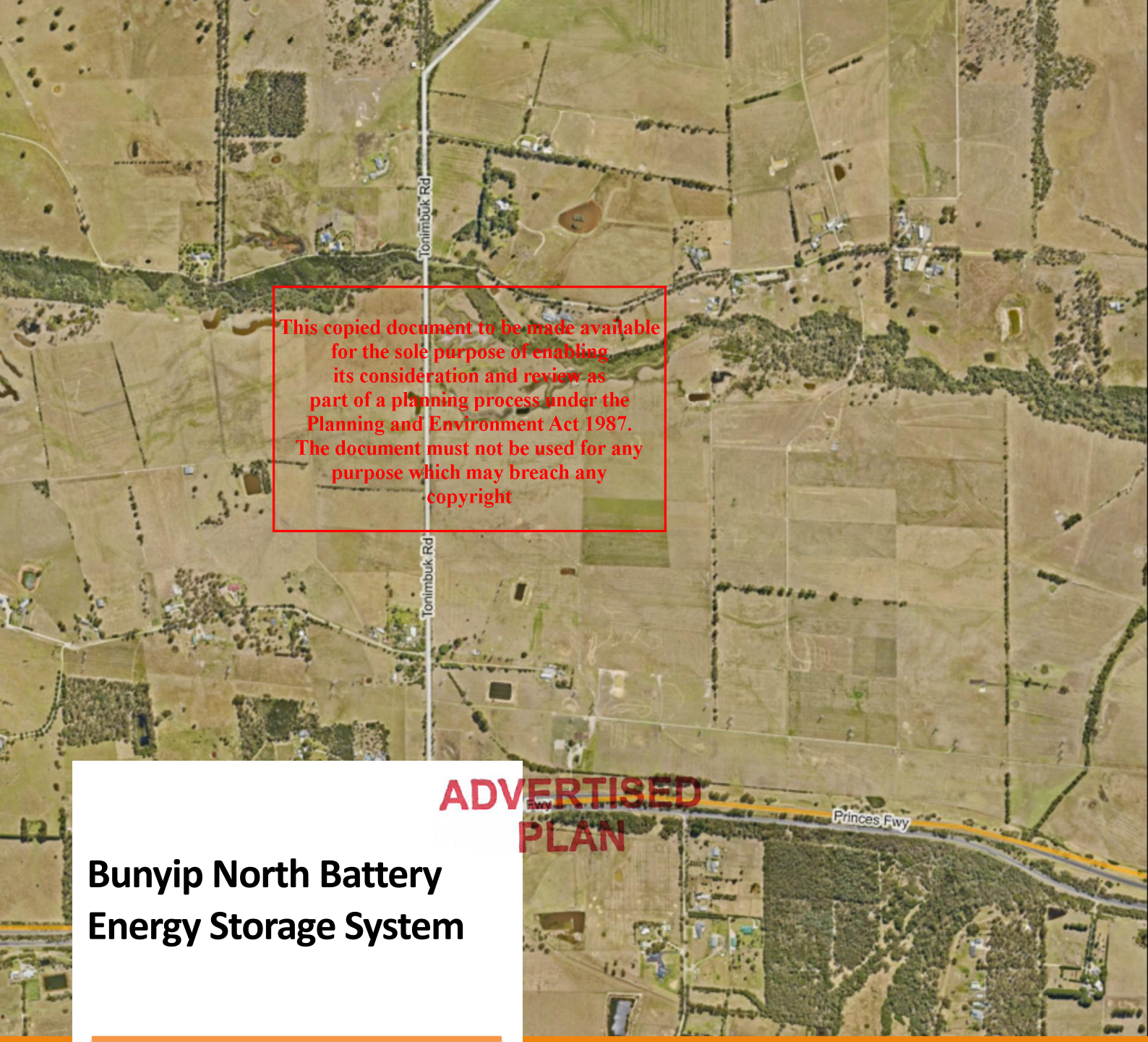

Bunyip North Battery Energy Storage System

Risk Management Plan (including Fire Safety Study)

March 2026

FIRE RISK Consultants

Front cover – Bunyip North BESS site and surrounding area

Document history

Revision	Date	Description	By	Review	Approved
V1	21/07/2025	Initial draft following analysis of supplied information	M Potter & FRC Project Team	FRC Review Team	G Taylor Managing Director
V1.1	3/9/2025	Minor updates following client feedback	M Potter & FRC Project Team	FRC Review Team	G Taylor Managing Director
V2	25/11/2025	Updates following client feedback and additional project description information.	M Potter & FRC Project Team	FRC Review Team	G Taylor Managing Director
V2.1	28/11/2025	Minor updates following client feedback	M Potter & FRC Project Team	FRC Review Team	G Taylor Managing Director
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Fire Risk Consultants
PO Box 12, Glenagarry VIC 3854
0487 790 287
www.fireriskconsultants.com.au

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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 has been engaged to develop a Risk Management Plan (RMP) for the proposed Bunyip North Battery Energ Storage System (BESS) (the Project).

The Project is located at 30 Tonimbuk Road, Bunyip North, Victoria. The Project is approximately 2.5 km north of Bunyip and approximately 80km southeast of Melbourne. The Project is located on the northern side of the Princes Freeway. The site is located within the Cardinia Local Government Area (LGA).

The proposal comprises of up to 400 megawatt (MW)/2,400 MWh utility-scale BESS and associated infrastructure. The Project is in an area that has historically been used for agricultural purposes. The site is within the Green Wedge Zone under the Cardinia Planning Scheme.

This RMP has been prepared in accordance with the *Design Guidelines and Model Requirements: Renewable Energy Facilities v4 (2023)* (CFA Guidelines) and has been developed to support a planning permit application.

This report has been prepared following an assessment of the site and analysis of supplied information in relation to the design, construction, commissioning and operation of the proposed Project.

As the Project is at the planning application stage, the selection of a battery supplier has not been finalised. This is normal practice at this stage of a project, with the final design and supplier being confirmed and assessed as part of an update to this RMP (and other documentation) prior to the construction of the Project. Section 5.3 of the CFA Guidelines outlines the information required to support the development of an RMP. How this RMP addresses these requirements is outlined in Table 1.

Table 1 - CFA Guidelines requirements

CFA Guideline – RMP requirement	How this RMP addresses the requirement?
a) Describe the risks and hazards at the facility to and from the battery energy storage system and related infrastructure.	Chapter 3 and 4
b) Specify and justify, in accordance with Section 6.2 of the CFA Guidelines:	
The location of the battery energy storage system on-site and in the landscape.	Chapter 4.2
Emergency vehicle access to and within the facility that: • **Includes site access points of a number suitable to the size and hazard of the facility (a minimum of two).** • **Provides access to battery energy storage systems, substations and fire service infrastructure.**	Chapter 4.1

CFA Guideline – RMP requirement	How this RMP addresses the requirement?
Firefighting water supply for the facility.	Chapter 4.1
A fire break width of 10m or greater, based on radiant heat flux (output) as an ignition source: • **Around the perimeter of the facility.** • **Between any landscape buffer/vegetation screening and battery energy storage systems (and related infrastructure).**	Chapter 4.1
The separation distance, based on radiant heat flux (output) as an ignition source, between: • **Adjacent battery containers/enclosures.** • **Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation.**	Chapter 2.2, 3.2.2 and 4.1
All other controls for the management of on and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).	Chapter 4.4.6
c) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.	Chapter 4.4.6
d) Be peer-reviewed by a suitably qualified, independent third party.	The Project is not proposing variations to the CFA Guidelines and therefore a peer review has not been considered as necessary.
e) Form the basis for the design of the facility.	The outcomes of the assessment against the CFA Guideline and the risk assessment within Chapter 4 have influenced the design of the Project.

As required by the CFA Guidelines, 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 within this report where it relates to the Project. Where the CFA Guideline provides specific requirements relating to matters that are outlined within the Fire Safety Study Guidelines, the CFA Guideline information has been utilised.

In summary, the following sections of the Fire Safety Study Guidelines have been covered within this report.

Table 2 - Response to NSW Fire Safety Study Guideline

Section 2 summary	Response
Identification of fire hazards and the consequences of possible fire incidents	The CFA Guideline and NFPA 855 provides an outline of the types of fire hazards associated with renewable energy developments. This report also analyses previous fire history (Chapter 3.2.2) and includes the assessment of risk resulting from these fire events and other information that is supplied by the developer and battery manufacturer (Chapter 4.4.5).
Fire prevention strategies and measures	The outcome of the assessment of risk and the assessment of the design against the CFA Guideline and NFPA 855 has resulted in a range of fire prevention strategies and measures. These strategies and measures will be included within the Fire Management Plan and include their design and maintenance standards.
Analysis of the requirements for fire detection and protection and identification of the specific measures to be implemented	The CFA Guideline provides specific fire detection and protection requirements including the installation of a fire hydrant system, detection and suppression systems and bushfire protection measures. The specific installation measures are outlined in Chapter 4.2.
Calculation of firefighting water supply and demand	The CFA Guideline provides clear requirements to design and install the fire hydrant system to AS2419 – open yard protection requirements. This includes the development of a firefighting water supply and demand requirement.
Containment of contaminated firefighting water	The CFA Guideline provides the requirement to contain firefighting water to enable testing to occur before it is allowed to either enter the stormwater drainage system or needs to be sent to a disposal location.
First aid fire protection requirements.	The CFA Guideline imposes certain requirements along with the obligation on the operator to meet the occupational health and safety requirements imposed by various legislation. This includes the provision of fire extinguishers, warning signs, road access minimum requirements, staff training, induction programs and emergency management planning.

In support of the assessment, engagement has commenced with CFA involving a meeting on 28th May 2025 where the project was introduced. The meeting discussed a range of matters including site access arrangements, fire water and fire water retention arrangements. CFA indicated general support subject to further engagement including the review of the RMP once finalised.

2 Project Overview

The Project is proposed to deliver a BESS for large-scale electricity storage and dispatch capability, supporting Victoria's transition toward a more renewable and reliable energy network. The Project is anticipated to have a storage capacity of up to 400 MW / 2,400 MWh, with a connection to the existing 220 kV transmission network via a new transmission terminal station, the Bunyip North Terminal Station (BNTS).

The Project is wholly located within the Cardinia Shire local government area (LGA), approximately 80 kilometres (km) southeast of central Melbourne in Victoria's Gippsland region and approximately 2.5 km north of the Bunyip town centre.

2.1 Project area and site

The Project Area (shown in Figure 1), being the land within which the Project may be developed, comprises approximately 27.6 hectares of private freehold land (the Site) and 3.2 hectares of public land to accommodate the proposed new access from the Princes Freeway.

The Site sits within the Green Wedge Zone Schedule 1 (GWZ1), Environmental Significance Overlay (ESO1) and Bushfire Prone Area (BPA). The accessway via the Princes Freeway to the south of the Site is within the Transport Zone (TRZ2 – Principal Road Network).

The Site is located on Lot 2 on Plan of Subdivision PS315155, at 30 Tonimbuk Road, Bunyip North, and comprises rural land currently used for grazing. The land is considered suitable to host the proposed BESS facility, BNTS, and associated ancillary infrastructure due to the following characteristics:

- Prominent high-voltage electricity infrastructure runs along the southern portion of the Site, supporting efficient grid connection for the BESS.
- The Site is directly bound to the south by the Princes Freeway(M1), a major arterial road zoned Transport Zone 2 (TRZ2).
- The surrounding area is characterised by open agricultural landscapes, scattered vegetation, and low-density rural development.

