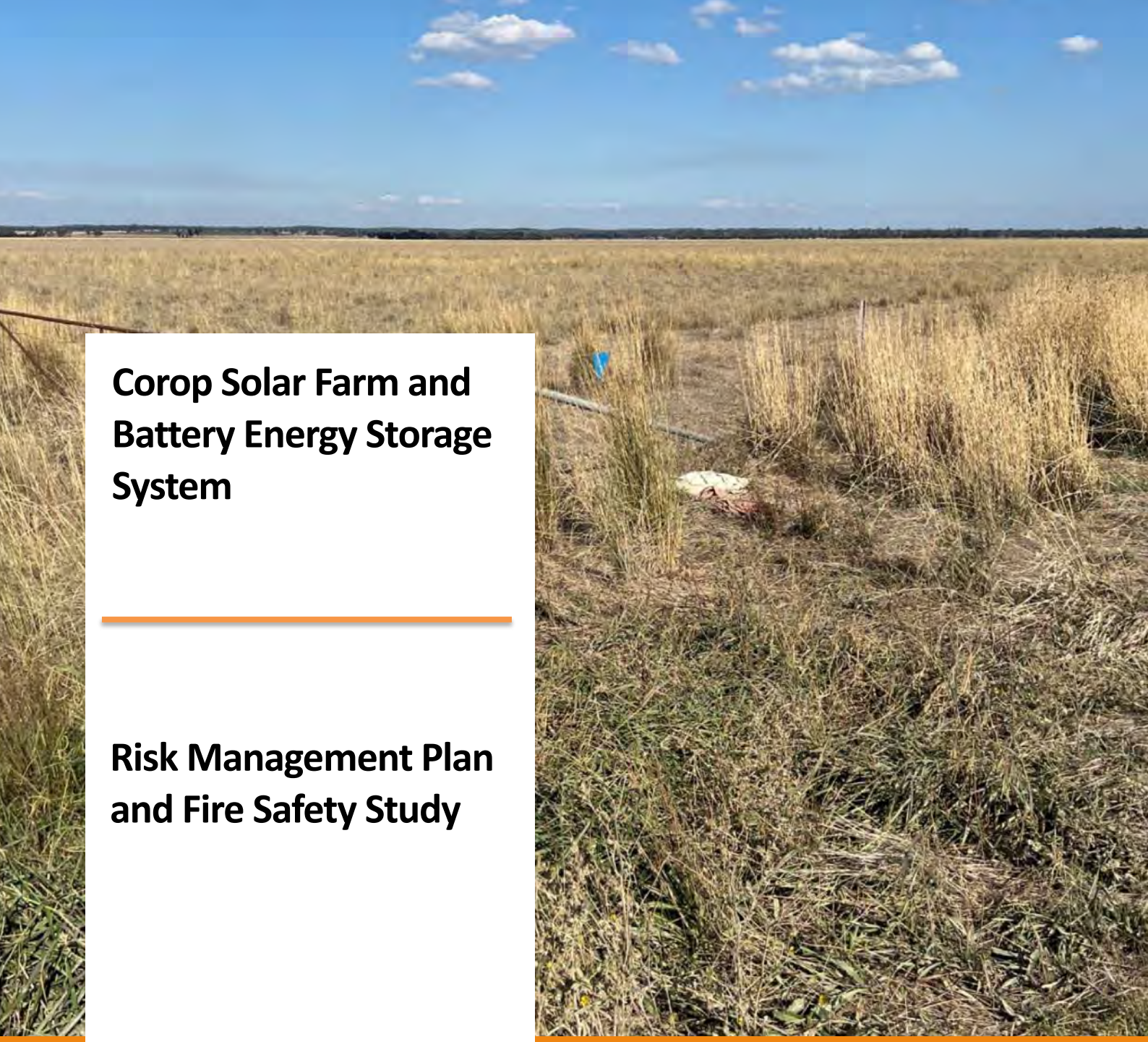
Appendix F Fire assessment



Corop Solar Farm and Battery Energy Storage System

Risk Management Plan and Fire Safety Study

July 2022

FIRE RISK Consultants

Cover photo –View of the Corop Solar Farm property (Fire Risk Consultants)

Document history and date

Revision	Date	Description	By	Review	Approved
V1 - DRAFT	10/5/2022	Initial draft following assessment of available information and site visit.	M Potter	G Taylor	G Taylor
V2 - FINAL	25/7/2022	Final version following feedback from client.	M Potter	G Taylor	G Taylor

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Any fire safety work, including but not limited to planned burning, back burning and/or fire suppression, on any property or building is specifically excluded from this report.

*Where the term **"Bushfire prevention and mitigation related activities"** (or words to that effect) are used, this is to be defined as the clearance of vegetation in accordance with the Victorian State Government guidelines, including clearing and maintenance of existing fire breaks and/or fire access for fire fighters under electricity pylons and properties that have been constructed to Australian Standard AS3959 and/or the National Construction Code.*

Contents

1 Introduction

Fire Risk Consultants have been engaged by Leeson Group to develop a Risk Management Plan for the proposed Corop Solar Farm and Battery Energy Storage System (BESS). The development encompasses an area of approximately 1000 hectares and will be developed in two stages. The site is located to the west of Rushworth in Victoria.

The Risk Management Plan is required to achieve compliance with the CFA Guideline - *Design Guidelines and Model Requirements: Renewable Energy Facilities 2022*. The Guideline outlines the purpose and need for a Risk Management Plan (RMP). The client has engaged with CFA prior to the preparation of this Plan, and they will be re-engaged once the design team has approved the Plan.

The RMP has been prepared following an assessment of the site, analysis of supplied information from the client and a meeting with technical experts in relation to the design, commissioning and operation of a BESS.

As per the CFA Guideline, this report also aligns with NSW Planning's *Hazardous Industry Planning Advisory Paper 2: Fire Safety Study Guidelines (2011)*. The various requirements outlined within the Advisory Paper have been included in this report where it relates to the proposal.

2 Project Overview

This development includes a Solar Farm and Battery Energy Storage System (BESS) that, when completed, will have a capacity of approximately 440MW DC (320MW AC). It will be built in two stages and separated by a northern and southern section.

When completed, the project will deliver:

- A solar farm spread over nearly 1000 hectares.
- Battery Energy Storage System
- Access roads
- Static water supplies for firefighting purposes

The project will take approximately two years to construct each stage.

3 Existing conditions assessment

3.1 Site description and location

The development site is spread over 11 property titles with a combined area of 1,099.68ha. The land is located about five kilometres to the west of the Rushworth township and about six kilometres to the south of Stanhope. The properties are currently used for farming purposes.

Refer to Figure 1 for the general location of the development in relation to the surrounding landscape.

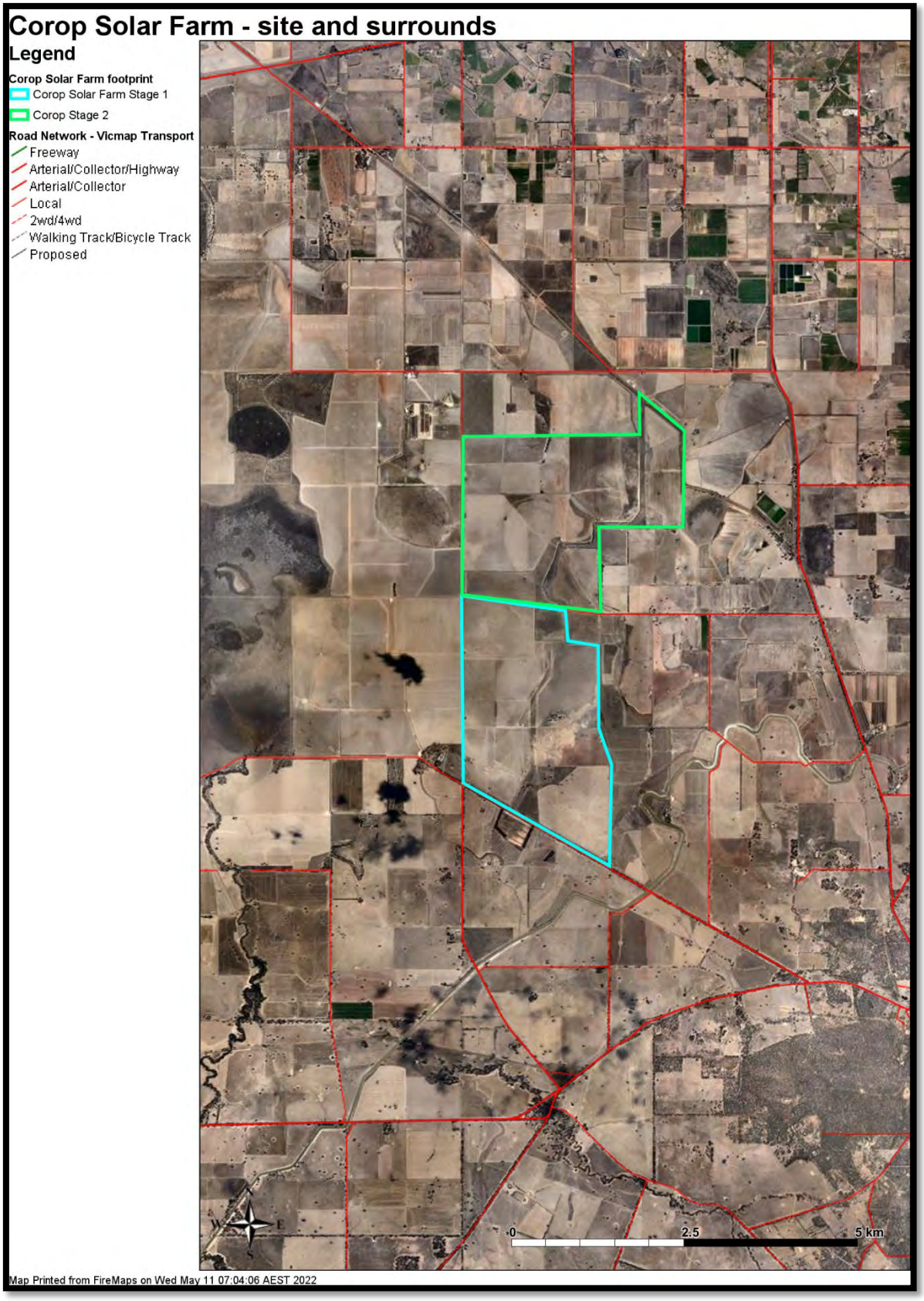


Figure 1 - Corop Solar Farm

3.2 Risk indicators

The following information has been obtained and provides relevant information that informs the analysis of risk. This information is primarily related to the existing bushfire risk that exists on the property and in the surrounding area.

