA) has a statutory responsibility under The CFA Act (1958) for (the more) effective control of the prevention and suppression of fires in the country area of Victoria. For renewable energy installations, CFA's involvement may be required in relation to planning permit approval, the assessment of dispensations under the Building Act and Regulations, and/or the provision of written advice in relation to dangerous goods storage and handling.	✓	CFA consultation has occurred as part of the preparation for a Planning Permit application. It is unlikely that consultation will be required under the Building Act. Advice provided by CFA explains that any application under the Dangerous Goods (storage and handling) Regulations can be undertaken following the Planning Permit being issued.
1.1.1 All design requirements need to take into consideration all the relevant Australian Standards.	✓	In the context of bushfire safety, the water tanks will be installed using AS 2419 and the buildings, where required, will be constructed to AS 3959.
1.1.2 In the planning context, CFA's involvement may be via referral from a municipal council (responsible authority) for CFA's consideration and comment. If this occurs, this document is a guide as to the conditions CFA is likely to include in response to council's referral. The conditions prescribed in this guideline should be incorporated by the applicant in the planning permit application.	✓	CFA has been consulted through the development of this report. Ongoing engagement will occur with CFA.
1.1.3 Dangerous Goods Written Advice - Where the facility includes battery storage, CFA's responsibility may include the provision of written advice under Regulations 54 and 55 of the Dangerous Goods (Storage and Handling) Regulations 2012. This advice will be issued by the State Infrastructure and Dangerous Goods Unit.	✓	A Battery is included as part of the Proposal. Engagement with CFA will occur under the Dangerous Goods (Storage and Handling) Regulations 2012 following the Planning Permit process.
1.1.4 Any building on Site is required to comply with the National Construction Code. If a development has a building that will be over 500m ² , and dispensations are requested, the local delegated CFA fire safety officer will handle such applications.	✓	The Proposal does not propose any buildings that are larger than 500m ² .

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
<p>1.1.5 Any new development needs to ensure that the design of plans and infrastructure installations consider the requirements of the Victorian Occupational Health and Safety Act 2004 (OHS Act) and the Occupational Health and Safety Regulations (2017).</p> <p>Section 28 of the OHS Act, states the following in relation to the duty of designers:</p> <p>“A person who designs a building or structure or part of a building or structure who knows, or ought reasonably to know, that the building or structure or the part of the building or structure is to be used as a workplace must ensure, so far as is reasonably practicable, that it is designed to be safe and without risks to the health of persons using it as a workplace for a purpose for which it was designed.”</p> <p>Owners/occupiers have obligations under the OHS Act to ensure the health and safety of people ‘so far as is reasonably practicable’. This legislation requires consideration of risk control measures and safe systems of work, which for renewable energy installations may relate to the development of systems and activities for:</p> <ul style="list-style-type: none"> • Housekeeping • Security (monitoring, alarms, etc) • Undertaking hot works • Ignition source control • Vehicle, plant and equipment maintenance requirements. 	✓	<p>The bushfire risk assessment has also considered mitigation treatments that will reduce the risk to workers or visitors at the Site.</p> <p>Examples of mitigation are:</p> <ul style="list-style-type: none"> • Onsite firefighting capability will only be conducted after the completion of relevant training. • Hot Works Permit system will be implemented. • Ignition source control including the management of smoking will be implemented. • An induction process will be implemented that ensures all visitors and contractors understand the emergency management arrangement including bushfire response.
<p>1.1.6 To enable CFA to provide timely and accurate advice, the following information is required to be provided at the planning and design stage:</p> <ul style="list-style-type: none"> • Details of the facility, its operation, size and type • Details of any buildings on-Site, their floor area, class and use (e.g. inverter plant room, substation, maintenance shed, office) • Details of any battery, diesel or other dangerous goods storage/handling, including the class identification, quantity, type (bulk or packaged) and location • Details of the proposed fire protection system for the Site and design standards. 	✓	<p>This report outlines the requested information including a description of the Proposal, Site plan, locations of Solar Farm infrastructure and the layout of firefighting water supply.</p>