2.1.1 Project area context

Cannibal Creek runs to the north of the Project Area, which is located within an area of identified Aboriginal cultural heritage sensitivity and is zoned Public Conservation and Resource Zone (PCRZ), and is within the Land Subject to Inundation Overlay (LSIO). The Project Area has been designed to maintain a buffer distance from Cannibal Creek to protect environmental and cultural values.

To the east and west of the Project Area is agricultural land, with Tea Tree Creek also located to the east. South of the Project Area is bounded by the Princes Freeway, with the Bunyip Native Sanctuary located on the opposite side of the Freeway.

2.2 Project description

The Bunyip North BESS will comprise the key electrical, civil, and supporting infrastructure outlined below. These components collectively enable the safe and reliable operation of the Project and are subject to discipline-specific assessments but are included here for cross-reference within the overall Project description.

All design details are indicative and subject to refinement through detailed design and consultation with relevant authorities.

2.2.1 Electrical infrastructure

- Battery Energy Storage System (BESS) units – modular containerised units comprising battery banks and associated management systems, providing a total installed capacity of approximately 400 MW / 2,400 MWh.
- Power Conversion System (PCS) – bi-directional inverter(s) and transformer skids to convert DC output from the batteries to AC (and vice versa) for transformer voltage step-up and grid connection.
- On-site Substation (HV) – including 33/220kV step-up transformer(s), switchgear, busbars, earthing, protection and metering equipment, reactive power plant and connection points to the terminal station.
- Underground LV/MV cabling – to connect battery enclosures, inverters (PCS units), and auxiliary systems.
- High-voltage (HV) connection infrastructure – to connect the on-site substation to the terminal station via either overhead or underground connection, to be confirmed through detailed design and in consultation with the network operator.
- Bunyip North Terminal Station – to connect the Project to the established Victorian Declared Shared Network (DSN), a new 220kV Terminal Station (Bunyip North Terminal Station) will be built for the Project. This new Terminal Station will connect to the existing 220kV transmission line between Rowville and Yallourn via a direct cut-in arrangement. Construction of additional and/or relocation of existing transmission towers may be required to facilitate the deviation necessary for the cut-in.
    - The layout allows for space for both the cut-in arrangement design and the Bunyip North Terminal Station, which is proposed to be constructed and operated by the Declared Transmission System Operator (DTSO).
    - Detailed design will be confirmed at a later stage, after connection approval by AEMO, and addressed through conditions of the planning permit.

2.2.2 Site preparation and civil works

- Benches – engineered hardstand areas will provide a stable, level foundation for the PCS and BESS enclosures, electrical infrastructure, balance of plant equipment, and internal access roads. The final cut and fill requirements will be finalised during the detailed design phase.
- Batters – formed around the bench to provide a gradual transition to surrounding natural terrain. The batter will also assist with drainage and perimeter firebreak (subject to CFA requirements).
- Foundations - concrete slab or pier foundations with mounting bolts for the battery containers, transformers, switch room and inverter components.

2.2.3 Ancillary infrastructure

- Control Room – a combined facility housing medium-voltage switchgear, protection and control systems, and communications equipment for operation of the BESS.

- Operations and Maintenance (O&M) storage area – for maintenance equipment.
- Temporary construction compound and laydown area – for offices, amenities, and equipment storage during construction.
- Car parking areas for operational and construction staff.
- Security fencing and controlled access gates – enclosing the Project Site.
- Low-level night-time lighting for safety and security purposes.
- Business identification signage installed in accordance with planning requirements.
- Water storage tanks – to provide water supply for firefighting, construction, and maintenance purposes. As the site does not have access to mains water, water will be sourced from commercial sources, trucked onto site and stored in water tanks for use during construction and operation.
- Fire detection and suppression systems – integrated within each battery container, incorporating monitoring and control equipment in accordance with fire safety and electrical standards.
- Fire water and stormwater management system / Detention Basin – proposed to manage runoff from potential fire events and general stormwater flows, with design measures to be refined through detailed design and consultation with relevant authorities.
- Landscape screening – to reduce visual impacts and support local amenity.

2.2.4 Access and transport

- New Site access road – proposed along the southern boundary of the Site from the Princes Freeway, designed to support construction and operational vehicle movements.
    - The concept design identifies the maximum anticipated footprint for entrance and exit lanes to facilitate safe access to the Site.
    - A construction buffer has been applied to account for potential refinement in detailed design phase, with all vegetation within this area conservatively assumed to be disturbed.
    - The final design, location, and configuration of the access will be determined in consultation with, and subject to approval by the Department of Transport and Planning (DTP) as the relevant road authority.
- Internal access roads (gravel or sealed) – to support access for construction, operations and emergency vehicles.

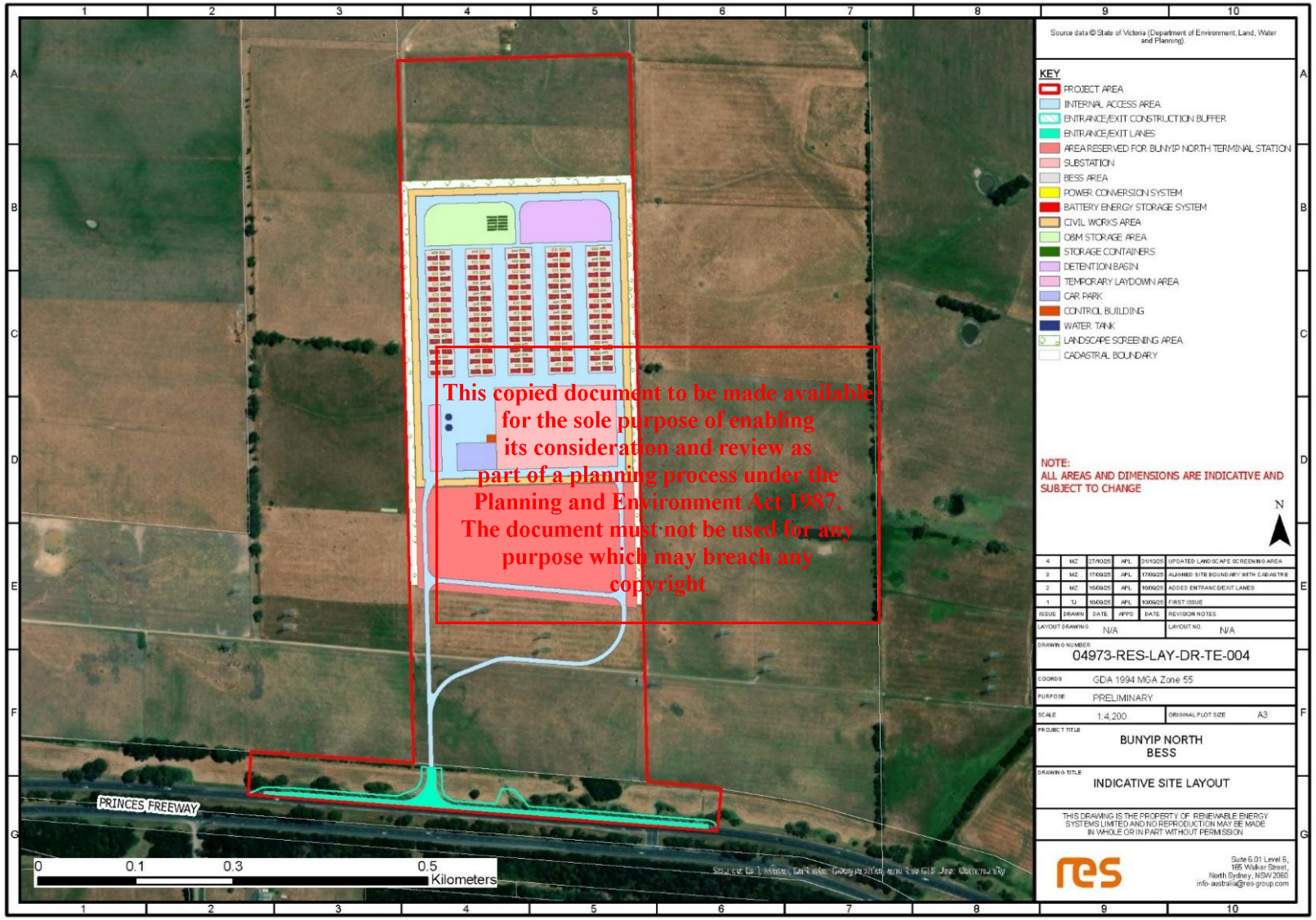


Figure 1 - Site overview (supplied by RES)

2.3 Battery Energy Storage Systems

Whilst the selection of a battery supplier has not been finalised, there are numerous consistencies in the design, construction and installation of the Battery Units. This is mainly driven by the requirement to comply with International and Australian codes and standards. In relation to managing fire risk, the following standards and codes will be complied with:

- UL9540A Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
- UL9540 Energy Storage Systems and Equipment
- NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.

The Battery Unit will likely be assembled offsite within the factory and arrive with a small charge and largely a plug-in type of arrangement. The product will be fitted with a range of systems that manage the Battery Units and receive and respond to various alerts, these are outlined in Table 3.

The equipment will be supplied with a range of manuals that address installation, maintenance and safety. The manuals will outline the outcomes of the various tests including UL9540A that demonstrates that the design of the system meets the requirements of UL9540.

Table 3 outlines the typical fire safety systems that are likely to be installed within the Battery Units:

Table 3 - Overview of fire safety systems

Fire Safety System	Description
Battery Management System (BMS)	The BMS constantly monitors cell and pack level voltage, temperature, State of Charge (SOC), and other parameters to ensure early detection of pre fault conditions, and immediate detection of fault events. Should any parameter exceed a permissible value, the BMS will disconnect the affected Battery Units and send an alarm to the monitoring centre. The BMS can be regularly updated as new technologies or learnings are introduced into the software
Detection and suppression systems	The Battery Units will be fitted with smoke, heat and gas detectors and an aerosol suppression system to detect and suppress fires. These systems will be connected to a Fire Indicator Panel located within a central area and will also be monitored through the Supervisory Control and Data Acquisition (SCADA) system.

Fire Safety System	Description
Site Controller and Monitoring (SCADA)	Beyond the built-in safeguards of the BMS described above, the Battery Units will have 24/7 remote monitoring, diagnostics, and troubleshooting capabilities, without the need to have a technician on site. Customers and first responders will benefit from immediate support from trained technicians via the monitoring centre. Additionally, the facility will have a local SCADA system.
Emergency system shutdown	In the event of an emergency on site, the Battery Units can be shut down locally, or remotely. A system shutdown will result in electrical isolation of the battery strings and cessation of battery charging or discharging.
IP Rating	The IP (Ingress Protection) rating varies for each manufacturer, but it will likely be elevated in that it will prevent ember ingress into the Battery Units. The IP rating is defined by the international standard EN 60529 (British Standard BS EN 60529:1992). The first digit relates to the ability for solids to enter the enclosure and the second digit indicates the ability for liquids to enter the enclosure. In the unlikely event of a bushfire in the surrounding vegetation that develops embers, the IP rating will likely reduce the ability for embers to enter the Battery Unit.
Explosion prevention	The chosen Battery Unit will comply with Clause 9.6.5.1.5 of NFPA 855. This clause permits compliance with either NFPA 68 or NFPA 69. The explosion prevention system that is provided will be designed to direct overpressure, and any other explosive events or flammable gases, away from the Battery Unit.