3.2.1 Bushfire Management Overlay

The Bushfire Management Overlay (BMO) is a Planning Overlay that is provided within a Municipalities Planning Scheme. It is reliant on areas of a municipality being identified as at risk from bushfires.

The criteria to determine if a BMO should be implemented include:

- Criteria 1: Vegetation type and size
    - Forest, woodland, scrub, shrubland, mallee and rainforest vegetation that is 4 hectares or more in size.
- Criteria 2: Ember buffer
    - A 150m buffer is applied from the edge of vegetation identified in Criteria 1.
- Criteria 3: Extreme risk inclusions
    - Areas that fire authorities have advised may be subject to extreme landscape bushfires.

There are no BMO areas near the project area. The nearest BMO is located to the south east and surrounds the Rushworth township and to the north west that is associated with the Wallanjoe Swamp Wildlife Reserve.

3.2.2 Bushfire Prone Area

Bushfire Prone Areas (BPA) are areas that are subject to, or likely to be subject to, bushfires. The Minister for Planning has determined that specific areas are designated BPA's for the purposes of the building control system. Specific bushfire construction standards apply in designated bushfire prone areas in Victoria.

These bushfire construction requirements are aimed at improving bushfire protection for residential buildings. The creation of the BPA map fulfils one of the 67 recommendations made by the Victorian Bushfires Royal Commission.

A minimum construction standard applies to new residential buildings, schools, childcare centres, hospitals, aged care facilities, industrial buildings and associated buildings in designated Bushfire Prone Areas.

Landowners are required to build to a minimum Bushfire Attack Level of 12.5 in these areas as outlined within AS3959:2018 *Building in bushfire prone areas*.

The entire project area is within a BPA. The existence of the BPA will trigger the need to respond to Clause 13.02 of the Planning Scheme. Refer to Section 4.1.

3.2.3 Municipal Fire Management Plan[1]

The Campaspe Municipal Fire Management Plan (MFMP) identifies that the major fires that have occurred over the previous ten years have been predominantly in grassland. The MFMP identifies grass, crop and stubble as one of four risk landscapes present within the municipal footprint. Figure 4 is an excerpt from the MFMP and outlines the four landscapes.

Landscape	Fuel Hazard Level	Topography	Primary Driver	Spotting / Ember Potential
Grass, Crop and Stubble	Low to Moderate	Flat to Undulating	Wind	Low
Box and Ironbark Forest and Woodland	High to Extreme	Undulating	Fuel / Topography	Moderate / High
Riverine Forest	High to Extreme	Flat	Fuel	Low
Urban	Low to High	Flat to Undulating	Wind / Fuel	Low

Figure 2 - sourced from Campaspe MFMP

The outcome is that the landscape surrounding the proposed Solar Farm is considered low risk due to the low fuel level and low spotting potential.

3.2.4 Safer Together assessment[2]

The regional bushfire management strategy was developed to reflect the region's unique environments and communities. The strategy was developed through a regional planning process that was guided by the knowledge and priorities of experts, stakeholders and community members from Loddon Mallee.

The Loddon Mallee Bushfire Management Strategy 2020 has resulted in an analysis of bushfire risk. It has identified the large areas utilised for cropping and grazing and has considered these as low risk. The area surrounding the Rushworth township is considered at an elevated risk due to the forested vegetation in close proximity.

The strategy does not identify any additional requirements for the area surrounding the proposed Corp Solar Farm.

3.2.5 Bushfire history

An analysis of bushfire history in the area surrounding the proposed Corp Solar Farm indicates extensive activity in the forested areas surrounding the Rushworth township. This property itself has not been impacted by bushfires, according to the data available from DELWP.

[1] Campaspe Municipal Fire Management Plan - https://www.campaspe.vic.gov.au/Our-services/Emergency-management/Emergency-management-planning

[2] Loddon mallee Bushfire Management Strategy 2020 - https://www.safertogether.vic.gov.au/__data/assets/pdf_file/0029/493535/DELWP_BushfireManagementStrategies_2020_LoddonMallee_rr.pdf

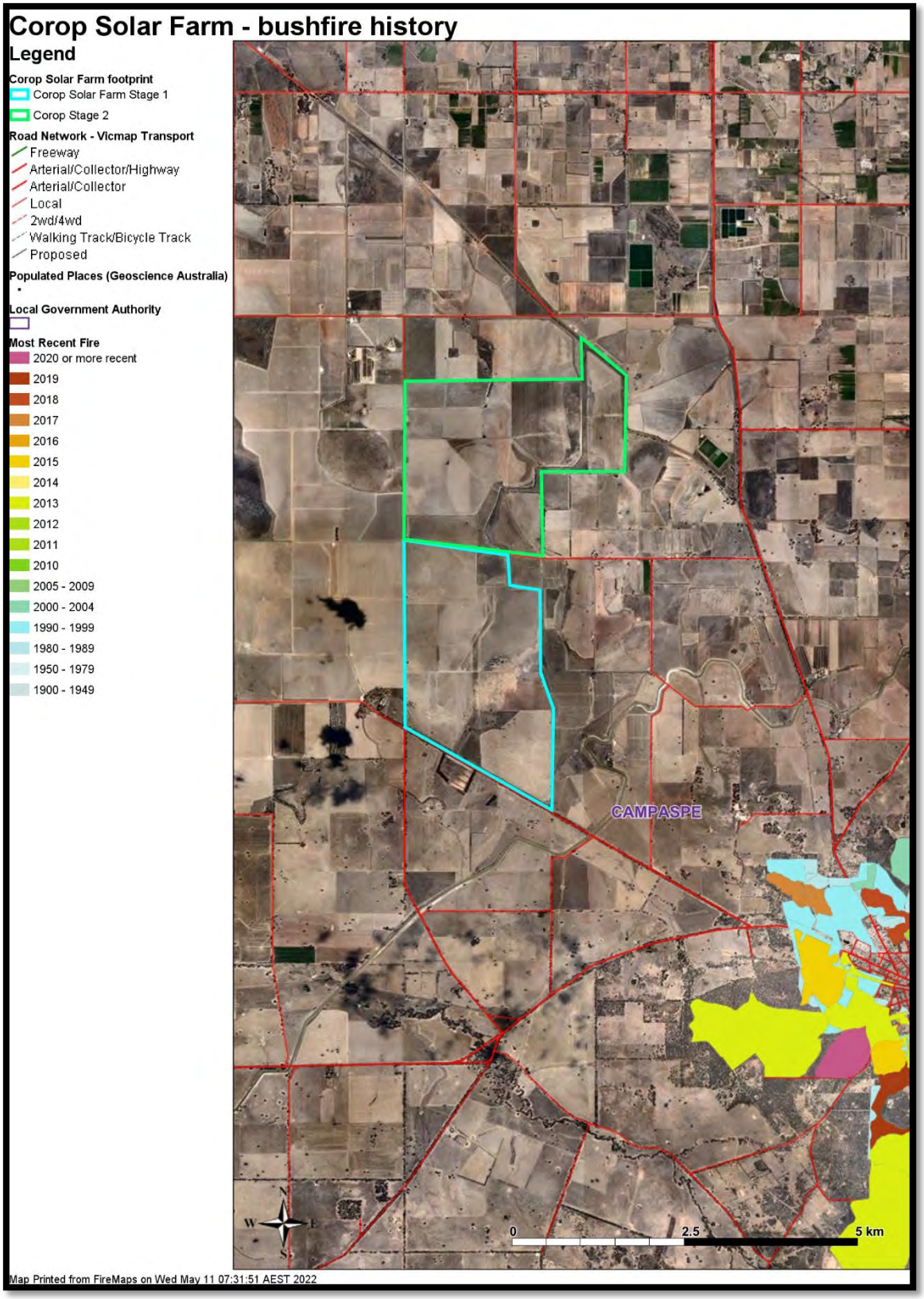


Figure 3 - Bushfire history

3.2.6 High risk vegetation

Often areas that can contribute to bushfire risk are contained within Public Land reserves. An analysis of this data has identified various areas surrounding the development that are recognised as Public Land. The closest area is to the west of the development and is the One Tree Swamp and Two Tree Swamp Nature Conservation Reserve. This Reserve is not classified as a Bushfire Management Overlay and would be reflective of its grassy type of vegetation layer. To the north west is the Wallenjoe Swamp and Mansfield Swamp Wildlife Reserves. These areas have been declared as Bushfire Management Overlay however would be considered low risk due to the elevated moisture content during the summer period.