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
2. Planning, design and construction		
<p>2.1 The design team should consult with CFA as a key stakeholder early in the planning and design phase to ensure that CFA can consider the implications of the design on emergency response. Plans for the facility can be forwarded to CFA for consideration prior to a consultation meeting. Documentation is to be submitted to firesafetyreferrals@cfa.vic.gov.au.</p> <p>Where any proposed facility design does not or is unable to meet the requirements of this guideline, designers are to contact CFA's State Infrastructure and Dangerous Goods Unit for design review and advice.</p>	✓	The required level of consultation has occurred with CFA.
<p>2.1.1 The construction and commissioning phases of facility development pose challenges for effective risk management. During construction of any renewable energy installation, Site occupiers must:</p> <ul style="list-style-type: none"> • Develop an Emergency Management Plan for the construction and commissioning phases 	✓	The Proponent has committed to developing an Emergency Management Plan for the construction and commissioning phases.
<ul style="list-style-type: none"> • Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to • Adhere to restrictions on Total Fire Ban or days of high fire danger (refer to www.cfa.vic.gov.au) • Carry fire extinguishers or firefighting equipment in vehicles • Carry emergency communications equipment • Ensure vehicles keep to tracks whenever possible • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. 	✓	The Proponent has committed to ensure that all relevant permits are in place. The Emergency Management Plan will outline the need to carry first attack firefighting equipment on vehicles, have in place an emergency communications system and manage ignition sources.
Construction phase		

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
<p>The fire protection measures contained within this guideline should be installed during the construction phase. This will ensure that the Site has appropriate fire protection during this phase.</p> <p>CFA requires that the emergency information container be:</p> <p>2.3.7 Painted red and marked 'EMERGENCY INFORMATION' in white contrasting lettering not less than 25mm high</p> <p>2.3.8 Located at all vehicle access points to the facility, installed at a height of 1.2m - 1.5m</p> <p>2.3.9 Accessible with a fire brigade standard '003' key.</p>	✓	<p>The static water supplies will be installed at the commencement of the construction phase. As each access point is constructed, a static water supply will be installed.</p> <p>As an access point is constructed, an emergency information container will be installed that includes the following:</p> <ul style="list-style-type: none"> • Emergency contact details. • Site Plan. • Safe operation specifications for the solar farm and battery storage.
2.4 Fire Brigade Site Familiarisation and Exercises		
<p>2.4.1 Prior to commissioning the facility, operators should offer a familiarisation visit and explanation of emergency service procedures to CFA and other emergency services. Information in relation to the specific hazards and fire suppression requirements of the Site should be provided to CFA during this visit. Contact with the local CFA district to arrange local brigade contact. Refer to https://www.cfa.vic.gov.au/contact/#district</p>	✓	<p>The requirement to regularly engage with CFA is outlined within the Bushfire Response Plan.</p> <p>The construction project plan will include the requirement to engage with CFA prior to final commissioning.</p>
<p>2.4.2 A schedule for ongoing Site familiarisation to account for changing personnel, Site infrastructure and hazards should be developed in conjunction with the local CFA brigade.</p>	✓	<p>The Bushfire Response Plan outlines the requirement to engage with CFA to offer Site familiarisation opportunities.</p>
<p>2.4.3 An annual emergency exercise should be conducted at the Site, with an invitation extended to the local CFA brigade to participate.</p>	✓	<p>The Bushfire Response Plan outlines the requirement to conduct annual exercises and to invite CFA.</p>
2.5 Training for Facility Staff		
<p>2.5.1 Site and operational risks and hazard</p>	✓	<p>The Bushfire Response Plan outlines the types of training required to effectively and safely respond to bushfires. The Site will also meet its OH & S obligations by providing relevant training.</p>
<p>2.5.2 Site emergency management roles, responsibilities and arrangements</p>	✓	<p>The Bushfire Response Plan outlines the types of training required to effectively and safely respond to bushfires. The Site's Emergency Management Plan will outline additional training required to respond to all identified events.</p>
<p>2.5.3 The use of any firefighting equipment where there is an expectation for staff to undertake first aid firefighting</p>	✓	<p>The Bushfire Response Plan outlines the types of training required to effectively and safely respond to bushfires.</p>