2.4 Terminal station and substation

An on-site substation will be constructed and consist of 33/220 kV step-up transformer(s), switchgear, busbars, control building, earthing and reactive power equipment.

A terminal station is also proposed to be constructed and will consist of switchgear, busbars, control and protection systems, and other equipment required to connect to the existing 220 kV transmission network, including construction of new overhead line sections and towers to facilitate diversion of the existing line.

3 Existing conditions assessment

3.1 Site description and location

The site is located at on Lot 2 on PS315155 at 30 Tonimbuk Road, Bunyip North, approximately 2.5 km north of Bunyip and 80 km southeast of Melbourne.

Site access will be from Princes Freeway.

The property and surrounding area are mostly free of vegetation, aside from grass cover. Scattered trees and small clusters are located along roads, on neighbouring lots, and near waterways. Denser patches of woody vegetation are present south of the Princes Freeway, about 320 metres from site infrastructure, and to the north, around 350 metres away, associated with Cannibal Creek.

The Project site is within the Bushfire Prone Area (BPA) but not within the Bushfire Management Overlay (BMO). The closest BMO is located adjacent to the site, but approximately 220 m from site infrastructure. There are some minor slopes in the surrounding landscape, but the site is effectively flat.

The Project site and surrounding landscape is presented in Figure 2.

3.2 Risk indicators

In support of the risk assessment required by the CFA Guideline, the following information has been obtained and informs the analysis of risk. This information supports the assessment contained within Chapter 4.4. This information relates to the potential bushfire risk and the fire risk relating to a BESS installation.

3.2.1 Bushfire Management Overlay and Bushfire Prone Area

The BMO and BPA are legislative controls within the State of Victoria that are included within the planning and building systems. The BMO recognises areas that are deemed to be extreme risk with the BPA declared for areas that are subject to, or likely to be subject to bushfires.

The Project is located wholly located within the BPA. There is some BMO within the Project Area, which overlaps with proposed access infrastructure only, and is located approximately 220 m from the proposed BESS area.

Figure 3 indicates the location of the BMO in relation to the Project Area. Furthermore, as the property is within the BPA, this triggers an assessment against Clause 13.02-1S of the Cardinia Planning Scheme.

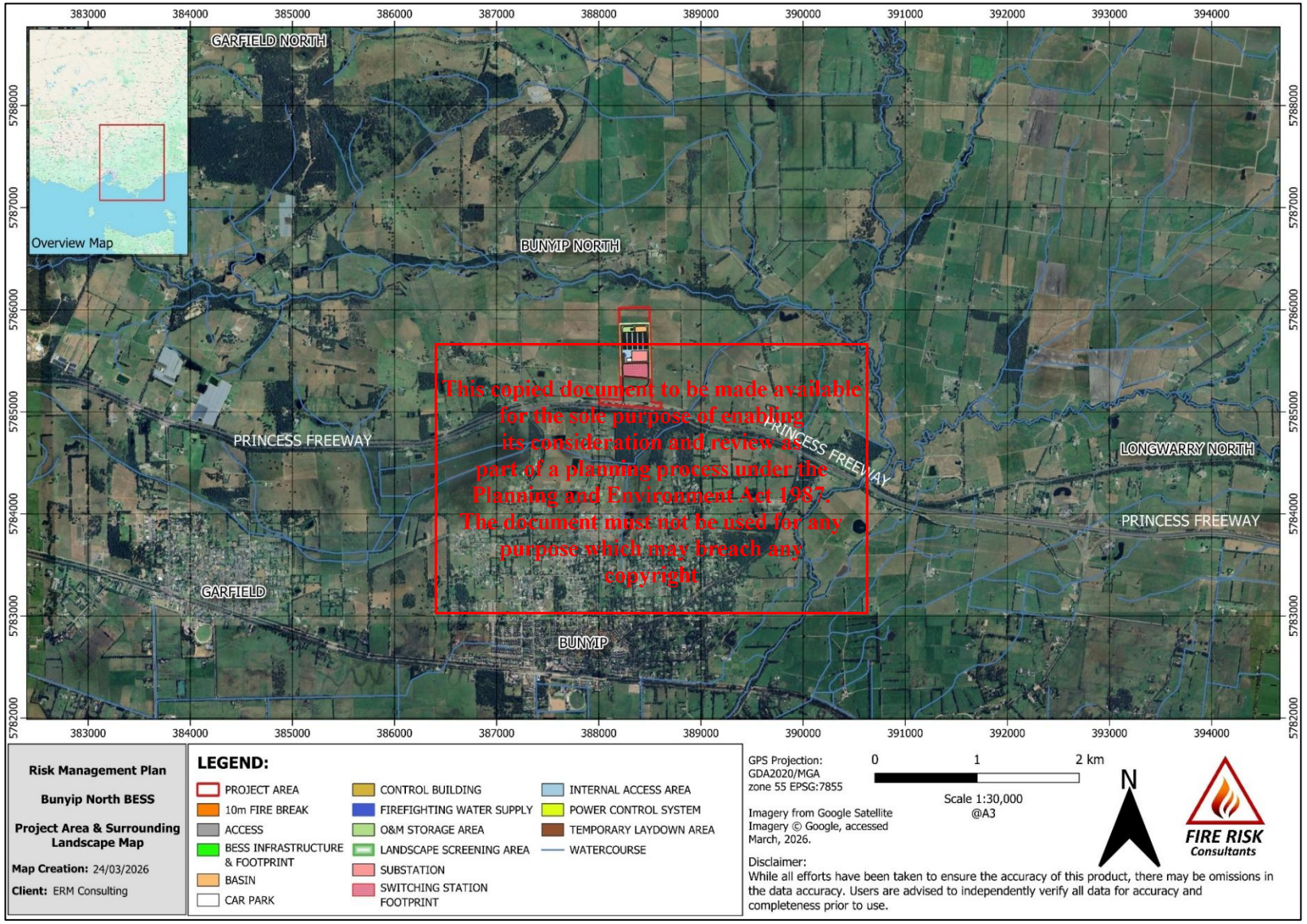


Figure 2: The Project Area and the surrounding landscape

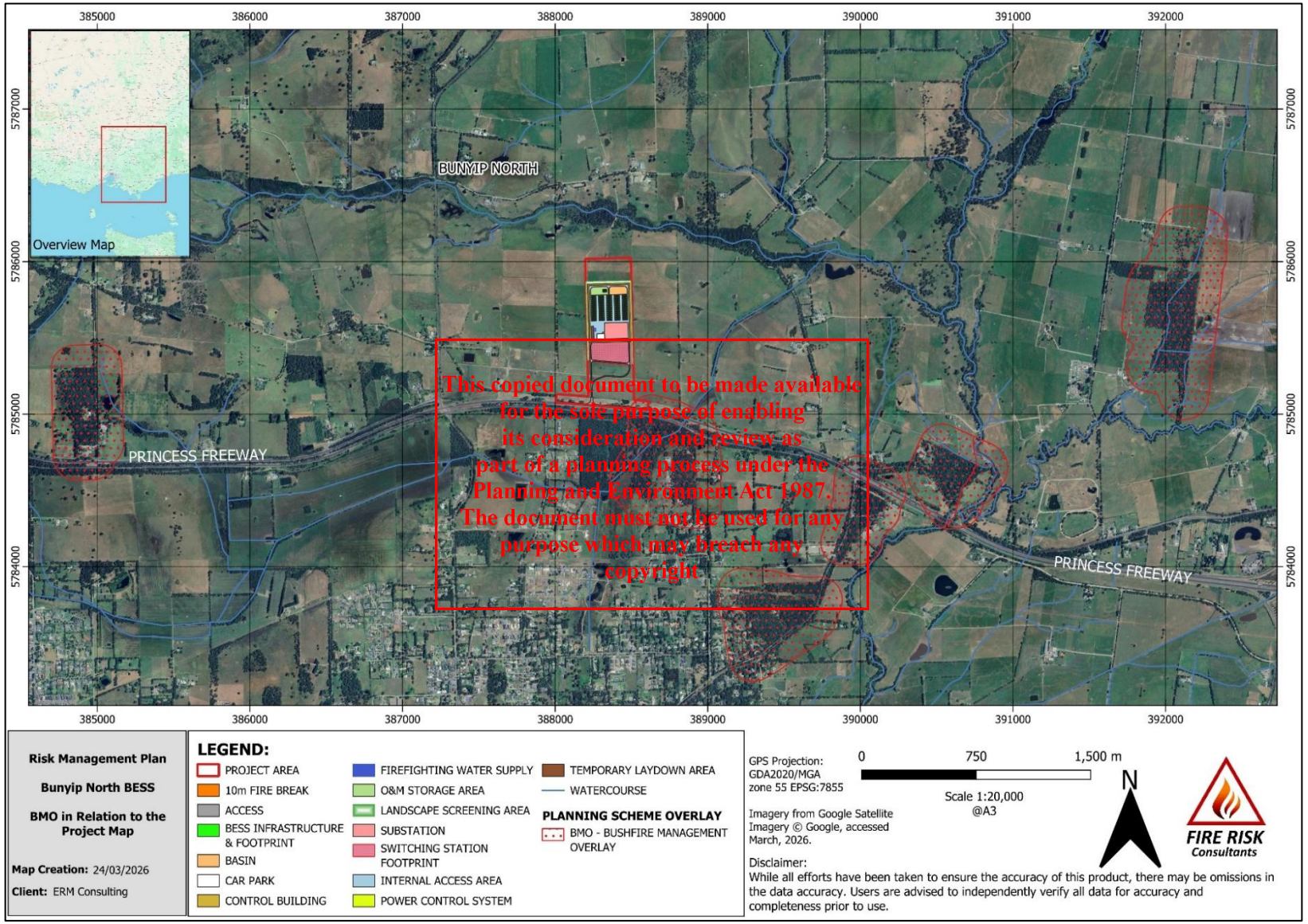


Figure 3 – BMO in relation to the Project

3.2.2 Bushfire history

The available data indicates that the site has been impacted by a bushfire in 2019 (Figure 4).

The 2019 bushfire started after several lightning strikes occurred in Bunyip State Park and travelled under a north westerly wind influence towards the site. The fires were recorded to have impacted more than 15,000 ha. This fire resulted in 29 houses losses and at least 67 outbuildings destroyed.[1]

Another fire occurred northeast of the site and was associated with the 2009 Black Saturday Fires. This bushfire was recorded to have impacted 22,690 ha.[2]

Prior to these, the last larger bushfire to have impacted the landscape occurred in 1939 and impacted 275,858 ha.

Other smaller bushfires and planned burns have also occurred in the surrounding landscape.

3.2.3 Vegetation management activities

Some fuel reduction activities have been conducted in the surrounding landscape to the north of the site, however, are generally not extensive. Future Planned burns detailed in the Joint Fuel Management Plan are shown in Figure 5.