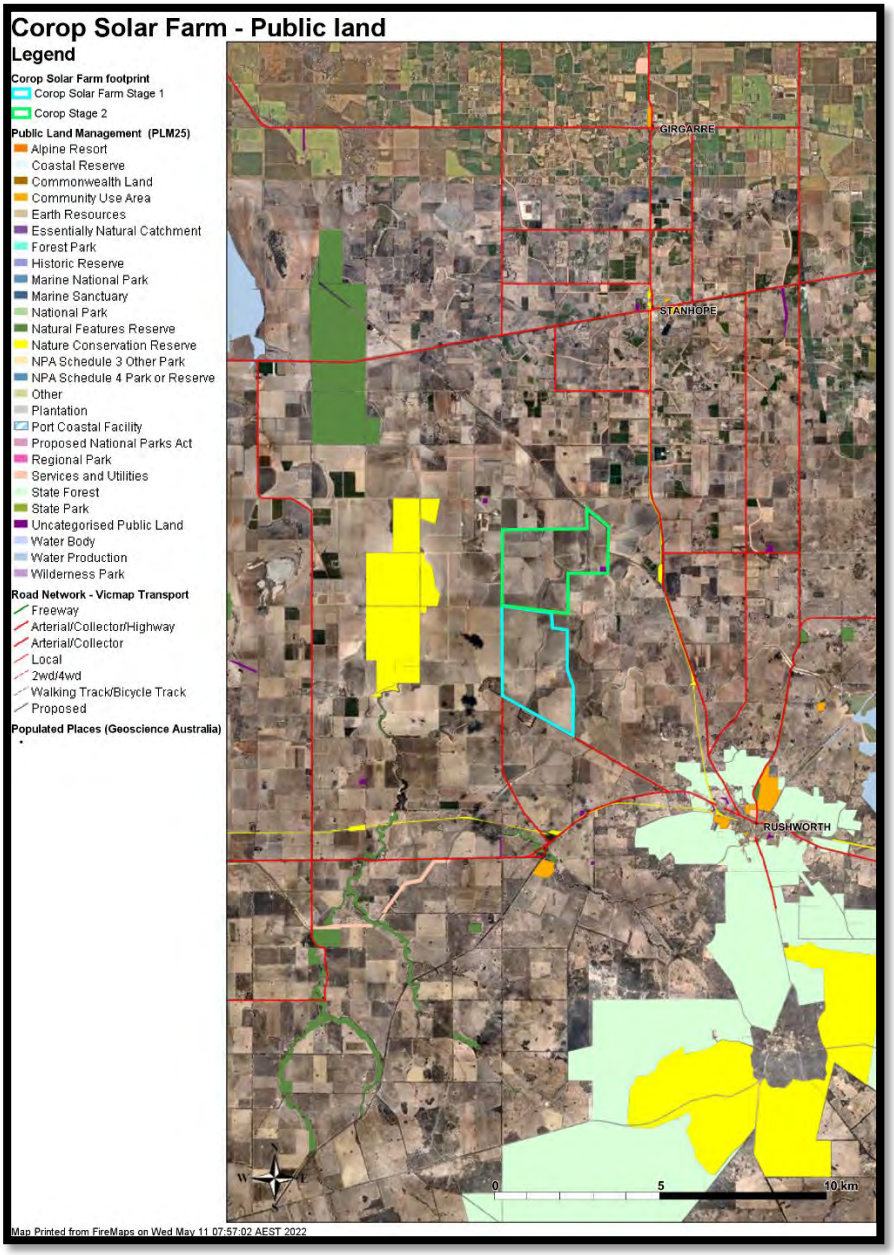


Figure 4 - Public Land in relation to the Corop Solar Farm and BESS

4 Risk assessment process

To effectively assess the fire risk associated with the proposal, this report is structured to assess risk using the following frameworks:

- Clause 13.02 – Bushfire Planning – Campaspe Planning Scheme
- Assessment against the requirements of the CFA Guideline *Design Guidelines and Model Requirements: Renewable Energy Facilities 2022*
- Risk assessment that meets section 5 of the CFA Guidelines.

The risk assessment provides the opportunity to pull all of the information together and make any additional recommendations that may be required to reduce risk to an acceptable level.

4.1 Clause 13.02 – Bushfire planning assessment

Clause 13.02 of the Campaspe Planning Scheme plans to strengthen the resilience of settlements and communities and prioritise the protection of human life through several objectives. However, it should be noted the proposal does not introduce new settlements into the landscape. The assessment has been undertaken within the context of an energy facility, including the Solar Farm and BESS.

4.1.1 Bushfire hazard assessment

Elevated bushfire behaviour in south east Australia is often dominated by strong and gusty north westerly winds followed by a south westerly change that normally occurs in the afternoon or early evening. These conditions have historically caused the loss of life and property and are usually associated with elevated fire danger warnings issued by the fire agencies.

Table 1 below outlines the hazard assessment relating to the proposed development. Figures 5 and 6 provide an overview of the likely bushfire scenarios within the surrounding area. The assessment has identified the presence of the north westerly and south westerly bushfire impacts. It is acknowledged that bushfires may approach from other directions however the treatment of the risk from these aspects will be sufficient to offset bushfire approaches from other directions.

Table 1 - Assessment against Clause 13.02

Bushfire hazard type	Conditions	Likely Scenario	Considerations
The site for the development	Once completed, the Solar Farm will be required to comply with conditions that will see the vegetation on the property managed	A bushfire starting on the property is unlikely once the project moves into the operations phase. The maintenance of vegetation on the property during the fire danger period will limit a fire's	During the construction phase, all vegetation within 100 metres of works areas is to be managed during the fire danger period so that

	during the fire danger period. However, during construction, there is a risk of a fire igniting and spreading through unmanaged vegetation.	ability to spread. The surrounding fire break and various roads through the development will limit a bushfire's ability to leave the property. During construction, any work that is occurring near unmanaged grassland has the potential to start a bushfire and leave the property.	grassland is always less than 100mm in height. The Emergency Management Plan includes requirements for when the site is to be closed during the construction phase.
Neighbourhood (400 metres) and local conditions (one kilometre)	The surrounding landscape within one kilometre is predominantly grassland associated with farming activities. There are roads and roadsides that travel through these areas.	A bushfire starting on an adjoining property is unlikely as shown through the bushfire history analysis. Wherever there is a road, there is an elevated risk of a fire starting that may be caused by vehicle and human related causes. As the Solar Farm is surrounded by a fire break and large areas of the development perimeter is adjoining roads, a bushfire that starts within proximity of the development will have some landscape features that may slow or stop the bushfires spread. The entire western boundary of the development abuts Geodetic Road North.	The provision of perimeter fire breaks will assist with slowing or stopping the bushfire from entering the property. This along with the management of vegetation during the fire danger period will limit the ability of a bushfire to burn through the development.
Landscape conditions (10 kilometres)	The predominant vegetation surrounding the development is grassland. There are isolated Public Land reserves within 10 kilometers of the development however these are a mix of grassland and woodland vegetation.	The likely bushfire behaviour will be dominated by the grassland vegetation. If the bushfire burns through the Public Land reserves, it will likely generate embers that will start spot fires ahead of the fire front. The surrounding landscape features including reduced fuel paddocks and roads will slow the bushfires spread	The perimeter fire breaks along with the abutting road on the western side will support the bushfire slowing or stopping as it approaches the development. This in addition to the requirement to maintain all vegetation on the property will see the

		under lower fire danger conditions.	development as likely assisting with the slowing or stopping of a bushfire on the western edge.

4.1.2 Bushfire Hazard Landscape Assessment

Figure 5 and 6 outlines the outcome of the bushfire hazard landscape assessment. The assessment identifies the two likely scenarios that may occur in relation to the Solar Farm and Bess. Both scenarios are consistent in that the likely bushfire impact on the development is from either the north west or south west. Table 1 provides a description of each of the scenarios contained in Figure 5 and 6.

Table 2 - Bushfire scenarios

Scenario	Description
A	A bushfire that approaches from the north west is likely to be under elevated bushfire conditions. Traditionally a north westerly wind influence is associated with elevated fire danger days. The bushfire will be influenced by the availability of vegetation and in this landscape it is likely to be fragmented. This is due to the various uses of the paddocks and the crop growth stage or the level of grazing by stock. The amount of vegetation along roadsides may either support fire spread or slow the fire to enable suppression activities to be successful. The presence of the Public Land Reserves to the north west may support the generation of embers however it is not anticipated for any significant increase in bushfire intensity to occur. The reserves are associated with swamps and are dominated by grassland areas. Due to the lack of forested areas and trees across the landscape immediately surrounding the Solar Farm, it is not likely for embers to assist with bushfire spread.
B	A bushfire that approaches under a south westerly wind influence usually occurs late in the day after a north westerly wind has been influencing the weather conditions. The wind change can occur after a bushfire has been burning for some time under the north westerly influence. Depending on the location of the bushfire, the entire western side of the Solar Farm can come under threat at the same time. A bushfire that starts and then travels towards the property under a south westerly wind influence will be influenced by the various farming activities including grazing and cropping. As there is limited trees and forested areas, it is unlikely for medium to long distance spotting to occur. The various roads and other landscape features will likely slow the bushfires progression and limit the impact.