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
2.5.4 The storage, handling and emergency procedures for dangerous goods on-Site	✓	Following the final design, if dangerous goods are stored on-Site, relevant training will be provided to staff in accordance with the organisations OH & S obligations.
2.5.5 The location of first-aid facilities and application of first aid equipment	✓	The Emergency Management Plan will outline the location of first aid facilities and ensure trained staff are on-Site to administer first aid if required.
3.1 Access		
3.1.1 A four (4) metre perimeter road should be constructed within the ten (10) metre perimeter fire break.	✓	A 4 metre wide perimeter road is provided around the entire Site. This is located within a 10 metre perimeter fire break. The perimeter road network is connected to an internal road network that provides access/egress to all areas of the development.
3.1.2 Roads are to be of all-weather construction and capable of accommodating a vehicle of 15 tonnes.	✓	The roads will be of all weather construction and capable of accommodating vehicles of up to 15 tonnes.
3.1.3 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.	✓	The roads will be at least 4 metres in width and will be provided with a 4 metre vertical clearance. There are no plans to plant vegetation alongside roads.
3.1.4 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 metres.	✓	As the Site is mostly flat and with slopes of approximately 1- 2 degrees maximum, all roads will meet the grade requirements.
3.1.5 Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	As the Site is mostly flat and with slopes of approximately 1- 2 degrees maximum, all roads will meet the dip requirements.
3.1.6 Incorporate passing bays at least every 600m which must be at least 20m long and have a minimum trafficable width of 6m. Where roads are less than 600m long, at least one passing bay is to be incorporated.	✓	The Site Plan outlines the provision of passing bays throughout the entire Site including perimeter roads.
3.1.7 Road networks must enable responding emergency services to access all areas of the facility.	✓	The entire Site is surrounded by a perimeter road with an internal road network providing access to all areas of the facility. The operations area, battery storage and maintenance areas are all located at the main entrance to the Site.
3.1.8 The provision of at least two (2) but preferably more access points to the Site, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points should be informed through a risk management process.	✓	The Site is provided with 8 access points. These are outlined in the Site plan. The access points are located on the western, eastern and southern side of the Proposal.
3.2 Firefighting water supply		

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
3.2.1 The static water storage tank shall be of not less than 45,000 litres effective capacity. The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel. The location and number of tanks should be determined as part of the Site's risk management process and in consultation with a CFA delegated officer.	✓	The Site is being provided with 8 static water tanks that contain 100,000 litres of water each. The static water will be located at the access points to the Site and be available for firefighting purposes.
3.2.2 The static storage tanks shall be capable of being completely refilled automatically or manually within 24 hours.	✓	The static storage tanks will be capable of being refilled within 24 hours through the use of water cartage contractors.
3.2.3 The hard-suction point shall be provided, with a 150mm full bore isolation valve (Figure 1) 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 (Figure 2) with a matching blank end cap to be provided.	✓	The outlets will conform with the CFA guidelines and will be provided with the appropriate outlets.
3.2.4 The hard-suction point shall be positioned within 4m to a hardstand area and provide clear access for fire personnel.	✓	A hard stand area will be provided at each tank in accordance with the CFA guideline.
3.2.5 An all-weather road access and hardstand shall be provided to the hard-suction point. The hardstand shall be maintained to a minimum of 15 tonne GVM, 8m long and 6m wide or to the satisfaction of the relevant fire authority.	✓	All tanks will be located adjacent to the perimeter access road and appropriate hard stand will be provided so that a firefighting appliance that is accessing the water supply does not block the perimeter road.
3.2.6 The road access and hardstand shall be kept clear at all times.	✓	The operations plan will include the requirement to keep road access and hardstand areas cleared at all times.
3.2.7 The hard-suction point shall be protected from mechanical damage (i.e. bollards) where necessary.	✓	Bollards will be installed to protect the tank outlets.
3.2.8 Where the access road has one entrance, a 10m radius-turning circle shall be provided at the tank.	✓	All tanks are located on through roads.
3.2.9 An external water level indicator is to be provided to the tank and be visible from the hardstand area.	✓	External water level indicators will be provided at each tank.
3.2.10 Signage (Figure 3) shall be fixed to each tank.	✓	Signage in accordance with the CFA guideline will be provided at each tank. This will include the following: Fire Water 100,000 litres