The closest planned burn activity is approximately 6km from the site, within Bunyip State Park. The reason for the fuel reduction burnings in the surrounding landscape is generally to develop fuel reduced areas of sufficient width and continuity to reduce the speed and intensity of bushfires.

[1] https://www.theguardian.com/australia-news/2019/mar/08/victoria-bushfires-29-homes-destroyed-in-bunyip-forest-blazes

[2] https://www.nma.gov.au/defining-moments/resources/black-saturday-bushfires

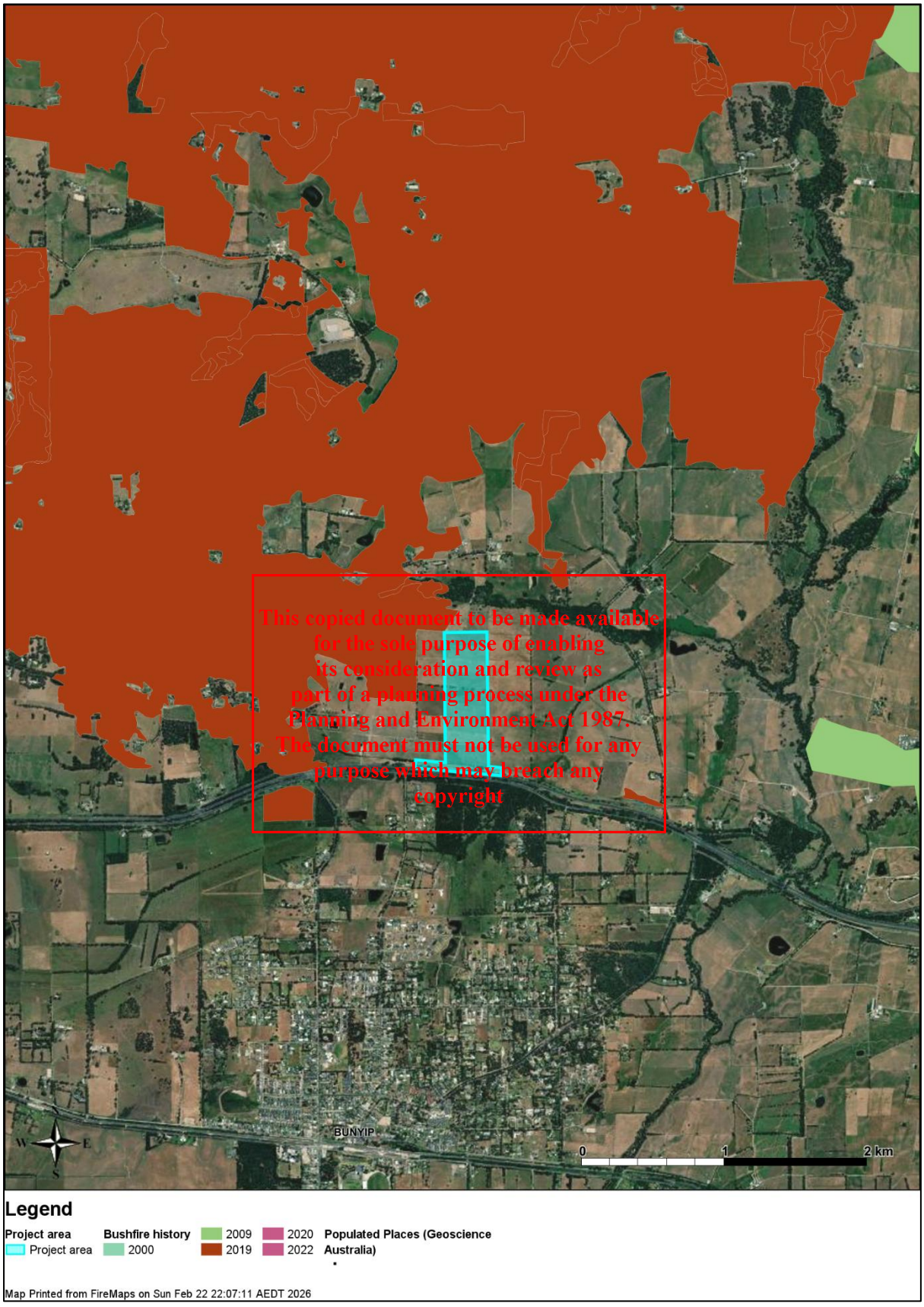


Figure 4 - Bushfire history surrounding the Project site.

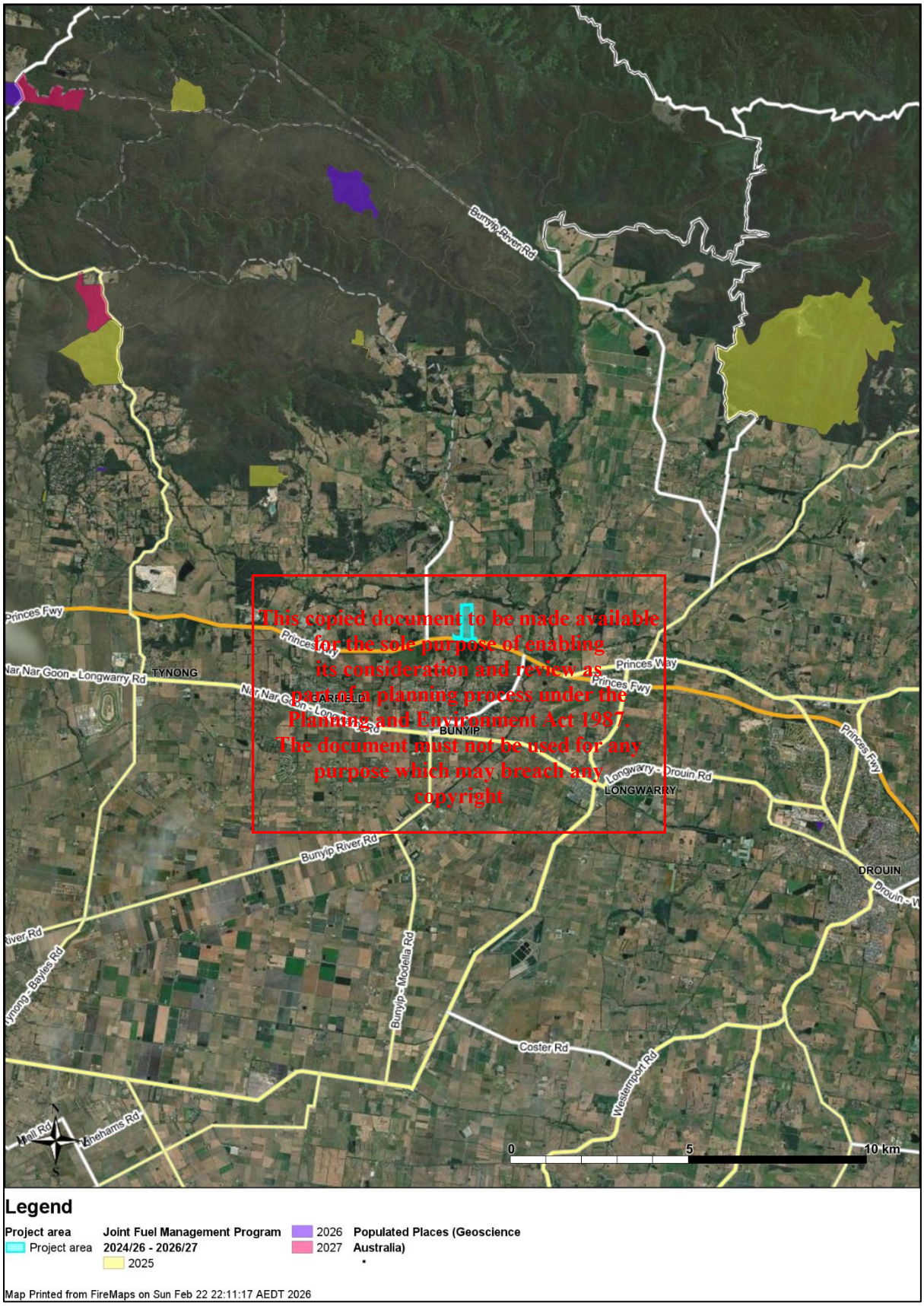


Figure 5 - Joint Fuel Management Program.

3.2.4 Battery Unit design fire

The BESS supplier selection process will be guided by the information contained within this RMP along with the CFA Guideline requirements.

The minimum requirements include:

- The Battery Unit and its components has been tested in accordance with the UL9540A test method.
- The BESS supplier has undertaken a large-scale fire test to demonstrate that the separation between the Battery Units is sufficient.

Prior to construction, and once a BESS supplier is selected, more detailed analysis will be undertaken to ensure the outcomes of fire testing meets the requirements of the CFA Guidelines. The available data will provide a range of information including:

- The likely radiant heat impact on adjoining Battery Units from a fully involved Battery Unit fire.
- The performance of the cell, module and unit when exposed to elevated temperatures as specified within UL9540A.
- The required separation distances to prevent fire spread between Battery Units.

4 Risk assessment process

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

- Assessment against Clause 13.02 – 1S of the Cardinia Planning Scheme (Chapter 4.1).
- Assessment against the requirements of the CFA Guidelines (including the Fire Safety Study requirements outlined within the NSW Planning Guidelines) (Chapter 4.2).
- Risk assessment that meets section 5 of the CFA Guidelines (Chapter 4.3).

The risk assessment is based on the information outlined in this report along with industry best practices and our professional expertise.

4.1 Clause 13.02-1S – Bushfire Planning Assessment

Clause 13.02-1S of the Cardinia Planning Scheme is utilised to support the assessment of bushfire risk. The Clause 13.02-1S policy aims to strengthen the resilience of settlements and communities and prioritise protection of human life through several objectives. However, it should be noted the Project does not introduce new settlements into the landscape. The assessment has been undertaken within the context of a BESS development.

4.1.1 Bushfire Hazard Assessment

Elevated bushfire risk in southeast 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.

Figure 6 and Figure 7 provide an overview of the likely bushfire scenarios within the surrounding area. There is the potential for bushfires to approach from a north westerly or south westerly direction. It is acknowledged that bushfires can approach from other directions, however, they are unlikely to be as severe as those that approach from the northwest or southwest.

Clause 13.02-1S outlines the need to assess the bushfire hazard based on:

- Landscape conditions - meaning conditions in the landscape within 20 kilometres (and potentially up to 75 kilometres) of a site
- Local conditions - meaning conditions in the area within approximately 1 kilometre of a site
- Neighbourhood conditions - meaning conditions in the area within 400 metres of a site; and
- The site for the development

Considering the landscape factors, the consideration and assessment of the bushfire hazard can be effectively achieved using a methodology that includes the site, one kilometre and 20 kilometres from the development.

It is acknowledged that bushfires may approach from other directions, however the treatment of the risk from these aspects will be sufficient to address bushfire approach from any direction.