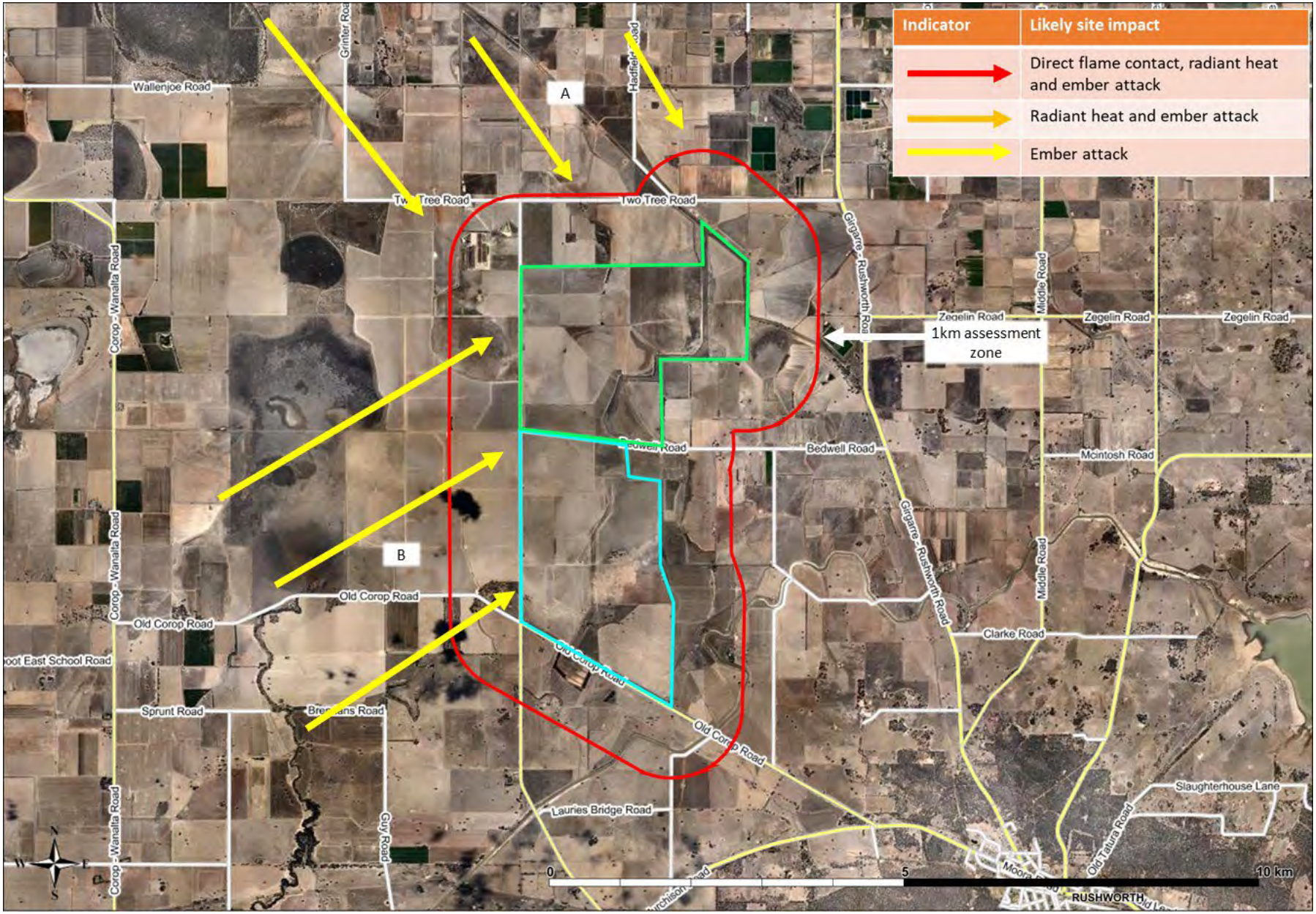


Figure 5 - 1 kilometre landscape assessment

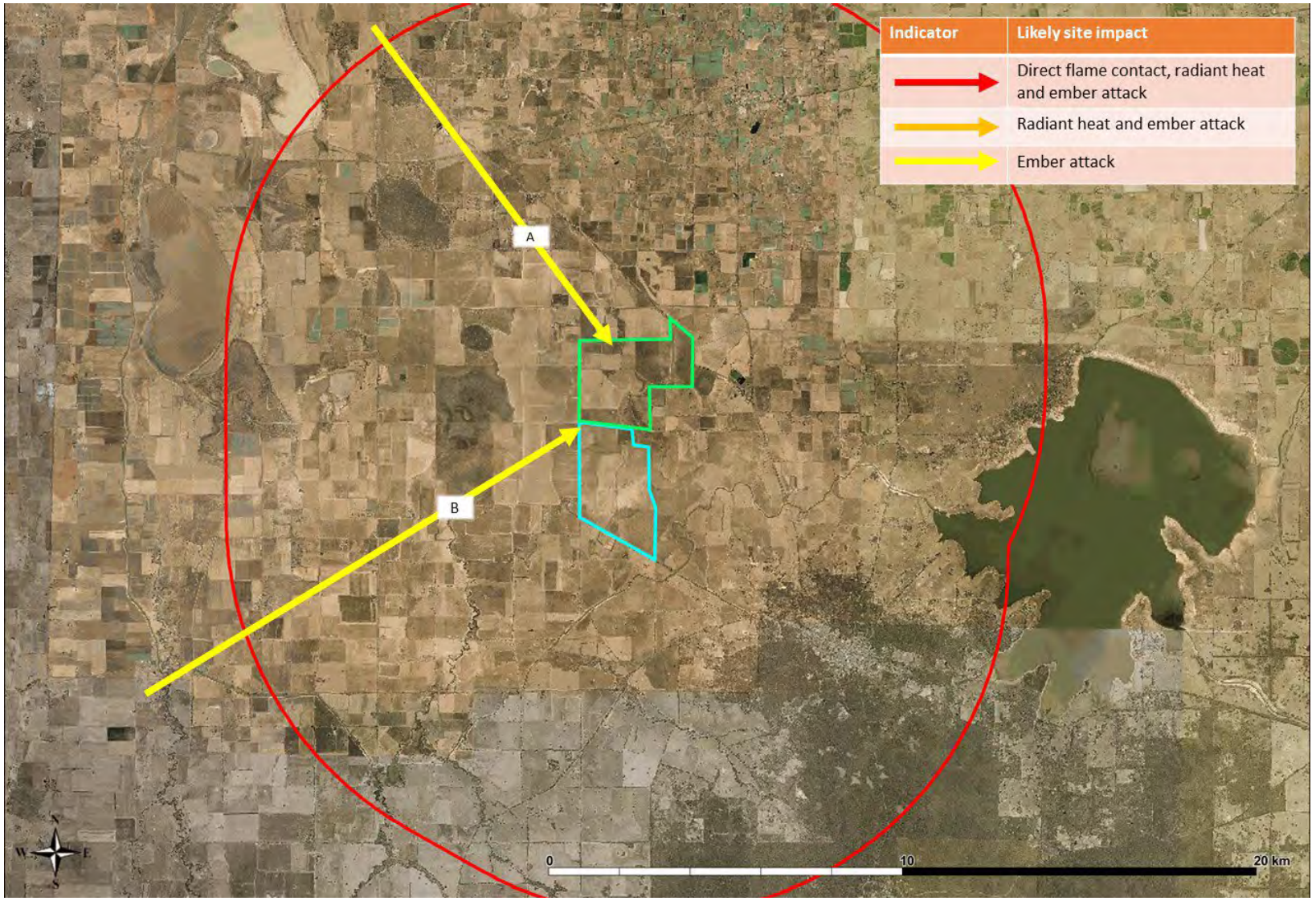


Figure 6 - 10 kilometre landscape assessment

Settlement planning objectives	Project response	Achieved (✓ or ×)
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 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).	The location of the development is achieving a balance between the need to place Solar Farms in isolated areas and being in a low bushfire risk location. The analysis contained within Section 3 has identified that the various fire management strategies do not identify this area as being at an elevated risk of bushfire. The predominant grassland areas surrounding the development are conducive to generating fast running bushfires but burning at a low intensity. The development through compliance with the CFA Guideline can achieve less than 12.5 kW/m² when assessed using AS3959.	✓
Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.	The development itself will create areas that can be considered as achieving BAL Low under AS3959. These areas include the Loading Bay and Storage areas and car parking areas. Each stage is provided with an area that can be considered as BAL Low. The development is also close to townships including Rushworth and Stanhope that will provide areas that are considered to be BAL Low. It is noted that areas of Stanhope are not within a Bushfire Prone Area.	✓
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.	The Solar Farm and BESS will be provided with a range of protection measures that will ensure the bushfire risk to existing and future surrounding properties will not increase. These measures include: • Fire breaks around the entire perimeter of the development. • The requirement to maintain vegetation on the entire site to a maximum of 100mm during the fire danger period. • Provision of static water supply to support firefighting operations.	✓
Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire	This development, whilst introducing ignition risk, through the increased management of vegetation on the property and perimeter fire breaks, will actually reduce the risk to the surrounding landscape when compared to the existing risk. This development will	✓

protection measures and where possible reducing bushfire risk overall.	introduce a more than 1000 hectare managed space in the landscape. This development will likely improve the protection of Rushworth from a bushfire approaching under a north westerly wind influence.	
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.	The bushfire risk has been assessed at the landscape level and due to the surrounding landscape being dominated by grasslands associated with farming activities, the risk is considered low. This development will not change the current expected bushfire behaviour in the landscape, it will likely reduce the risk to the surrounding areas due to the area now being a managed landscape with reduced vegetation.	✓
Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.	As outlined previously, this site provides an effective balance between the need for this type of development to be located away from residential properties and being in areas that are not prone to bushfires that can cause neighbourhood scale destruction.	✓
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 3959-2009 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009).	The development will achieve a less than BAL 12.5 rating when assessed against AS3959. This will be achieved due to the separation between the adjoining properties and the Solar Farm through the provision of a fire break.	✓

4.1.3 Assessment against Clause 13.02 summary

The assessment against Clause 13.02 has identified that the development is within a grassland dominated landscape that is utilised for farming activities. As it is required to achieve the requirements outlined within the CFA Guidelines as a minimum, this will ensure that the settlement planning objectives are achieved.

The development will likely reduce the risk to the surrounding properties and provide a managed area within the landscape.

4.2 Analysis against CFA Guideline

CFA has produced Guidelines that outline its requirements to address fire risk within renewable energy installations. Section 5 of the Guidelines outlines the process of analysing risk to enable the identification of hazards that may or can cause fires.

The CFA Guideline also specifies model requirements for renewable energy installations. Prior to the risk assessment being undertaken, it is important to assess the Solar Farm and BESS project against these requirements. This will increase the effectiveness of the risk assessment.

The following table provides the model requirements from CFA's Guideline and how this project addresses the specific areas.

Table 3 - Response to CFA Guideline

Model requirement	Compliance	Comments
Section 3 – consulting with CFA		
Early consultation, prior to the development of the planning permit application, ensures that CFA can effectively consider emergency response implications.	✓	CFA has been consulted on the project and ongoing consultation will continue to occur in particular through the development of the Fire Management Plan and Emergency Management Plan once the Planning Permit has been issued.
Section 4 – Planning Applications		
Planning applications must address all relevant aspects of fire safety, including landscape and bushfire hazards, and hazards to and from the proposed technologies.	✓	This RMP forms part of the Planning Permit application and includes all fire related considerations relating to a Solar Farm and BESS.
Section 6- Facility Location and Design		
Section 6.1 – Facility Location		
Planning applications for all renewable energy facilities proposed in high-risk environments must address the following, in addition to providing an assessment against policy at Clause 13.02-1S (Bushfire Planning):	✓	This RMP includes an assessment against Clause 13.02 within Section 4.1.

a) The impact of any ignitions arising from the infrastructure (solar panels, wind turbines, battery energy storage systems, electrical infrastructure) on nearby communities, infrastructure and assets.	✓	This report considers the impact and the likelihood of fires that leave the property. The Clause 13.02 assessment has considered this and has also been addressed within the risk assessment in Section 5.
b) The impact of bushfire on the infrastructure (eg. ember attack, radiant heat impact, flame contact).	✓	This report considers the impact of bushfire on the infrastructure. Clause 13.02 assessment considered this and has also been addressed within Section 5.
c) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.	✓	The Clause 13.02 assessment has considered this and determined that the project will likely reduce the risk in the landscape from bushfire. The requirements including managing vegetation on the property during the fire danger period and the perimeter fire break supports the reduction of risk.
Section 6.2 – Facility Design		
Section 6.2.1 – Emergency vehicle access		
All facilities		
a) Construction of a four (4) metre perimeter road within the perimeter fire break.	✓	A four metre wide perimeter road is being provided within the fire break.
b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes.	✓	This has been included within the design.
c) Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.	✓	This has been included within the design.
d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than fifty (50) metres.	✓	The site is mainly flat, with only small slopes present. There are no roads that will require an assessment of the grade.