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
3.2.11 Signage (Figure 4) shall be provided at the front entrance to the Site, indicating the direction to the static water tank and being to the satisfaction of a CFA delegated officer.	✓	Directional signs will be placed around the property in the event that the water supply cannot be sighted from the entrance. In addition, a Site plan showing the location of the water supply will be available within the emergency information container.
3.3 Dangerous Goods Storage and Handling		
3.3.1 The requirements of the relevant Australian Standards must be complied with, e.g. (DR) Australian Standard 5139: Electrical installations – Safety of battery systems for use with power conversion equipment; Australian Standard 3780: The storage and handling of corrosive substances; and Australian Standard 1940: The storage and handling of flammable and combustible liquids.	✓	In the event that Dangerous Goods are stored on Site, engagement with CFA will occur under the Dangerous Goods (storage and Handling) Regulations 2012.
3.3.2 Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2012, and the relevant Australian Standards is to be provided.	✓	In the event that Dangerous Goods are stored on Site, engagement with CFA will occur under the Dangerous Goods (storage and Handling) Regulations 2012.
3.3.3 All dangerous goods stored on-Site must have a current safety data sheet (SDS). Safety data sheets must be contained in the Site's emergency information book, in the emergency information container.	✓	In the event that Dangerous Goods are stored on Site, engagement with CFA will occur under the Dangerous Goods (storage and Handling) Regulations 2012.
3.3.4 Appropriate material (including absorbent, neutralisers, equipment and personal protective equipment) for the clean-up of spills is to be provided and available on-Site.	✓	In the event that Dangerous Goods are stored on Site, engagement with CFA will occur under the Dangerous Goods (storage and Handling) Regulations 2012.
4. Site Operation		
4.1 Operation and Maintenance of Facilities		
4.1.1 Maintenance and repair activities that involve flame cutting, grinding, welding or soldering (hot works) are to be performed under a 'hot work permit' system or equivalent hazard or risk management process.	✓	A hot works permit system and other ignition controls will be put in place at the Site. This will be managed through relevant policies and procedures, staff training, visitor and contractor induction and the requirement to have a water supply available during how works.
4.2 Fuel/Vegetation Management		
4.2.1 Grass is to be maintained at below 100mm in height during the declared Fire Danger Period.	✓	The vegetation on Site will be managed during the fire danger period. All grass will be maintained at below 100mm in height.

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
4.2.2 A fire break area of ten (10) metres width is to be maintained around the perimeter of the facilities, electricity compounds and substations. This area is to be of non-combustible mulch or mineral earth.	✓	A 10 metre wide fire break is provided and will be maintained during the fire danger period. The 10 metre wide fire break includes a 4 metre wide road. Additional separation between the boundary fence and the Solar Panels is provided in addition to the 10 metre fire break. This additional space will be managed during the fire danger period.
The fire break area must commence from the boundary of the facility or from the vegetation screening (landscape buffer) inside the property boundary. The fire break must be constructed using either mineral earth or non-combustible mulch such as crushed rock.	✓	Where possible the fire break is located inside the screening area. As the fire break is incorporated with the road, some locations will require the fire break to be no more than 10 metres from the boundary fence. Where this occurs, the grass will be maintained to less than 100 mm during the fire danger period.
The fire break must be vegetation free at all times.	✓	The fire break will be free from vegetation at all times.
No obstructions are to be within fire break area (e.g. no stored materials of any kind).	✓	The Solar Farm design has ensured sufficient space is available for the storage of equipment and other materials away from the fire break.
4.2.3 Adhere to restrictions and guidance during the Fire Danger Period, days of high fire danger and Total Fire Ban days	✓	The Solar Farm operators will ensure all legislative obligations are complied with including appropriate permits during the fire danger period.
4.2.4 All plant and heavy equipment is to carry at least a 9-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-Site during the Fire Danger Period.	✓	All plant and equipment will carry at least a 9 litre water extinguisher with a minimum rating of 3A during the fire danger period.
4.2.5 There is to be no long grass or deep leaf litter in areas where plant and heavy equipment will be working.	✓	Vegetation surrounding the work areas will be managed during the fire danger period to less than 100mm.
6. Siting for Solar Facilities		
6.1.1 Solar facilities are to have a 6 metre separation between solar panel banks/rows.	✓	Spacing between the banks of Solar Panels is greater than 6 metres. Further information is available in the Site Plan.
6.2 Operation and maintenance of solar facilities		