Table 4 - Assessment against Clause 13.02

Bushfire hazard type	Conditions	Likely Scenario	Considerations
The site for the development	Once completed, the BESS will comply with the conditions specified within the CFA Guidelines that include the management of vegetation around the Project site during the fire danger period. During construction, there is a risk of a fire igniting and spreading through unmanaged grassland vegetation.	A bushfire starting on the property is a possibility during the construction phase of the Project. Fires starting because of construction or operational activities have the potential to leave the property and enter adjoining areas. There is sufficient grassed areas and connectivity in some directions for a fire to spread rapidly under elevated fire danger conditions. Management of vegetation during the construction phase will occur regularly and be maintained during the fire danger period. Following construction, the Project will have either all vegetation removed or managed as per the requirements of the Fire Management Plan that conforms with the CFA Guidelines.	During the construction phase, if the vegetation n the Project Area is retained, it will be managed during the fire danger period. During the fire danger period the grassed areas within the Project Area will be managed as per the CFA Guideline requirement. Hot works are not to occur within 10 metres of vegetation (including grass and other plants) during the fire danger period. When the fire danger conditions are elevated (Catastrophic Fire Danger Rating), the Emergency Management Plan will outline procedures to close the site during the construction phase and limit operations unless critical. The access roads will be established at the commencement of the construction phase and be maintained for the life of the Project.
Neighbourhood and local conditions (one kilometre)	Within one kilometre of the development, the surrounding landscape is generally grassland with some groups of woody vegetation associated	The likely scenario is for a fire to start in the broader landscape and travel towards the site under north westerly or south westerly wind conditions. Under strong wind conditions a grassfire can travel	The vegetation management in the Project Area will limit the impact of a fire. Under reduced fire danger conditions,

Bushfire hazard type	Conditions	Likely Scenario	Considerations
	with roads or small public reserve. There is the possibility for a fire to start within the surrounding agricultural grassland and spread towards the site. Directly to the south of the site is woody vegetation associated with Bunyip Nature Sanctuary, which is approximately 36ha in size. Bunyip Nature Sanctuary is approximately 320m from the site infrastructure. This vegetation may allow for some ember generation to impact the subject site, but will be limited due to the short fire run of approximately 500m. There is also the potential for a bushfire to start along the surrounding road network and spread towards the Project. The surrounding road network provides access and egress opportunities for emergency services.	quickly across the landscape. Grassfires are heavily influenced by the quantity of fuels and the wind strength. To the south, Bunyip Nature Sanctuary may support increased ember generation but is unlikely to fully develop. Roadsides may contribute to bushfire spread when they haven't been managed prior to a bushfire commencing.	surrounding roads may slow or stop the fires spreading towards the Project Area. The vegetation management requirements will limit the chances of a bushfire starting on the site and impacting on the surrounding landscape. The BESS area and associated infrastructure will be provided with adequate setback from unmanaged vegetation.
Landscape conditions (20 kilometres)	The landscape hazard surrounding the development mostly consists of grassland associated with agricultural land, except for the area to the north.	The likely bushfire behaviour that will result in the greatest intensity and risk to the development is typically from either the northwest or southwest. In the context of this development, the areas to the northwest is forest, followed by	The protection of the Project Area through the provision of vegetation management arrangements will reduce bushfire intensity.

Bushfire hazard type	Conditions	Likely Scenario	Considerations
	Bunyip State Park is located more than 5km to the north of the site and supports large areas of forested vegetation. However, the 5km separating the site from the Bunyip State Park is generally grassland and managed properties, which is expected to reduce bushfire activity.	approximately 5km of grassland closer to the site. A fire can start within Bunyip State Park and travel towards the site and continue burning for some time; however, the grassland and managed properties that provide more than 5km of separation will reduce the intensity of a fire approaching from this direction. To the southwest is grassland with some fragmentation introduced by roads. Sparse woody trees can assist with ember generation.	The vegetation management arrangements will be effective regardless of the fire starting locally or having travelled to the site. The provision of multiple access roads will increase the ability for firefighters to access the areas surrounding the Project.

4.1.2 Bushfire Hazard Landscape Assessment

Figure 6 and Figure 7 show the outcome of the bushfire landscape assessment. The assessment identifies the two likely scenarios that may occur in relation to the Project. Both scenarios are possible, however would be influenced by the surrounding landscape that includes varying farming activities, roads and other landscape features. Table 5 provides a description of each of the scenarios.

Table 5 - Bushfire Scenarios

Scenario	Description
Northwest – Scenario A	A bushfire starting in the forested areas to the northwest could burn for some time but would need to travel around 5 kilometres through mostly grassland and managed road networks before reaching the BESS site. Under elevated fire danger conditions, a fire starting in the northwest forest could generate embers capable of igniting grassfires closer to the Project site. These fires could potentially spread rapidly through the surrounding grassland, depending on fuel load and wind strength. Locally, the road network and infrastructure associated cleared areas would likely slow or stop the fire's movement under lower fire danger conditions, including Tonimbuk Road and other surrounding roads. Spot fires from ember attack are possible in elevated conditions but are expected to be limited due to the extent of managed land and separation from the forested environment. Likely ignition sources from this direction include roadside activities, farm operations or lightning strikes in the forest. The fire risk from the northwest can be managed through the implementation of asset protection zones and suitable IP Ratings.

Southwest – Scenario B	A bushfire approaching from the southwest would have limited access to forested vegetation and would generally be restricted to grassland. Landscape barriers, such as roads, rivers, and managed properties, would assist in controlling a fire that moves through this area. If a fire travelled to or started in the Bunyip Nature Sanctuary, the presence of woody vegetation would likely increase the chance of ember attack on the site or embers that start smaller grass fires around the area. However, a short fire run of ~500m will likely limit the intensity of ember generation. Standard vegetation management activities and BESS Ingress Protection are likely to offset the impact of ember attack on and around the Project Area.

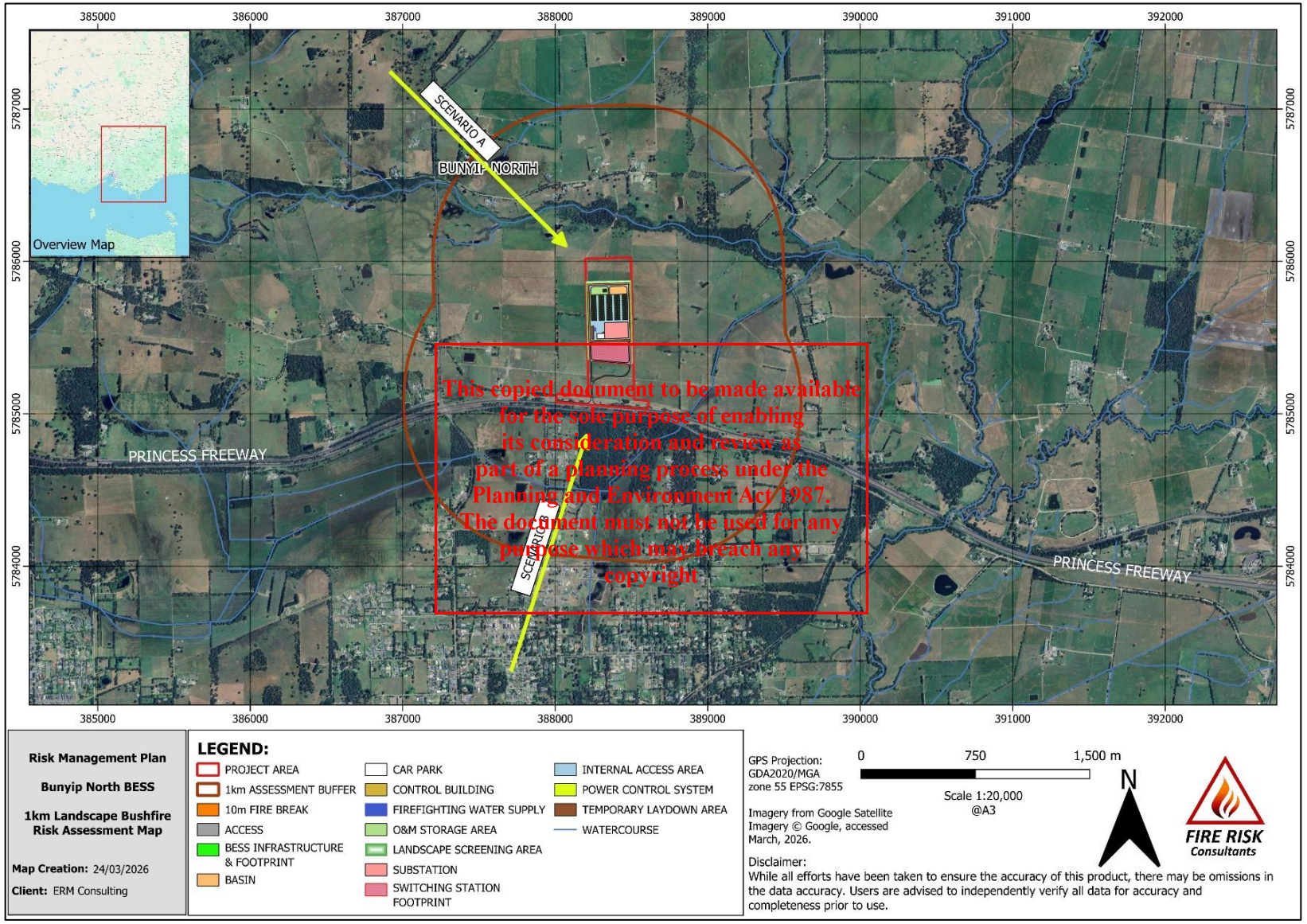
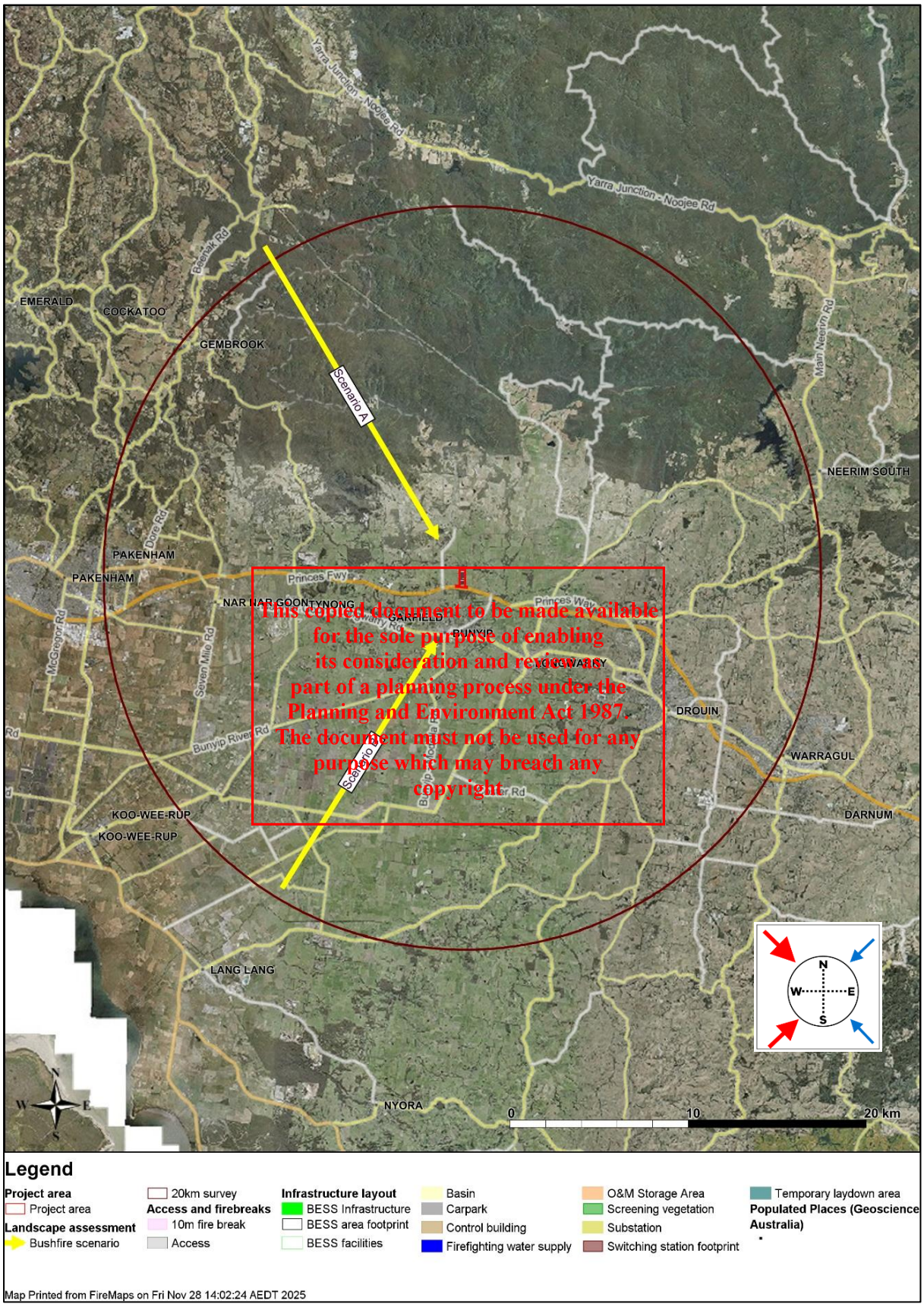