e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	The site is mainly flat with only small slopes present. There are no roads that will require an assessment of dips.
f) Roads must incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.	✓	This has been included within the design.
g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure.	✓	The BESS and substation are located near Old Corop Road which will be the likely access road that the fire brigade will use. Driveway access is provided to these areas and across the development.
h) The provision of at least two (2) but preferably more access points to the facility, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points must be informed through a risk management process.	✓	The property is provided within a main entrance from Old Corp Road with additional access points available around the site. With the surrounding road network and the perimeter access road being included, there is effective all year round access to the entire site.
Section 6.2.2 Firefighting Water Supply		
All Facilities		
a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	Static water supplies will be located where possible at entrance locations or at other strategic locations around the site. The final location of static water supplies will be completed in conjunction with CFA.
b) Static water storage tank installations must comply with AS 2419.1-2005: Fire hydrant installations – System design, installation and commissioning.	✓	This has been included within the design.

c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	This has been included within the design.
d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	Site management will have an arrangement with a local water carrier to ensure static water supplies are refilled within 24 hours.
e) The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.).	✓	This has been included within the design.
f) The hard-suction point must 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.	✓	This has been included within the design.
g) The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.	✓	This has been included within the design.
h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.	✓	This has been included within the design.

i) The road access and hardstand must be kept clear at all times.	✓	This has been included within the design.
j) The hard-suction point must be protected from mechanical damage (eg. bollards) where necessary.	✓	This has been included within the design.
k) Where the access road has one entrance, a ten (10) metre radius turning circle must be provided at the tank.	✓	This has been included within the design.
l) An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	This has been included within the design.
m) Signage (Figure 3) indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	This has been included within the design.
n) Signage (Figure 4) must be provided at the front entrance to the facility, indicating the direction to the static water tank.	✓	This has been included within the design.
Solar Energy Facilities		
a) The fire protection system for solar energy facilities must incorporate at least one (1) x 45,000L static water tank for every 100ha. For example, a 500ha site requires a minimum of five (5) x 45,000L static water tanks.	✓	The development is approximately 1000 hectares and will result in 11 x 45,000 litre static water supplies spread across the site. Where possible these will be located at entrances to the property with additional tanks located following discussions with CFA.
b) A fire water tank must be located at the primary vehicle access point to the facility, and elsewhere in consultation with CFA.	✓	This has been included within the design.
c) Fire water must be provided to cover buildings, control rooms,	✓	This has been included within the design.

substations and grid connections, in consultation with CFA.		
d) Additional fire protection systems or equipment required under any Australian Standards for dangerous goods must be provided as prescribed.	✓	There is no dangerous goods storage specified for the site.
Battery Energy Storage Systems		
1) For facilities with battery energy storage systems, the fire protection system must include as a minimum:		
b) Where no reticulated water is available, a fire water supply in static storage tanks, where:		
i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2005 flowing for a period of no less than four hours at 20L/s, whichever is the greater.	✓	Once the final design has been completed, the provision of static water supply for the BESS will comply with this requirement.
ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2005, Table 3.3. *(E.g., For battery installations with an aggregate area of over 27,000m2, 4 hydrant outlets are required to operate at 10L/s for four hours, which equates to a minimum static water supply of 576kL.)*	✓	Once the final design has been completed, the provision of static water supply for the BESS will comply with this requirement.
iii. Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.	✓	This will be included within the design to the satisfaction of CFA.
iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any	✓	This will be included within the design to the satisfaction of CFA.

infrastructure (electrical substations, inverters, battery energy storage systems, buildings).		
v. The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (Eg., Fire water tanks are to be located closer to the site entrance that the battery energy storage system).	✓	This will be included within the design to the satisfaction of CFA.
vi. The fire water supply must comply with AS 2419.1-2005: Fire hydrant installations - Section 5: Water storage.	✓	This will be included within the design to the satisfaction of CFA.
Substations		
Fire water must be available to substations.	✓	The substation is located adjacent to the BESS and near the property entrance where a 45,000 litre static water supply is located. There are sufficient water supplies in the area to support firefighting activities.
Section 6.2.4 – Fire Breaks		
A fire break must be established and maintained around:		
a) The perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.	✓	The solar panels are set back from all perimeter boundaries. Within this space will be a fire break and access road. A vegetation screen will be established along the western boundary of the development that will be a maximum of 9 metres wide and contain 4 rows of trees/shrubs.
b) The perimeter of control rooms, electricity compounds, substations and all other buildings onsite. The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not	✓	All infrastructure is protected by the provision of a 10 wide fire break.

create the potential for ignition of on-site infrastructure.		
Battery Energy Storage Systems		
A fire break must be established and maintained around battery energy storage systems and related infrastructure.	✓	A fire break of 10 metres has been included in the design. The surrounding areas include works area, substation and solar panels and will also be managed.
Section 6.2.5 – Design Specific to Facility Type		
Solar Energy Facilities		
Solar energy facilities are to have a minimum six (6) metre separation between solar panel banks.	✓	This has been included within the design.
Battery Energy Storage Systems		
1) The design of the facility must incorporate:		
a) A separation distance that prevents fire spread between battery containers/enclosures and: • Other battery containers/enclosures. • On-site buildings. • Substations. • The site boundary. • Any other site buildings. • Vegetation. *Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements.*	✓	The final decision in relation to a BESS system will be made following the Planning Permit decision. Further design work will then be undertaken to ensure that the BESS layout meets CFA Guideline requirements including separation of the battery units from each other and from other infrastructure including the substation. The location of the BESS is set back from the road and will be in a managed area where a fire break will be provided along with vegetation management requirements between the road and the BESS. Following the Planning Permit being issued, further risk analysis work will be undertaken to support the location and design of the BESS to the satisfaction of CFA.
b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m, or greater	✓	A fire break of 10 metres is being provided around the entire perimeter of the battery facility This is supported by the vegetation

where determined in the Risk Management Plan. Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. *The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.*		management requirements in and around the Solar Farm along with the perimeter road.
c) A layout of site infrastructure that: i. Considers the safety of emergency responders. ii. Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. iii. iii. Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure.	✓	The design of the entire development and the large open space areas between the Solar Farm and the BESS will ensure there is sufficient space available for firefighters to stage and assess the emergency prior to entering the area. The vegetation management arrangements for the entire site will reduce the potential for fires to either leave or enter the site.
2) Battery energy storage systems must be:		
a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).	✓	This has been included within the design.
b) Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of fire at the battery energy storage system.)	✓	The main entrance is of sufficient distance from the BESS to enable access to the property without being impacted by smoke. Once on the property there are several staging locations that will ensure firefighters will not need to enter the smoke plume.
c) Provided with in-built detection and suppression systems. Where these systems are not provided, measures to	✓	The BESS will be provided with detection and suppression systems and their performance will be included within the further risk analysis work that will be completed following the

effectively detect and/or suppress fires within containers must be detailed within the Risk Management Plan.		selection of the most appropriate battery technology.
d) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.	✓	This will be a requirement of the battery technology chosen.
e) Provided with suitable access roads for emergency services vehicles, to and within the site, including to battery energy storage system(s) and fire service infrastructure.	✓	Driveway access will provided within and around the BESS area.
f) Installed on a non-combustible surface such as concrete.	✓	The battery area and the supporting infrastructure are being stored on a non combustible surface which will be maintained.
g) Provided with adequate ventilation.	✓	The batteries are stored with sufficient ventilation around and between the pack of containers.
h) Provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers/enclosures.	✓	There will be various protection systems installed including bollards to ensure the battery enclosures and other infrastructure are protected from damage from vehicles and other equipment.
i) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.	✓	This has been included within the design.
j) Provided with spill containment that includes provision for management of fire water runoff.	✓	The detailed site design will include the provision for containing fire water runoff. This will also include an assessment to determine the amount of fire water required to be contained on the property.
Section 7 – Facility Construction and Commissioning		
Section 7.1.4 – Emergency Management		

An Emergency Management Plan must be developed for the construction and commissioning phase of the facility.	✓	An Emergency Management Plan will be developed for both the construction and operations phase.
Section 8 – Facility Operation		
Section 8.1 – Vegetation and Fuel Management		
Facility operators must undertake the following measures during the Fire Danger Period:		
a) Grass must be maintained at or below 100mm in height during the declared Fire Danger Period.	✓	This requirement will be included within the Fire Management Plan. This will also include the areas that have been avoided including waterways. These areas will continue to be grazed by sheep to maintain low fuel loads.
b) Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation.	✓	This requirement will be included within the Fire Management Plan.
c) Restrictions and guidance must be adhered to during the Fire Danger Period, days of high (and above) fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au).	✓	This requirement will be included within the Fire Management Plan.
d) All vehicles and heavy equipment must carry at least a nine (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.	✓	This requirement will be included within the Fire Management Plan.
Section 8.2 – Maintenance		
All Facilities		
Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. Maintenance must be in	✓	This requirement will be included within the Fire Management Plan.

line with any relevant Australian Standards and the manufacturer's requirements.		
Section 8.4 Facility and System Monitoring		
All Facilities		
Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.	✓	In addition to the detection and suppression systems, the site will be provided with a SCADA system that will monitor the day to day operations of the batteries and associated infrastructure. The system includes a range of sensors that are preprogramed to send alert messages and includes: • Over temperature • Under temperature • Under voltage warning • Power off fault • Voltage and current changes. These alerts are automatically transmitted to a monitoring centre. There are appropriate levels of back up communication systems installed in the event of power failures or other events that may interrupt the communications connections.
Section 9 – Fire Management Planning		
All Facilities		
A Fire Management Plan must be developed for the facility, in conjunction with CFA, before commissioning of the facility.	✓	A Fire Management Plan will be developed prior to the commissioning of the BESS. This Plan will be provided to CFA for their consideration and feedback.
Section 10 – Emergency Management Planning		
All Facilities		
An Emergency Management Plan must be developed specific to the facility, in conjunction with CFA,	✓	An Emergency Management Plan will be developed prior to the commissioning of the BESS. This Plan will be provided to CFA for their consideration and feedback.

prior to commissioning of the facility.		
Section 10.2.1 – Developing an Emergency Information Book		
All Facilities		
An Emergency Information Book must be developed and available to emergency responders. Emergency Information Books must be located in Emergency Information Containers, provided at each vehicle entrance the facility.	✓	An Emergency Information Book will be provided at the site entrances in a container that is protected from weather. The final decision on how many and the location will be made in conjunction with CFA.