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
6.2.1 Solar farm operators must provide specifications for safe operating conditions for temperature and the safety issues related to electricity generation, including isolation and shut-down procedures, if Solar Panels are involved in fire. This information must be provided within the content of the emergency information book.	✓	Within the emergency information boxes at each of the Site entrances, information will be provided that outlines the safe operating conditions and isolation and shut down procedures.
6.3 Fuel/Vegetation Management at Solar Facilities		
6.3.1 Solar arrays are to have grass vegetation maintained to 100mm under the array installation or mineral earth or non-combustible mulch such as stone.	✓	Vegetation under the solar arrays will be managed to a maximum of 100 mm during the fire danger period.
6.3.2 Where practicable, solar energy installations can be Sited on grazed paddocks. In this case, vegetation is to be managed as per the requirements of this guideline, or as informed through a risk management process.	✓	The Site for the Proposal is located on what is currently a grazed paddock. Through the provision of access roads and other infrastructure, the grassland will be reduced significantly. The Solar Farm operators will utilise the most efficient method to manage the vegetation under the solar arrays.
7 Battery installations		
7.1 Siting of Battery Installations		
7.1.1 Containers/infrastructure for battery installations are to be located so as to be directly accessible to emergency responders (e.g. provided with a suitable access road).	✓	Thee battery storage area is located adjacent to a dedicated emergency access entrance to the Site.
7.1.2 Adequate ventilation of the battery container/storage area is to be provided where required under (DR) Australian Standard 5139 Electrical Installations – Safety of battery systems for use with power conversion equipment; the manufacturer’s requirements and/or SDS for battery storage.	✓	Ventilation will be provided to the battery storage area in accordance with DRAS 5139 2019.
7.1.3 Containers/infrastructure for battery installations are to be provided with appropriate spill containment/bunding that includes provision for fire water runoff.	✓	The battery storage area will be designed and constructed to ensure that the fire water runoff is contained.
7.2 Operation and Maintenance of Battery Installations		

Item from CFA Guidelines for Renewable Energy Installations	Compliance	Comment
7.2.1 Battery installations that contain dangerous goods may have to comply with the requirements of the Dangerous Goods Act 1985; the Dangerous Goods (Storage and Handling) Regulations 2012; and relevant Australian Standards.	✓	In the event that Dangerous Goods are stored on Site, engagement with CFA will occur under the Dangerous Goods (storage and Handling) Regulations 2012.
7.2.2 Battery storage manufacturers must provide specifications for safe operating conditions for temperature and the effects on battery storage if involved in fire. This information must be provided within the content of the emergency information book.	✓	Safety information relating the battery storage infrastructure will be provided within the emergency information containers.
7.2.3 Battery installations are to be kept free of extraneous materials and combustible materials of all kinds. Regular inspections and housekeeping is to be conducted to ensure materials do not accumulate.	✓	The operations plan for the Site will include the requirement to regularly inspect and undertake appropriate housekeeping within the battery storage area.
7.2.4 Battery installations are to be serviced/maintained as per the manufacturer's requirements.	✓	Maintenance will be undertaken as specified by the manufacturers and will be outlined within the Site operations plan.
7.3 Fuel/Vegetation Management at Battery Installations		
7.3.1 Containers/infrastructure for battery installations must be clear of vegetation for 10 metres on all sides, including grass. CFA requires non-combustible mulch such as stone or mineral earth within this 10-metre area.	✓	The battery storage area will be provided with an Asset Protection Zone for a distance of 10 metres which will have no combustible vegetation.