Figure 6 - One kilometre landscape bushfire risk assessment



Legend

Project area	20km survey	**Infrastructure layout**	Basin	O&M Storage Area	Temporary laydown area
Project area	**Access and firebreaks**	BESS Infrastructure	Carpark	Screening vegetation	**Populated Places (Geoscience Australia)**
Landscape assessment	10m fire break	BESS area footprint	Control building	Substation	
Bushfire scenario	Access	BESS facilities	Firefighting water supply	Switching station footprint	

Map Printed from FireMaps on Fri Nov 28 14:02:24 AEDT 2025

Figure 7 - 20-kilometre landscape Bushfire Risk Assessment

Table 6 - Response to Clause 13.02 - Settlement Objectives

Note that whilst the planning policies refer to AS3959:2009, all assessments have been undertaken against AS3959:20218.

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).	This Project does not promote population growth and will likely only have people onsite during the construction phase and when undertaking maintenance during the operations phase.	✓
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 Project will likely result in areas that will achieve a BAL Low rating. In addition, multiple travel options are available away from the site to areas that are considered safer. The direction the bushfire is approaching will influence the decision as to which direction to leave the Project site. This will be addressed within the Emergency Management Plan that is developed for the Project. There are multiple locations in the surrounding landscape that will provide BAL Low areas.	✓
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 Project 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: • Asset Protection Zone (an area where vegetation is either managed or removed) surrounding the BESS footprint and other ancillary infrastructure areas. • An access road to be developed around the BESS footprint and maintained for the life of the Project. • Provision of firefighting water to support firefighting operations.	✓
Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where	The fire protection measures required by the CFA Guidelines ensure that there is no net increase in risk to existing and future residents. The Project Area has been chosen to ensure adequate separation from existing dwellings or other infrastructure is achieved.	✓

Settlement planning objectives	Project response	Achieved (✓ or ×)
possible reducing bushfire risk overall.	The placement of the BESS location ensures the Battery Units are a reasonable distance from nearby roads to ensure egress routes are not disturbed.	
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. This has identified the potential for grassfires to approach from the northwest and southwest aspects. This Project will not change the current expected bushfire behaviour in the landscape.	✓
Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.	As outlined previously, a BESS project is not a settlement. The CFA Guidelines requirements ensure the management of risk is occurring based on the landscape bushfire risk.	✓
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 Project does not involve any strategic planning document, local planning policy, or planning scheme amendment.	✓

4.1.3 Assessment against Clause 13.02-1S summary

The assessment against Clause 13.02-1S has identified that the development is within an area where bushfires are possible, but unlikely to directly impact the site. The bushfire risk is minorly influenced by the forested areas to the northwest. However, the impact to the site is most likely going to be from grassfires that start in the local area or spread from the landscape.

The Project has been designed to limit both the potential impact from grassfires impacting the site and to limit the risk of fires leaving the property and entering the surrounding landscape. As the development is required to achieve the requirements outlined within the CFA Guidelines as a minimum, this will ensure that the settlement planning objectives are achieved.

4.2 Analysis against CFA Guidelines

The CFA have developed guidelines (CFA Guidelines) that outline their requirements to address fire risk within renewable energy installations. These guidelines are anticipated to be aligned to likely conditions recommended by CFA to be included in a Planning Permit for the Project.

Table 7 outlines the model requirements from the CFA Guidelines and details how this influences the design. In addition, further analysis occurs (Chapter 4.3) that addresses the risk assessment requirements of the CFA Guidelines.

Table 7 - Response to CFA Requirements

Model requirement	Compliance	Comments
Section 2 – Consulting with CFA		
a) Where located within a Bushfire Prone Area, bushfire risk is addressed according to the Victoria Planning Provisions, Clause 13.02-1S (Bushfire Planning), through bushfire hazard identification and assessment (including a bushfire hazard site and landscape assessment). This assessment must include risks to the proposed technologies from the landscape (bushfire/grassfire).	✓	The Project is located in a BPA. The indicative layout and design of the Project demonstrates that it has and will be designed to prevent fires from occurring and to then limit the potential for fires to leave the property. As required by the CFA Guidelines, an assessment against Clause 13.02-1S has been undertaken in Chapter 4.1.
b) Address risks from proposed technologies through a comprehensive risk management process, documented in a Risk Management Plan.	✓	This RMP includes an analysis of risk to demonstrate the mitigation solutions are sufficient to manage the fire risk.
c) Indicate where the exact specifications of elements within the renewable energy facility will be determined during the detailed design phase, such as solar panel and wind turbine model/ manufacturer and battery chemistry.	✓	This RMP considers the indicative layout and design and identifies further design solutions to manage the fire risk. The RMP will be updated prior to construction, in accordance with any anticipated Planning Permit conditions, and for the final BESS supplier and project layout. Additionally, informed by the RMP, a Fire Management Plan and Emergency Management Plan will also be developed.
d) Explicitly state that the following documentation will be prepared in accordance with this guideline, in	✓	This document is the Risk Management Plan (RMP), which (as discussed above) will be updated prior to construction. The outcomes of this assessment will inform the preparation

Model requirement	Compliance	Comments
consultation with CFA, before development starts: • Risk Management Plan • Fire Management Plan • Emergency Management Plan		of a Fire Management Plan and Emergency Management Plan.
Section 3 – Risk Management Plan		
A Risk Management Plan must be developed for all renewable energy facilities. The Risk Management Plan must:		
a) Describe the infrastructure (natural and built), landscape, nature of operations and occupancy of the facility.	✓	Refer to Chapter 2 and 3.
b) Describe the risks and hazards at the facility to and from the renewable energy infrastructure (including battery energy storage systems).	✓	Refer to Chapter 4.
c) Specify and justify, in accordance with Section 4.2 of [the CFA Guideline]:		
• The location of the facility in the landscape, and the proposed infrastructure on-site.	✓	Refer to Section 4.3 of this Table.
• Emergency vehicle access to and within the facility that: ○ Includes site access points of a number suitable to the size and hazard of the facility (a minimum of two). ○ Provides access to renewable energy infrastructure, substations and fire service infrastructure.	✓	Refer to Section 4.3 of this Table.
• Firefighting water supply for the facility.	✓	Refer to Section 4.3 of this Table.

Model requirement	Compliance	Comments
• A fire break width of 10m or greater, based on radiant heat flux (output) as an ignition source: ○ Around the perimeter of the facility. ○ Between any landscape buffer/vegetation screening and infrastructure.	✓	Refer to Section 4.3 of this Table.
• The separation distance, based on radiant heat flux (output) as an ignition source, between: • Adjacent renewable energy infrastructure (e.g., between adjacent battery containers/enclosures). • Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation.	✓	Refer to Section 4.3 of this Table.
• All other controls for the management of on and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).	✓	Refer to Section 4.3 of this Table.
d) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.	✓	Refer to Chapter 4.3.
e) Form the basis for the design of the facility.	✓	The outcomes of this assessment will form the basis of the design.
Section 4- Facility Location and Design		
Section 4.1 – Facility Location		

Model requirement	Compliance	Comments
Planning applications for all renewable energy facilities proposed in high-risk environments must address the following:		
a) An assessment against policy at Clause 13.02-1S (Bushfire Planning) where the facility is located in a Bushfire Prone Area (BPA).	✓	An assessment has been undertaken against Clause 13.02-1S and is contained within this RMP (see Chapter 4.1).
b) 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 potential impact of fires that leave the property. Refer to Table 14 in Chapter 4.3 for the assessment detail.
c) The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	✓	If embers landed on or around the site, the standard safety features fitted within the Battery Units would be sufficient to prevent new fire ignition. The Battery Units IP rating that prevents dust sized particles entering the battery enclosure will also keep embers from entering. The perimeter road and 10m fire break will maintain adequate separation from the grassland hazard. Refer to Table 15 in Chapter 4.3 for the assessment detail.
d) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.	✓	This report considers this matter in Section 4.2 and provides various strategies to reduce the impact on the surrounding areas. The risk reduction strategies include: • Provision of setbacks from the surrounding grassland of approximately 10 metres. • Provision of a perimeter road around the BESS Facility. • Vegetation management activities to occur across the site during the fire danger period.

Model requirement	Compliance	Comments
Section 4.2 – Facility Design		
Section 4.2.1 – Emergency vehicle (Fire Truck) access		
a) Construction of a four (4) metre perimeter road within the perimeter fire break.	✓	A minimum four metre wide perimeter road will be provided around the BESS facility and has been included in the indicative design.
b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g. no compacted earth).	✓	All areas where a vehicle can park or travel across including the formed access roads will be designed and constructed to accommodate a vehicle of 15 tonnes.
c) Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface. Ensure any fencing along access routes allows for width of fire vehicles.	✓	This has been considered as part of the Project indicative design and will also be included within the final design. The road widths will be a minimum of four metres wide.
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.	✓	Significant undulation or steep slopes on site are not present. This requirement has been considered as part of the indicative design and compliance can be achieved.
e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	There are no roads that will require 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. At least one passing bay must be incorporated where roads are less than 600 metres long.	✓	Access tracks are approximately 6m wide. If any access tracks have a width of less than 6m, a passing bay will be incorporate every 600m.
g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure,	✓	Access is proposed from the Princes Freeway.