5 Risk Assessment

5.1 Introduction

The risk assessment process involves identifying, analysing, evaluating and treating the identified risks. The overall risk assessment process requires a consistent approach and follows *AS ISO 31000:2018 Risk management – Guideline*s as incorporated into the National Emergency Risk Assessment Guidelines (NERAG). Figure 1 provides an overview of the risk assessment process as outlined within *AS ISO 31000:2018 Risk management – Guidelines*.

Risk management is the process of recognising risk and developing methods to both minimise and manage the risk. This requires the development of a method to identify, prioritise, treat (deal with), control and monitor risk exposures.

A risk assessment is a function of the likelihood of an adverse event occurring and the consequence of the event. A comprehensive risk assessment will identify potential risks and consequences and therefore assist with the development of mitigation actions.

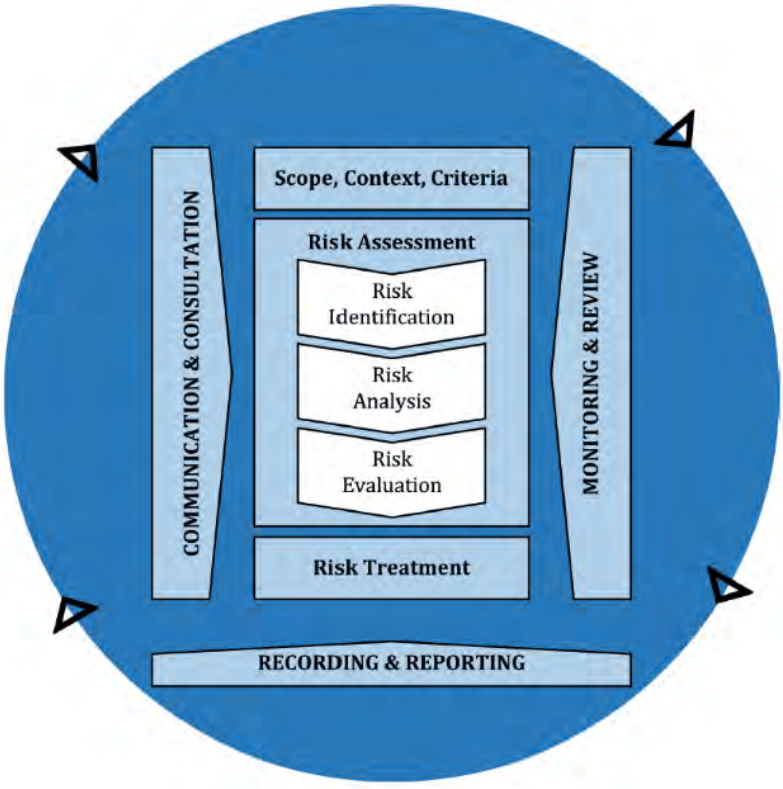


Figure 7 - Overview of AS/NZS ISO 31000-2018 risk management process

This report seeks to follow the steps outlined within the risk management guideline along with the process outlined within NERAG. The outcome of this assessment is a detailed understanding of hazards, the likelihood and consequence of a hazard becoming an emergency, and the treatments identified to manage this risk.

5.2 Context

The assessment of fire risk is a key requirement imposed on the development by CFA through the Planning Permit. The CFA Guideline outlines the types of hazards that may need to be considered in relation to Solar Farm and BESS infrastructure at the design, construction and operation phases.

5.3 Analysis of fire risk

Solar Farm and BESS infrastructure is largely acknowledged as having limited potential to cause fires and is considered reasonably safe. There have been fires previously and these have been considered during the assessment of risk outlined within this report.

It is important the assessment of risk considers the various stages of the project including construction and the operation phase.

5.3.1 Assessment of fire risk during construction

The construction phase includes various stages including site works, construction of footings and the installation of the solar panels and battery units. This stage also includes the commissioning of the technology and other systems including fire protection systems. This ensures the relevant connectivity is installed to ensure that all alerts and system messages are transmitted to an appropriate monitoring location.

A recent fire that occurred at the Victorian Big Battery[3] installation on the outskirts of Geelong has been assessed and reports are available that outlines what occurred and how system manufacturers and installers should be considered in the future. This fire occurred during the commissioning phase of the unit. In summary, the isolation of the unit whilst it contained a charge was considered an incorrect process[4].

5.3.2 Assessment of fire risk during operations

The operations phase follows the commissioning stage of the project, and the role of maintenance becomes critical to ensure that the system operates as it was designed, for the life of the

[3] https://victorianbigbattery.com.au/wp-content/uploads/2022/01/VBB-Fire-Independent-Report-of-Technical-Findings.pdf

[4] https://esv.vic.gov.au/wp-content/uploads/2021/09/VBB_StatementOfFindings_FINAL_28Sep2021.pdf

development. The ongoing maintenance of the infrastructure and development is critical to ensure the ongoing management of fire risk.

All the system components are to be considered as critical as they all are contributing to the ongoing safe operations. The system components including monitoring connectivity, fire protection systems, vegetation management, site access controls, battery and other safety systems.

5.4 Risk identification

Through discussions with the client, review of various documentation and the consideration of previous fire history that involved Solar Farms and BESS infrastructure, the following hazards have been identified:

Figure 8 - Hazard identification and description

Hazard	Description
Electrical hazards causing a fire	Electrical faults and/or hazards can be a key cause of fire in Solar Farm and BESS infrastructure. BESS hazards including battery faults, overcharging, rapid discharge, loss of remote monitoring systems, internal short circuits and overheating. Solar Panel hazards include faulty wiring and connections.
Fire causing spread to adjoining infrastructure on the property	A fire that has started in the development may spread to adjoining infrastructure or surrounding facilities. Rapid escalation of the fire size and complexity can create issues for onsite staff and contractors, firefighters and the community.
Fire causing offsite impacts	Any fire on the property that can spread to adjoining properties most likely through vegetation connectivity, on bushfire risk days can start fires in the surrounding landscape that can threaten the community.
Offsite fire impacting on the site	A bushfire burning through the surrounding landscape can enter the property and threaten the infrastructure by potentially starting new fires.
Fire water runoff	In the event of a fire, firefighters will respond and use water to either extinguish or cool the surrounding area until the infrastructure is deemed safe.
Staff and firefighters	The response to a fire by staff, contractors or firefighters can be dangerous due to the various safety hazards associated with a fire in this type of infrastructure.

The above list may not be exhaustive however it is believed that it will allow the assessment of most hazards that may be encountered in a development of this type.

5.5 Risk analysis

The analysis of risk requires the consideration of the likelihood and consequence of an event occurring and measuring this against a predetermined matrix to enable the consideration of each risk both individually and collectively.

For this assessment, a 3 x 3 matrix has been developed that enables the effective consideration of risk and to enable a comparison between the outcome of the hazard assessment.

5.5.1 Likelihood

An assessment of the likelihood of a fire occurring at this development including the potential to impact on people and other infrastructure/property is a key part of the risk assessment. The following will be considered during the assessment of an event occurring:

- Potential for an unplanned fire to occur
- Potential for this ignition to develop and exhibit significant fire behaviour
- Potential for that fire to destroy assets
- Potential for people to be affected or threatened
- The potential for it to develop into a major fire.

Recommendations for mitigation actions in the area may be determined by a number of approaches depending on the level of assessed risk. Strategies to lower risk are provided to ensure the risk is managed to an acceptable level.

An assessment of likelihood considers factors such as:

- Sources of ignition
- Use of the property and/or surrounding area
- History of ignitions within similar infrastructure
- Ability to spread from the property.

Table 4 - Likelihood table

Likelihood scale frequency	Description
Very Likely	Almost certain and will definitely occur, and /or high level of recorded incidents, or there is a strong likelihood that the event will occur.
Likely	High probability it may occur; and/or some recorded incidents.
Unlikely	It is not expected to occur, but it is not impossible.

5.5.2 Consequence

Consequence refers to the potential damage that could result from a fire occurring in relation to people and assets. In assessing the possible consequences, the assessment considers a variety of hazard, exposure and vulnerability factors including:

- The likely number of people at the facility
- The proximity of other assets
- The location of surrounding properties and the type of activities

- Response capability if an event occurred.

The consequence scale refers to the potential impacts which could occur should a fire occur.

Table 5 - Risk assessment consequence table

Consequence scale	Description
Major	• Significant consequences that may include long term closure of the site, major damage or effect. • Loss of life and/or significant injuries that cause disability. • Major offsite impacts causing destruction of other assets or life loss.
Moderate	• Moderate loss of property with the facility operating again in the short term. • Medical treatment may be required but no fatalities or long term affects. • Localised damage that can be rectified. • Some environmental impact with short to long-term effects.
Minor	• Minor or negligible consequences or effects. • Isolated damage to property with no ongoing impact on operations. • First aid injuries with no hospitalisations required. • Impact on the environment with short term effects.

The risk rating table is used to combine likelihood and consequence to obtain a risk score. The risk score is used to aid decision making by determining which areas are at the greatest risk of a fire starting and spreading through the estate. Actions can be prioritised using this method to determine where risk mitigation works will occur.

Table 6 - Risk rating table

RISK RATING TABLE			
	CONSEQUENCE		
	Minor	**Moderate**	**Major**
LIKELIHOOD	Minor or negligible consequences or effects. Isolated damage to property with no ongoing impact on operations. First aid injuries with no hospitalisations required. Impact on the environment with short term effects.	Moderate loss of property with the facility operating again in the short term. Medical treatment may be required but no fatalities or long term affects. Localised damage that can be rectified. Some environmental impact with short to long-term effects.	Significant consequences that may include long term closure of the site, major damage or effect. Loss of life and/or significant injuries that cause disability. Major offsite impacts causing destruction of other assets or life loss.
Very Likely: Almost certain and will definitely occur, and /or high level of recorded incidents, or there is a strong likelihood that the event will occur.	Medium	Very High	Extreme
Likely: High probability it may occur; and/or some recorded incidents.	Medium	High	Very High
Unlikely: It is not expected to occur, but it is not impossible.	Low	Medium	High

The outcomes of the risk assessment are used to inform the recommendations. These are aimed at providing guidance to management to reduce the fire risk at the property.