Appendix D – Vegetation Screen planting and maintenance requirements

The following information is provided to guide the ongoing management of the Vegetation Screen that is being provided around the entire Site. It also applies to the existing shelterbelts and windbreaks along the western edge of the Site. As outlined within this Report, the management of the Vegetation Screens will ensure these areas of vegetation do not increase the bushfire risk to the Site and the local area.

Utilising plant species that are not highly flammable

There are a variety of factors that are to be considered when selecting the most appropriate species to ensure there is no increase in bushfire risk. Ramsay and Rudolph (2003) states that an assessment of vegetation bushfire risk should include the type of bark, moisture content, foliage density, leaf fineness and height of the lowest foliage above the ground. All of these factors will determine the suitability of the vegetation and how it performs during a bushfire.

The most critical factor is the selection of vegetation that has limited bark hazard. Vegetation that has bark that is fibrous or stringy will support the generation of fire spotting embers. Smooth barked vegetation will generally reduce the number of short distance embers that are generated during a bushfire.

The initial identification of species for the vegetation Screen will be influenced by the Ecological Vegetation Class (EVC) for the local area. Trees that have limited bark and smooth surfaces should be used.

CFA have produced a Plant Selection Key³³ to support the assessment of vegetation to determine its flammability level. Once the preferred vegetation has been identified, the Plant Selection Key would be utilised to inform the flammability level of a particular species. Final species selection should be aimed at achieving at least low to moderate flammability.

Removal of Dead vegetation in the screen before the declared Fire Danger Period

Any branches and other vegetation that has fallen from the screen can accumulate on the ground and increase bushfire risk. This material can increase bushfires intensity and allow for the generation of increased radiant heat along with allowing the fire to burn for longer periods. Prior to the annual declared Fire Danger Period, this dead material must be removed.

Maintain grass to 100mm or less in the planting areas during the Fire Danger Period

CFA guidance material clearly outlines the importance of maintaining grass to less than 100mm during the Fire Danger Period. This will reduce the likelihood of a bushfire burning on the ground under the Screen vegetation developing significantly and will restrict the amount of heat being produced in a bushfire event.

Removal of branches within 2m of the ground.

The removal of branches from within two metres of the ground will limit a fire's ability to move vertically from the ground to the canopy. If the fire is of an intensity high enough to directly burn the canopy, this could generate additional embers that may land in and around the Site. This requirement,

³³ Plant Selection Key – CFA, <https://www.cfa.vic.gov.au/plan-prepare/plant-selection-key/>.

along with the requirement to maintain the grass below 100mm will reduce the ability for fires to establish, develop significantly and enter the canopy.

Appendix E – Peat Assessment

Attached separately.

Appendix F – Consideration of the VCAT decision

Finding No.	VCAT concern	How this concern has been addressed
10	The bushfire assessment is also inadequate. The applicant's expert evidence cites some factors relevant to mitigate bushfire risk, but does not comprise a substantive risk and hazard assessment.	A full bushfire risk assessment (Bookaar Solar Farm Bushfire Risk Assessment & Mitigation Plan 2020) has been conducted. This includes risks to Site staff, contractors and surrounding neighbours from bushfire. A suite of supporting documents including a preliminary Bushfire Response Plan (BRP) and a Bushfire Mitigation Operational Schedule (BMOS) have also been developed.
	<ul style="list-style-type: none"> There is no draft fire or emergency plan. 	<p>An Emergency Management Plan is being developed by the Proponent and will be in place for the construction and operational phase.</p> <p>A preliminary Bushfire Response Plan has been prepared for the Proposal and is attached to this report.</p>
	<ul style="list-style-type: none"> There is reference to general CFA guidelines that require, for example, a static water supply of not less than 45,000 litres capacity, but all parties (including the CFA and the applicant) concede that this would be inadequate for a large solar energy facility covering almost 6 km². 	<p>A significant water supply to support firefighting operations onsite is provided in the Plan.</p> <p>Static water supply now incorporated into the design at 8 strategic locations adjacent to vehicle entrances. Each tank holds 100, 000 litres with fire appliance access in accordance with the CFA Guideline.</p>
	<ul style="list-style-type: none"> There is no clear assessment of what other fire suppressants may be needed to deal with a fire affecting particular electrical installations. 	<p>CFA provides guidance to its firefighters on how to combat fires involving Solar Panels. This includes information on:</p> <ul style="list-style-type: none"> Power isolation Control Strategies <p>The primary strategy for fires involving electrical installations is to isolate the power before using water. As mentioned in this report, the key challenge with Solar Farms is the vegetation under and surrounding the panels.</p>
	<ul style="list-style-type: none"> There is no clear assessment of: the impact of fencing and limited access. 	<p>The Proposal is serviced by an all-weather road network that gives access to all areas of the Site including a perimeter road. Eight access points have been included within the design with, 4 of these available at all times and the remaining for emergency vehicle access only.</p> <p>Due to the number of access points now provided for emergency vehicle access, the provision of fencing will not limit access and egress.</p>
	<ul style="list-style-type: none"> There is no clear assessment of the 20 metre landscape buffer surrounding almost the entire Site. 	Vegetation Screen planting guidance has been included within this report at Appendix D. Further information to reduce bushfire risk annually has been included as part of the Bushfire Mitigation Operational Schedule.