Model requirement	Compliance	Comments
buildings, battery energy storage systems and related infrastructure, substations and grid connection areas.		The access provides connection to internal roads that provide access to all areas of the BESS Facility. The provision of access will allow for emergency services to assess the situation and choose a favourable access method based on conditions.
h) Provision of at least two (2) but preferably more access points to each part of the facility. The number of access points must be informed through a risk management process, in consultation with the CFA.	✓	See discussion above. The Indicative Development Footprint provides dual access so emergency services can assess the situation and choose a favourable access based on conditions. The location of these access/egress points have been located based on previous feedback from CFA. Secondary emergency access point at a location to be determined prior to construction and in consultation with and to the satisfaction of CFA
Section 4.2.2 Firefighting Water Supply		
a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	The fire hydrant system will be located and marked to enable efficient access for firefighters.
b) Static water storage tank installations must comply with *AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning.*	✓	The fire hydrant system will comply with this requirement.
c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	Static water tank(s) will be located adjacent to the primary accessway in an above-ground tank constructed of concrete or steel. This is included in the indicative design shown in Chapter 2.1 and will be included in the final design.
d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	The static water storage tank(s) will be capable of being manually filled within 24 hours of them being used. This process will be contained within the FMP.

Model requirement	Compliance	Comments
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.).	✓	There is ample space on site to comply with this requirement, see the figure in Chapter 2.1. The final design will position all static water storage tanks more than 10m from site infrastructure.
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.*	✓	The fire hydrant system will comply with this requirement.
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.	✓	The fire hydrant system will comply with this requirement.
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.	✓	The fire hydrant system will comply with this requirement.
i) The road access and hardstand must be kept clear at all times.	✓	As illustrated by the indicative layout, and described above, the Project will include an appropriate access road. During operations, all on site vehicles will be parked in the nominated parking area. Due to the low number of staff and contractors that will be on the site, the potential for road access and hardstand areas to be blocked is highly unlikely. The Emergency Management Plan during the construction and operations phases, will

Model requirement	Compliance	Comments
		include a requirement that if a fire has started requiring fire brigade to respond, and where it is safe to do so, all vehicles will be removed from the site.
j) The hard-suction point must be protected from mechanical damage (e.g. bollards) where necessary.	✓	The fire hydrant system will comply with this requirement.
k) Where the access road has one entrance, a ten (10) metre radius turning circle must be provided at the tank.	✓	There is unlikely to be any access roads that will require a turning circle to be provided.
l) An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	The fire hydrant system will comply with this requirement.
m) Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	The fire hydrant system will comply with this requirement.
n) Signage must be provided at the front entrance to the facility, indicating the direction to the static water tank.	✓	The fire hydrant system will comply with this requirement.
Battery Energy Storage Systems		
1) For facilities with battery energy storage systems, the fire protection system must include as a minimum:		
a) Where reticulated water is available, a fire protection system as per Model Requirement (1a) under 'Centralised Battery Energy Storage Systems' *[Not applicable to this Project]*.		
b) Where no reticulated water is available, a fire hydrant system that complies with AS 2419.1-2021 must be provided.		
i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions of AS 2419.1-2021: Fire hydrant installations, Table 2.2.5(D) for open yards flowing for a period of no less than four hours at 20L/s, whichever is the greater.	✓	A fire hydrant system that meets the requirements of AS2419.1:2021 will be provided. A fire water supply of up to 576,000 litres will be provided. The tank locations will be shown on the final plans, and they will be located adjacent to the primary accessway.

Model requirement	Compliance	Comments
ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5(D). (E.g., For battery installations with an aggregate area of over 27,000m2, 4 (four) hydrant outlets are required to operate at 10L/s for four hours, which equates to a minimum static fire water supply of 576kL.)	✓	The aggregate area of the BESS footprint and yard area in the current design exceeds 27,000 m^2, which results in the need to provide 40l/s performance from the fire hydrant system.
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.	✓	The fire hydrant design will ensure this requirement is met.
iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings).	✓	A Water tank location will be located more than 10 m from any infrastructure. The final design will comply with this requirement.
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. (E.g., Fire water tanks are to be located closer to the site entrance than the battery energy storage system).	✓	The fire water tanks will be located at the primary accessway to the BESS. This is shown in indicative plans presented in Chapter 2.1.
Section 4.2.3 Fire Detection and Suppression Equipment		
Suitable fire detection and suppression equipment must be provided:		
a) For on-site buildings and structures, according to the requirements of the National Construction Code.	✓	The buildings will comply with the National Construction Code where required.

Model requirement	Compliance	Comments
b) For storages of dangerous goods, according to the requirements of any Australian Standards for storing and handling of dangerous goods.	✓	The storage of dangerous goods will comply with the requirements of any Australian Standards for storage and handling of dangerous goods. This requirement will be included in the Fire Management Plan for the Project.
c) For electrical installations, a minimum of two (2) suitable fire extinguishers must be provided within 3m-20m of each PCU.	✓	Fire extinguishers will be provided across the site. This requirement will be further reinforced within the Fire Management Plan.
d) In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	✓	This requirement will be specified within the Fire Management Plan.
Section 4.2.5 – 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.	✓	Vegetation within the Project site will be managed during the fire danger period. A 10 m firebreak will be provided from screening vegetation, as well as a 10m firebreak around property infrastructure. The BESS footprint surfaces will be covered with concrete or other non-combustible surface products. The BESS will also have a road running between BESS areas, as well as a perimeter road around the compound.
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 create the potential for ignition of on-site infrastructure.*	✓	All buildings within the BESS area will be provided with a minimum firebreak of 10m around the perimeter of the building. A perimeter road will also be included, further increasing the separation from the surrounding grassland.

Model requirement	Compliance	Comments
Battery Energy Storage Systems		
A fire break must be established and maintained around battery energy storage systems and related infrastructure.	✓	This is included in the indicative design shown in Chapter 2.1 and will be included within the final design. Requirements to maintain this fire break will be included in the Fire Management Plan.
Section 4.2.6 – Design Specific to Facility Type		
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 battery system as per the CFA Guideline is required to be designed with appropriate separation between the batteries and supporting infrastructure. The CFA Guideline also requires the Battery Unit to comply with UL9540 and be certified against UL9540A by an independent testing authority. The results of the UL9540A test guides the required separation distance between the various Battery Units and other infrastructure to reduce the likelihood of fire spread occurring. The layout of the Battery Units will conform with the manufacturer specifications that directly relate to the outcomes of the UL9540A test. The UL9540A standards requires the test methodology to: *Determine the capability of a battery technology to undergo thermal runaway and then evaluate the fire and explosion hazard characteristics of those battery energy storage systems that have demonstrated a capacity to undergo thermal runaway.* The spacing requirements are also influenced by NFPA 855 which requires the BESS manufacturer/supplier to determine the spacing requirements through appropriate testing including the use of UL9540A. Whilst the selection of a BESS supplier has not been finalised, demonstration of these spacing requirements being met will be part of an update to this RMP, and preparation of

Model requirement	Compliance	Comments
		the Fire Management Plan and Emergency Management Plan, prior to the commencement of construction.
b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m, or greater where determined in the Risk Management Plan. *Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.*	✓	The separation from vegetation being provided around the BESS and associated infrastructure is more than 10 m. The 10 m fire breaks will be a non-combustible surface and provide for the protection of the infrastructure, the ability to be utilised by firefighting vehicles. ADVERTISED PLAN
c) A layout of site infrastructure that: i. Considers the safety of emergency responders. ii. Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. iii. Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure.	✓	The indicative design ensures emergency responders have options to travel through BESS areas once they have entered the BESS footprint. The provision of a perimeter road around the BESS footprint and individual roads between the BESS units will ensure firefighters will have the ability to access all areas around the BESS. The indicative layout is considerate of the potential for fires and how they may spread through the Project Area.
2) Battery energy storage systems must be:		
a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).	✓	The Project site will be easily accessed from Princes Freeway but maintains sufficient setbacks to ensure hazards are not introduced to road users or surrounding houses.
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.)	✓	Fire water will be provided from the primary site entrance, and a hydrant system will be installed to ensure fire water is available regardless of wind direction.

Model requirement	Compliance	Comments
c) Provided with in-built detection and suppression systems. Where these systems are not provided, measures to effectively detect and/or suppress fires within containers must be detailed within the Risk Management Plan.	✓	The chosen BESS system will be provided with a fire safety system that meets the requirements of the CFA Guidelines. This is outlined in Chapter 2.2.
d) Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.	✓	The Battery Units will be provided with explosion prevention and venting systems that comply with NFPA855.
e) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.	✓	The Battery Units are designed to eliminate the ingress of dust, spiders and other insects. This will also assist with preventing any embers from fires in the surrounding area to enter the Battery Unit. The chosen Battery Unit will have a suitable IP rating (IP55), and this will be included within the updated RMP.
f) Provided with suitable access roads for emergency services vehicles, to and within the site, including to battery energy storage system(s) and fire service infrastructure.	✓	Driveway access will be provided that allows access to BESS units along with perimeter access around the battery storage area. The indicative design presented in Chapter 2.1 and the final design will address this requirement.
g) Installed on a non-combustible surface such as concrete.	✓	The BESS and associated infrastructure will be installed on a non-combustible surface.
h) Provided with adequate ventilation.	✓	The Battery Units are provided with sufficient ventilation. This includes appropriate separation between and within the Battery Units. The design of ventilation systems will be in accordance with either NFPA 68 or 69 and the manufacturer specifications.
i) 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, such as bollards to ensure the battery enclosures and other infrastructure are protected from damage from vehicles and other equipment. The final decision for the provision of a system to prevent mechanical

Model requirement	Compliance	Comments
		damage will be based on a final assessment during detailed design.
j) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.	✓	This will be included within the final design.
k) Provided with spill containment that includes provision for management of fire water runoff.	✓	The Project will include a stormwater retention area that will also be used to capture any fire water runoff from the BESS footprint that may occur during firefighting operations. This will be included in the final plan. The stormwater retention area will be able to capture a minimum of 576,000 litres of fire water. Procedures will be included within the Emergency Management Plan to inform onsite staff and firefighters on the procedure to utilise the stormwater/fire water retention area.
Section 5 – Facility Construction and Commissioning		
Section 5.1.4 – Emergency Management		
An Emergency Plan must be developed for the construction and commissioning phase, before development starts.	✓	An Emergency Management Plan will be developed for both the construction and operations phases.
Section 6 – Facility Operation		
Section 6.1 –Fire Management Plan		
A Fire Management Plan must be developed for the facility, in consultation with CFA, before development starts.	✓	A Fire Management Plan will be developed for both the construction and operations phase.
Section 6.2 1 –Fire Hazards and Risk Controls		
If your facility is at-risk of bushfire, prevention and preparedness	✓	Appropriate procedures will be incorporated within the Fire Management Plan and Emergency Management Plan that addresses the bushfire risk. This will be informed by an

Model requirement	Compliance	Comments
activities must be detailed in the Fire Management Plan.		update to this RMP once a BESS supplier has been finalised.
Section 6.2 2–Vegetation 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.	✓	The requirement to manage vegetation within the Project Area will be included within the Fire Management Plan.
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 and Emergency Management Plan.
Section 6.2 4–Facility and System Monitoring		
Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled. Any fire must be notified to 000 immediately.	✓	The site will be monitored by a SCADA system that is remotely monitored. All alerts will be received at a central monitoring centre and a procedure will be in place to determine the most effective response which may include the following: • Deploy a technician to the site. • Call 000 and request emergency service assistance.
6.2.5 – Maintenance		
Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. Maintenance must be in line with any relevant Australian Standards and the manufacturer's requirements.	✓	This will be outlined within the Fire Management Plan.
Section 7 – Emergency Planning		

Model requirement	Compliance	Comments
An Emergency Plan must be developed specific to the facility, in conjunction with CFA, before development starts.	✓	An Emergency Management Plan will be developed prior to construction commencing.
Section 8 – Provision of emergency information		
An Emergency Information Book must be developed and available to emergency responders. Emergency Information Books must be located in Emergency Information Containers, provided at each vehicle entrance the facility.	✓	An Emergency Information Book will be provided at the main entrance in a container that is protected from weather.