5.5.3 Risk analysis worksheets

The following worksheets have assessed the hazards identified in section 5.4 and results in a risk classification along with strategies to lower risk if it is deemed required. The initial assessment of risk is based on the information that has been supplied to date. The development of additional strategies to lower risk are made as either there was no information provided that identified the treatment or further clarity is required to considered.

Table 7 - Risk assessment - Electrical hazards causing a fire

RISK	Electrical hazards causing a fire
CAUSE	Electrical faults and/or hazards can be a key cause of fire in Solar Farm and BESS infrastructure. Hazards including battery faults, overcharging, rapid discharge, loss of remote monitoring systems, internal short circuits and overheating. Solar Panel hazards include faulty wiring and connections.
LIKELIHOOD	Likely
JUSTIFICATION	There are some examples of fires within BESS technology that indicates that when faults occur, they can escalate into challenging events. Solar Farms have also experienced fire events and are usually as a result of faulty wiring or connections. The BESS and Solar Farm technology will comply with the CFA Guidelines which ensures that the technology meets the relevant Standards and Codes.
CONSEQUENCE	Moderate
JUSTIFICATION	The consequence of an electrical hazard causing a fire is limited due to the various risk treatments that are required by the CFA Guideline including: • Non-combustible surface that won't support fire spread through vegetation accumulation • SCADA monitoring system that will send alerts to the monitoring centre • Compliance with UL9540A • Appropriate separation between battery containers and other infrastructure • Within the BESS a smoke detection and fire suppression system connected to a Fire Indicator Panel that will alert the monitoring centre • Solar Farm layout that ensures there is separation provided across the development.
RISK RATING	High

STRATEGY TO LOWER RISK	The requirements outlined within the response to the CFA Guideline will be sufficient to ensure the risk doesn't increase beyond medium. The additional requirements include:
	• Development of Emergency Management Plan that includes in addition to that required by CFA:
	  ○ A system to communicate effectively between the monitoring centre and the onsite staff and contractors.
	  ○ Provision of 24/7 contact details for the fire brigade to contact in the event of an emergency or threat of an emergency.
	• Developing a procedure that requires a technician to be deployed to the site when the site monitoring communications are down.
	• The SCADA monitoring system that is monitoring all system alerts and sensors that will indicate the early stages of a fault or emergency event and provides the ability to commence shut down procedures remotely from the site.

RESIDUAL RISK	Medium (unlikely/moderate)

Table 8 - Risk assessment - Fire causing spread to adjoining infrastructure on the property

RISK	Fire causing spread to adjoining infrastructure on the property
CAUSE	A fire that has started in a single battery unit or a connection within the Solar Farm may spread to adjoining batteries, facilities or other infrastructure. Rapid escalation of the fire size and complexity can create issues for onsite staff and contractors, firefighters and the community.
LIKELIHOOD	Unlikely
JUSTIFICATION	The monitoring systems that will be installed will send alerts to the monitoring station. These include smoke detection and fire suppression systems and the day to day monitoring system that will trigger an immediate response. The battery system is provided with a detailed operating manual that outlines the likely cause of an alert and how the operators are to respond. This also includes the procedures to follow if a smoke detector or the fire suppression system is activated. The site procedures will include a provision that ensures all alerts are addressed within two hours of activation. This will also include an immediate response to any smoke detector or fire suppression system activation. Upon activation of the fire protection systems, the monitoring centre will determine an appropriate response that may include: • Notify the on-call technician to attend the site. • Call 000 and report the activation to the fire brigade in addition to notifying the on call technician to attend. These procedures will be included within the Emergency Management Plan and reviewed by CFA. The battery system enclosure is non combustible and will provide a level of protection if a fire does occur inside the enclosure. If a fire occurs in an adjoining area of the site, the same enclosures will provide a level of protection. The majority of the infrastructure that supports the BESS and the Solar Farm is non combustible or has low quantities of combustible materials.
CONSEQUENCE	Minor
JUSTIFICATION	The consequence of a fire affecting adjoining areas of the plant is likely to be minor. The various protection systems, separation between the infrastructure and early notifications and other treatments will ensure that early intervention can occur.
RISK RATING	Low
STRATEGY TO LOWER RISK	Due to the low rating, no additional strategies are required to be implemented beyond compliance with the CFA Guideline as outlined in Section 4.
RESIDUAL RISK	Low

Table 9 - Risk assessment - Fire causing offsite impacts

RISK	Fire causing offsite impacts
CAUSE	Any fire on the property that can spread to adjoining properties most likely through vegetation connectivity, on bushfire risk days can start fires in the surrounding landscape that can threaten the community.
LIKELIHOOD	Unlikely
JUSTIFICATION	The compliance with CFA Guidelines requires a range of mitigation strategies implemented including: • Concrete surface under the battery containers and other infrastructure. • Provision of a fire break and additional managed area between the fire break and the boundary fence. • The battery systems are contained within the metal cabinets and any fire activity will mostly stay within the cabinets. • All solar panels are setback at least 20 metres from the boundary fence. In addition to the CFA Guideline requirements, the entire western and southern boundaries along with other sections of the development are bounded by public roads which provides additional separation.
CONSEQUENCE	Minor
JUSTIFICATION	The Clause 13.02 assessment has identified the limited risk for a fire to spread from the site into the surrounding landscape. The surrounding grassland dominated landscape reduces the risk of bushfires spreading out of the development property. The requirement to also manage vegetation during the fire danger period will ensure that a bushfire cant spread on the property or burn with elevated intensities. There are several roads surrounding the development that if a bushfire was caused, the fire would quickly need to cross a road to impact on residential dwellings.
RISK RATING	Low
STRATEGY TO LOWER RISK	The site Emergency Management Plan will include a procedure for contacting the Municipal Fire Prevention Officer (MFPO) if the vegetation on adjoining properties becomes a fire risk. The MFPO may, following an assessment issue a Notice requiring the vegetation to be managed. Any vegetation growth on the property will be managed and removed. During the fire danger period, additional inspections will occur to ensure that all weeds and other vegetation is removed from the fire break and other areas.
RESIDUAL RISK	Low

Table 10 - Risk assessment - Offsite fire impacting on the site

RISK	Offsite fire impacting on the site
CAUSE	A bushfire burning through the surrounding landscape can enter the property and threaten the infrastructure by potentially starting new fires.
LIKELIHOOD	Unlikely
JUSTIFICATION	The Clause 13.02 assessment has identified the low risk landscape which has been supported by the review of the MFMP and other bushfire strategies. There are several roads surrounding the development that if a bushfire was caused, the fire would quickly need to cross a road to impact on residential dwellings. The provision of a firebreak and other managed areas will limit the ability for a bushfire to impact on the property. The likely bushfire approach will be through the adjoining grassland and it is unlikely for this to produce elevated radiant heat due to the low fuel loads.
CONSEQUENCE	Minor
JUSTIFICATION	The ability for a bushfire to generate sufficient radiant heat in the surrounding landscape is unlikely. The requirements to maintain and manage the onsite vegetation will ensure that fire spread onto the property will be limited. It is highly unlikely for flame contact to impact on the development infrastructure from a bushfire in the surrounding landscape.
RISK RATING	Low
STRATEGY TO LOWER RISK	Within the Fire Management Plan ensure the following is included: • When either a severe, extreme or code red day is forecast, ensure all vegetation maintenance activities are up to date.
RESIDUAL RISK	Low

Table 11 - Risk assessment - Fire water runoff

RISK	Fire water runoff
CAUSE	In the event of a fire involving the BESS, firefighters will respond and use water to either extinguish or cool the surrounding area until the infrastructure is deemed safe.
LIKELIHOOD	Unlikely
JUSTIFICATION	As outlined in previous assessments, the risk of a large fire is very low and unlikely. This is due to the separation between various areas of the BESS and the extensive use of non combustible materials. The smoke detection system that is monitored 24/7 will also alert technicians and if required, the fire brigade to the site early. The suite is large and includes areas where fire water can be contained prior to it being collected by an authorised company. The final BESS design will include consideration of fire water runoff and ensure appropriate provision is made in the site layout and design.
CONSEQUENCE	Minor
JUSTIFICATION	Due to the remoteness and size of the site, there are a number of options available to contain fire water runoff and ensure that is not able to enter waterways or areas off site.
RISK RATING	Low
STRATEGY TO LOWER RISK	Fire water runoff design considerations will be included within the additional risk analysis once the BESS technology has been determined.
RESIDUAL RISK	Low

Table 12 - Risk assessment – Staff and firefighters

RISK	Staff and firefighters
CAUSE	The response to a fire by staff, contractors or firefighters can be dangerous due to the various safety hazards associated with a fire in this type of infrastructure.
LIKELIHOOD	Likely
JUSTIFICATION	There is the potential for firefighters and/or staff and contractors to be present during an emergency event and not being familiar with the site. The CFA Guideline does impose a variety of controls onto the management of the site through the Emergency Management Plan and how CFA interacts with the site if they are called to a fire. The potential for a fire to occur whilst a low risk, if it does occur, there is the potential for a firefighter to arrive who is unfamiliar with property and the technology installed.
CONSEQUENCE	Moderate
JUSTIFICATION	The provision of an Emergency Information Container that will include the Emergency Management Plan, site plans and contact details for technical specialists will ensure responding firefighters seek information prior to entering the property.
RISK RATING	High
STRATEGY TO LOWER RISK	The arrangements for monitoring the Fire Indicator Panel through the operators monitoring centre will ensure that an informed decision can be made following an assessment of the alerts being received. In all cases a technician will be dispatched to the site to review the alert at the BESS. Any faults that are sent to the monitoring centre will be assessed and a technician deployed to make an initial assessment. The Emergency Management Plan will include a requirement to engage with the responding firefighters early to ensure they are aware that a technician is on their way and that entry to the site can wait until they arrive unless there is a life or property protection emergency. The Emergency Information Container that is required by the CFA Guidelines will provide detailed contact information for responding firefighters to seek specialist advice prior to accessing the property.
RESIDUAL RISK	Medium

6 Conclusion

The assessment of risk for the Corop Solar Farm has identified that this development can occur safely providing the requirements outlined within this Risk Management Plan are implemented. The Solar Farm and BESS proposal is occurring within an area that is considered a lower risk from bushfire due to the surrounding landscape being dominated by farming properties.