Finding No.	VCAT concern	How this concern has been addressed
	<ul style="list-style-type: none"> There is no clear assessment of the likely location of all-weather internal access roads. 	Refer to detailed design drawing. All roads, emergency access points, asset protection zones and static water locations provided on map.
	<ul style="list-style-type: none"> There is an acknowledgement that the Site may contain peat soils, but the applicant is unable to indicate whether they add significantly to the risk. 	A detailed assessment of possible peat locations on Site has been undertaken. No peat was discovered as part of this assessment.
	<ul style="list-style-type: none"> There is no assessment of the capacity of the local brigade to deal with bushfire in or around the proposed facility. 	<p>CFA firefighting capability and capacity has been addressed in the Plan. In summary, CFA's dispatch system will respond the most appropriate appliances to the Site depending on the nature of the emergency.</p> <p>The Solar Farm operators will also have a first attack capability on Site which has been specified within the Bushfire Response Plan.</p>
248	<p>Application needs to address 2 scenarios:</p> <ul style="list-style-type: none"> Fire within the facility Fire in the area travelling towards the facility 	<p>Fires originating from within the Site and external to the Site have been addressed in this report. This includes a landscape risk assessment from within 1 km and 20 km of the Site.</p> <p>Possible Ignition sources have also been identified and recommendations to reduce the likelihood of ignitions have been included.</p>
249	Priority to be given to the protection of human life above all other policy considerations	<p>The Bookaar Bushfire Response Plan 2020 clearly identifies the protection of human life above all other considerations.</p> <p>This is in accordance with Victorian State Government direction and response doctrine adopted by the Fire Agencies.</p> <p>This report also addresses the requirements of Clause 13.02-1S of the Corangamite Planning Scheme that requires the primacy of life be considered.</p>
250	<p>There is a need for:</p> <ul style="list-style-type: none"> Risk and hazard assessment Emergency management plan 	This report analyses the risk associated with a bushfire both within or external to the Site. The Proponent will have in place an Emergency Management Plan that analyses the risks and hazards associated with the Solar Farm and outlines the response arrangements to respond to these types of events.
251 a)	Are there any guidelines published by the CFA that specifically relate to bushfire management in the context of solar farms?	<p>The CFA Guidelines for Renewable Energy Installations 2019 provide clear guidance on the management of fire risk within Solar Farm facilities. This report outlines in detail how the design meets these guidelines.</p> <p>DELWP have published Solar Energy Facilities – Design & Development Guidelines August 2019 that refers to the CFA guidelines.</p>

Finding No.	VCAT concern	How this concern has been addressed
251 b)	Has there been any study which has looked at incident of fire at solar farms?	A detailed assessment of previous fires in solar farms has been undertaken as part of this report. The primary outcome is the importance of managing vegetation under and surrounding the Solar Panels.
251 c)	Does the infrastructure associated with a solar farm create wind conditions that might accentuate any fire risk?	Following a literature search including the CFA Renewable Energy Guideline, there is no evidence available to support this scenario.
251 d)	Is there any concern with the proposed planting of up to 7 rows of trees with the 20m landscape buffer of the species outlined in the letter included in your brief?	The proposed makeup of the vegetation screens is 4 rows of trees within a 20m wide buffer. The Vegetation Screen plantings will be undertaken in accordance with design guidelines outlined within this report (see Appendix D). Complying with these guidelines will ensure the plantings meet the exclusion provisions outlined within clause 2.2.3.2 of AS3959:2018. Further information to reduce bushfire risk annually has been included in the Plan as part of the Bushfire Mitigation Operational Schedule.
251 e)	What assumptions have been made in keeping fuel levels with the Site array at acceptable levels?	The CFA Guidelines for Renewable Energy Installations 2019 provide clear guidance on the management of fuel within Solar Farm facilities. Grassland within the Site will be managed in accordance with the Guideline.
253	Detail regarding how a fire coming into the solar energy facility, or a fire within the solar energy facility, will be able to be managed, given 45,000 litres is known to be insufficient.	A separate preliminary BRP has been drafted for the Site. This will guide staff in the management of any fire that occurs onsite or threatens Site externally. Water supply is being provided. Static water will be located strategically across the Site in 8 locations. Each tank will have 100,000 litres of water.
255	The potential for peat and subsequent fire impact.	A detailed assessment of possible peat locations on Site has been undertaken. No peat was discovered as part of this assessment.
256	Information relating to the effect of solar panel toxicity on firefighters.	There is limited information available on the effects of solar panel toxicity on firefighters. It is understood that plastics will be present on cables, enclosures and other parts of the system. Fires involving plastics is a concern for firefighters and is why they are provided with safety equipment including breathing apparatus. Plastics are present in a wide variety of fires that firefighters respond to including car and building fires. CFA provide guidance to their firefighters and how to minimise exposure to any toxic environment through the use of breathing apparatus or by remaining away from the smoke.

Finding No.	VCAT concern	How this concern has been addressed
258	The ability for any bushfire on Site to be adequately managed is foremost, and not assumed.	A preliminary Bushfire Response Plan (BRP) has been prepared for the Site. This plan outlines the response capability for the onsite personnel and how they will interact with CFA when they arrive.

Appendix G – Authors background and experience

Graeme Taylor

Managing Director

Graeme has extensive strategic and operational management experience with a strong focus on leadership and critical decision making in an emergency management environment. He has extensive experience in State fire policy, planning, incident management and operational services for large fire events. Graeme has first-hand experience in leadership roles for major incidents including The Longford gas explosion, 2009 Black Saturday fires, and multiple Gippsland fire and flood events. He has also been called upon on numerous occasions to manage fires interstate.

Graeme provides support to agencies, local government and industry before, during and after emergencies. He has led the development of risk reduction and fire protection planning, including fuel modification and management across a range of projects in Australia. Current clients include the Country Fire Authority of Victoria, ESSO, Department of Defence, Forest Fire Management and numerous large asset managers and developers across Australia.

Graeme has excellent knowledge of State and local government emergency management and fire planning arrangements and provisions, including State legislation around bushfire risk in renewable energy projects.

Mark Potter

Risk and Emergency Planning Lead

Mark Potter is a proven executive with experience providing leadership across complex and diverse roles. He has a strong background in developing internal and external relationships, operating in complex and technical environments, leading teams through significant change and steering strategy into action.

Within the emergency management sector, Mark has extensive experience in leading the development, assessment and testing of all aspects of emergency management plans. This experience includes Major Hazards Facilities, Latrobe Valley Coal Mines, Gippsland Regional Strategic Fire Management Plan, the Bushfire Management Overlay and the Gippsland Emergency Management Plan. Mark has performed in roles including Chair – Gippsland Regional Strategic Fire Management Planning Committee, Project Manager – Latrobe Valley Coal Mines Emergency Management Project, member of the Gippsland Emergency Management Planning Committee and the State Fire Management Planning Committee.

His experience extends across the ability to undertake, participate or develop risk management plans that identify the relevant risks for treatment plans to be developed.