The key outcomes of the assessment have identified the following actions that must occur:

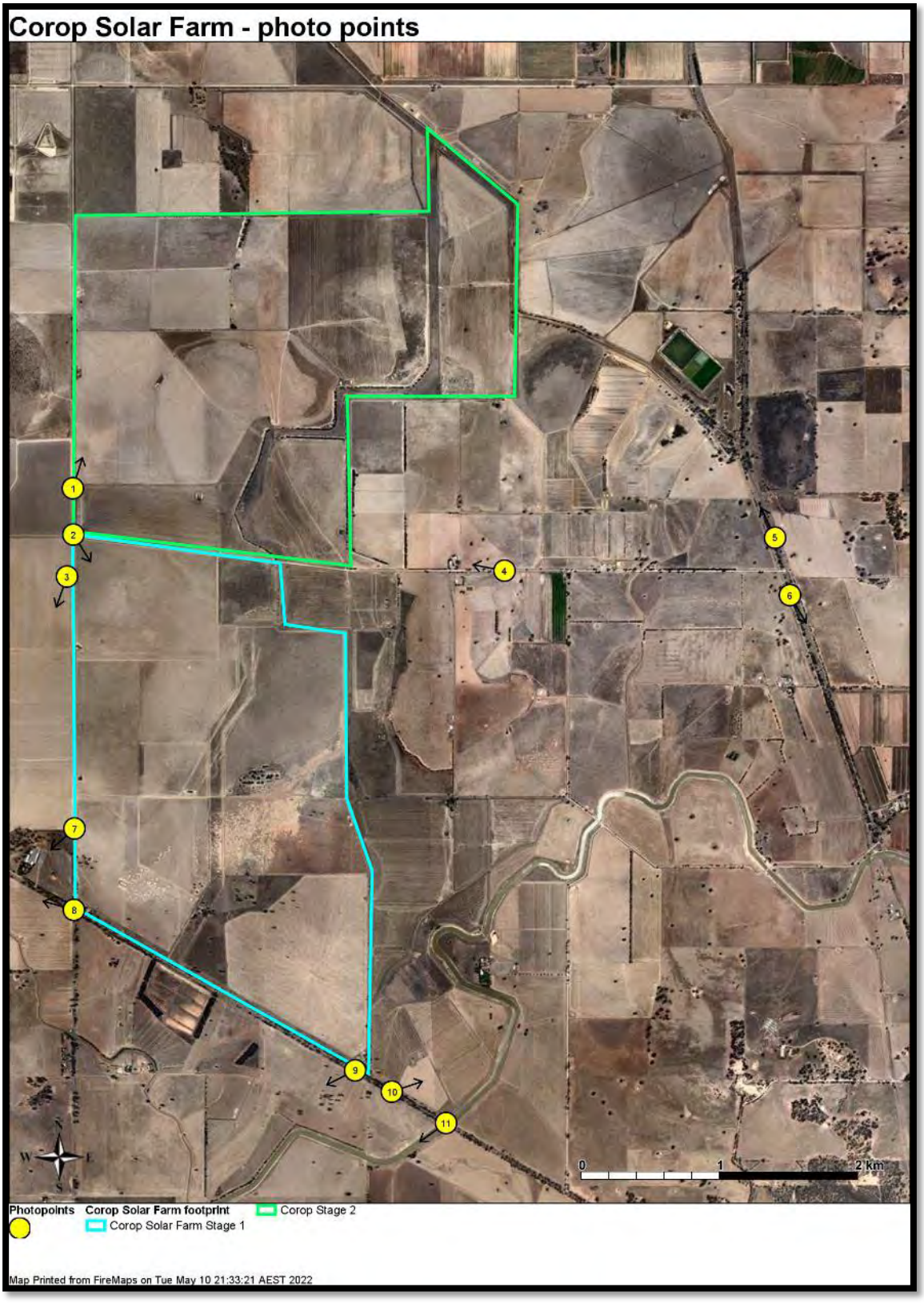
- Once the BESS technology has been determined, a further risk analysis is to be conducted to ensure that the provision of fire breaks, water supply and detection and suppression systems will manage the risk sufficiently.

- The requirements specified by the CFA Guideline will be implemented including perimeter and internal access roads, fire breaks around the perimeter and other infrastructure, separation between solar panels and management of vegetation during the fire danger period.

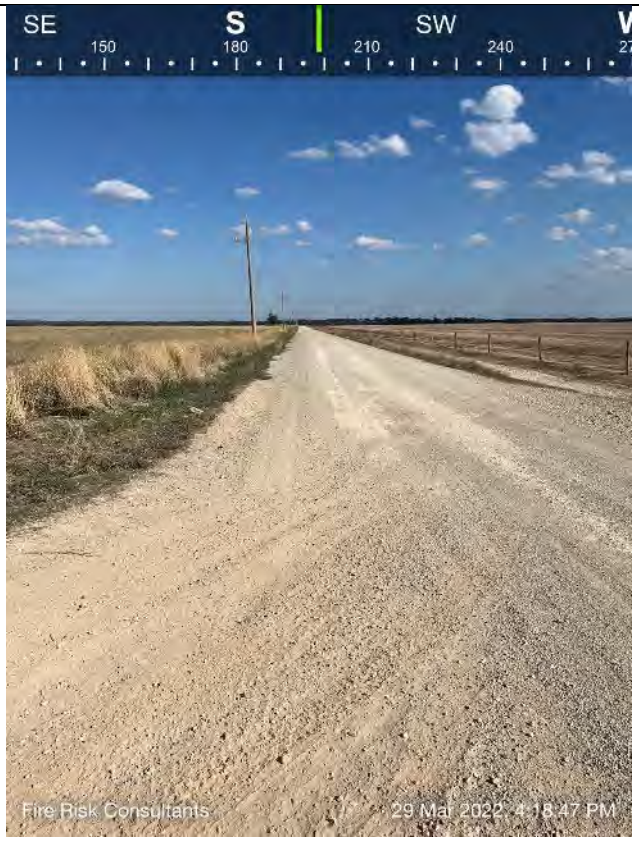
- The development of a Fire Management Plan and Emergency management Plan that meets the requirements of the CFA Guideline.

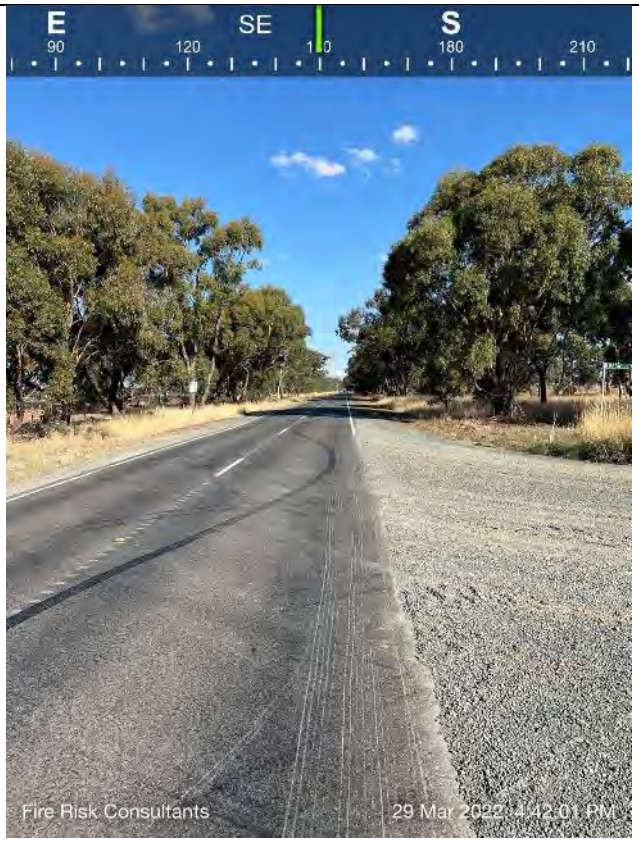
There is no doubt that a Solar Farm and BESS development can present fire risks if not designed, constructed, commissioned and operated effectively. The importance of following design requirements and committing to the ongoing maintenance of the system is critical to reduce fire risk.

Appendix 1 – Site photos

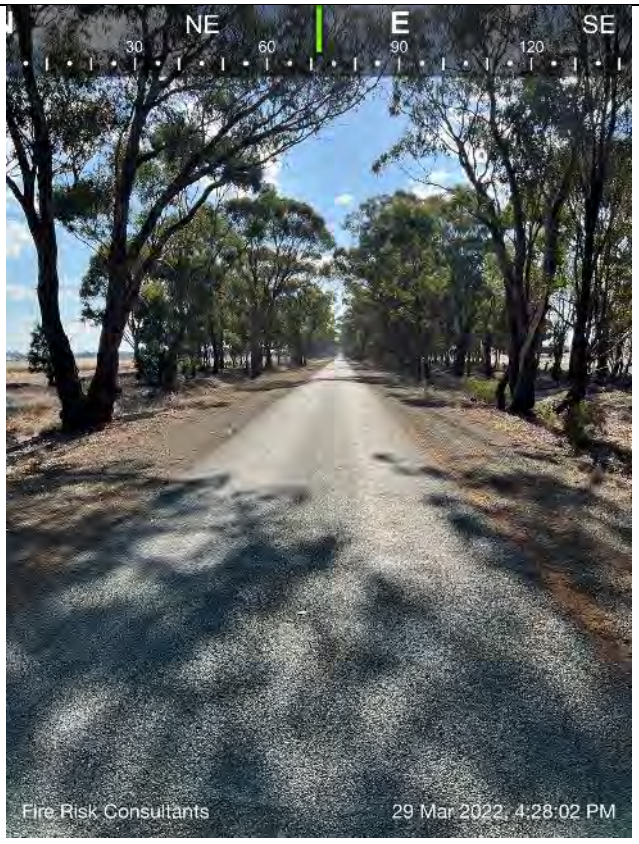


1 Looking north along Geodetic Road North. This road is along the western boundary of the development.	
2 Typical vegetation on the property. The low fuel loads are indicative of the surrounding landscape.	

3 Looking south along Geodetic Road North.	
4 Looking west towards the development site.	

5 Looking north along Girgarre Rushworth Road. This is indicative of the surrounding road network that supports bushfire suppression activities in the landscape.	
6 Looking south along Girgarre Rushworth Road.	

7 Small are of treed vegetation on the western side of Geodetic Road North.	
8 Intersection of Old Corp Road and Geodetic Road North.	

9 Typical roadside vegetation along Old Corop Road.	
10 Old Corop Road on the southern side of the development.	

11 Water irrigation channel to the east of the development site.