4.3 Treatment summary

Following the assessment against the CFA Guidelines the following treatments will be provided to manage the risk of fires. The Fire Management Plan will outline the detailed requirements for the provision and maintenance of fire management treatments. The below list is a summary of the requirements:

1. Access to the site to include full perimeter and internal access to the BESS area, including appropriate widths and load limits from access gates.
2. Perimeter firebreak of 10 metres from screening vegetation, as well as a 10m firebreak around property infrastructure.
3. Provision of a static water supply (576,000 litres) made of concrete or steel and located at the primary accessway and more than 10 metres from any infrastructure.
4. Fire hydrant system that complies with AS2419.1, and booster assembly and pumps that enables appropriate pressures at the fire hydrant.
5. Minimum fire water retention of 576,000 litres.
6. Fire Management Plan as per the requirements of the CFA Guidelines.
7. Emergency Management Plan as per the requirements of the CFA Guidelines.
8. Emergency Information Book and Emergency Information Containers located at the primary access entrance.

4.4 Risk Assessment

This risk assessment has been developed to meet the requirements of Section 5 of the CFA Guidelines.

4.4.1 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 – Guidelines* as incorporated into the National Emergency Risk Assessment Guidelines (NERAG). Figure 8 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.

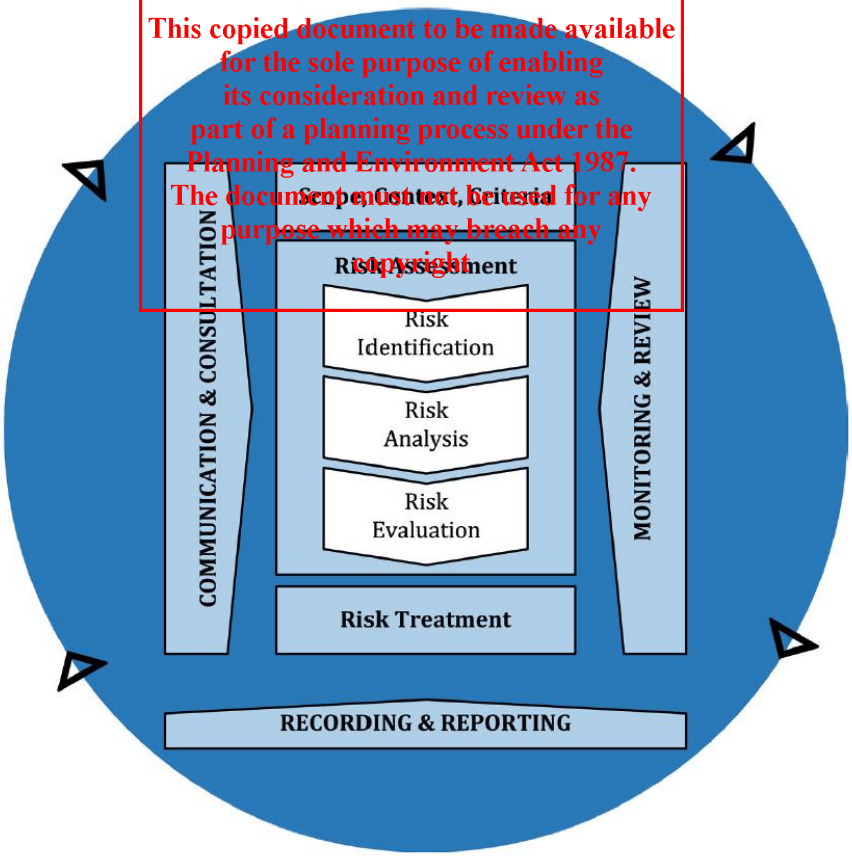


Figure 8 - Overview of AS/NZS ISO 31000-2018 risk management process

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.

4.4.2 Context

The assessment of fire risk is a key requirement to accompany an application for a planning permit for a BESS project. The CFA Guidelines outlines the types of hazards that may need to be considered in relation to BESS infrastructure at the design, construction and operational phases.

4.4.3 Analysis of fire risk

BESS infrastructure is largely acknowledged as having limited potential to cause fires largely due to the high standards of safety set by the Australian and International standards and guidelines. Fires have occurred previously and where possible these have been considered during the assessment of risk outlined this report. The occurrence of fires in large scale battery packs is not common. Fires have occurred and these are usually contained to a single battery pack. The range of sensors that are fitted to the systems will in most cases enable the early shut down that will prevent thermal runaway from occurring.

This assessment of risk considers the key stages of the Project being the construction and operations phase.

Assessment of fire risk during construction (including commissioning)

The construction phase includes various stages including site establishment works, installation of underground infrastructure, construction of hardstands and footings and the installation of the Battery Units and other ancillary infrastructure. This stage also includes the commissioning of the Battery Units and other systems (including fire protection systems). This stage also ensures the relevant connectivity is installed to ensure that all alerts and system messages are transmitted to an appropriate monitoring location.

A 2021 fire that occurred at the Victorian Big Battery[3] during its commissioning on the outskirts of Geelong has been assessed and reports are available that outline what occurred and how system manufacturers and installers should consider this information. This fire occurred during the commissioning phase of the particular Battery Unit. In summary, the isolation of the Battery Unit whilst it contained a charge was considered an incorrect process[4].

On 28 September 2021, Energy Safe Victoria released their Statement of Findings – Fire at the Victorian Big Battery. They outlined that the root cause was most likely:

[3] https://victorianbigbattery.com.au/wp-content/uploads/2023/10/VBB-Fire-Independent-Report-of-Technical-Findings.pdf

[4] https://victorianbigbattery.com.au/wp-content/uploads/2023/06/VBB_StatementOfFindings_FINAL_28Sep2021.pdf

a leak within the Megapack cooling system that caused a short circuit that led to a fire in an electronic component. This resulted in heating that led to a thermal runaway and fire in an adjacent battery compartment within one Megapack, which spread to an adjacent second Megapack.

The report outlines the contributory factors, and the lessons learned to prevent a reoccurrence. Energy Safe Victoria provided approval to recommence commissioning at the Victorian Big Battery providing the measures outlined were in place. The report states that the affected Battery Units failed safely despite total loss.

The outcomes of the Victorian Big Battery fire resulted in changes to the CFA Guideline to ensure the safety of firefighters is at the forefront of design requirements.

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 Project. 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 safety systems and other safety systems.

The development of an FMP will ensure the ongoing management of the fire safety systems for the life of the Project.

4.4.4 Risk identification

Through discussions with key stakeholders, review of various documentation and the consideration of previous fire history that involved BESS infrastructure, review of the site specific constraints, and engagement with the CFA, the following hazards have been identified:

Table 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 BESS infrastructure. Hazards including battery faults, overcharging, rapid discharge, loss of remote monitoring systems, internal short circuits and overheating.
Fire causing spread to adjoining infrastructure on the property	A fire that has started in a single Battery Unit 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.
Fire causing offsite impacts	Any fire on the property that is able to 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 may use water to either extinguish or cool the surrounding area until the infrastructure is deemed safe.
Dangerous Goods exposure	The dangerous goods that are stored within the BESS and associated infrastructure may leak and either ignite or require clean up by either on site staff, contractors or firefighters.
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.
Smoke and gas	A fire within a Battery Unit will generate either gas or smoke that can spread throughout the site and into the neighbouring properties.

The above list will allow the assessment of most hazards that may be encountered in a development of this type.

4.4.5 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 risk matrix has been developed that enables the effective consideration of risk and to enable a comparison between the outcome of the hazard assessment.

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 9 - Likelihood table

Likelihood scale frequency	Description
Almost certain	The event Is expected to occur in most circumstances. (75%-99%). Has occurred frequently at the location.
Likely	The event will probably occur in most circumstance (50% - 75%). Has occurred frequently in the company.
Possible	The event should occur at some time. Likely to occur sometime (25% - 50%). Has occurred many times in the industry, but not in the company.
Unlikely	The event could occur at some time. Unlikely but possible (10% - 25%). Has occurred once or twice in the industry.
Rare	The event may occur only in exceptional circumstances. Assumed it may not be experienced (0% - 10%). Unheard of in the industry.

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 10 - Risk assessment consequence table

Consequence scale	Description		
	People	**Environment**	**Plant/Equipment**
Catastrophic	Multiple fatalities	Permanent widespread ecological damage. Toxic release off-site with detrimental effect. Likely EPA prosecution	Massive widespread equipment damage (i.e. plant/equipment write-off)
Major	Single fatality or permanent disability	Heavy ecological damage with costly restoration. Off-site release contained with outside assistance and little detrimental impact.	Multiple equipment replacements.
Moderate	Major injuries - Incapacitations or requiring time off work	Major but recoverable ecological damage. On-site release contained with outside assistance.	Equipment level replacement /repair.

Minor	Significant injuries - Medical treatment, non-permanent injury	Limited but medium term damage. On-site release immediately contained	Component level replacement /repair.
Insignificant	Slight injuries- First Aid Treatments (cuts/ bruises)	Short term damage. Low financial loss, negligible environmental impact	Slight Damage.

The risk rating table (Table 11) 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 development. Actions can be prioritised using this method to determine where risk mitigation works will occur.

Table 11 - Risk matrix

				Impact Score				
				1	2	3	4	5
				Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Risk Assessment Matrix			**People**	Slight Injuries- First Aid Treatments (cuts/bruises)	Significant Injuries - Medical Treatment, non-permanent injury	Major Injuries - Incapacitations or requiring time off work	Single Fatality or Permanent Disability	Multiple Fatalities
			Environment	Short term damage / Low financial loss, negligible environmental impact	Limited but medium - term damage / On-site release immediately contained. Unlikley EPA investigation.	Moderate but recoverable ecological damage / On-site release contained with outside assistance. Possible EPA investigation.	Major ecological damage with costly restoration / Off-site release contained with outside assistance and little detrimental impact. Possible EPA prosecution.	Permanent widespread ecological damage / Toxic release off-site with detrimental effect / Likely EPA prosecution
			Plant / Equipment	Slight Damage	Component level replacement /repair	Equipment level replacement /repair	Multiple equipment replacements	Massive widespread equipment damage (ie plant/equipment write-off)
Likelihood	**A**	**Almost Certain**	The event Is expected to occur in most circumstances / 75%-99% / Has occurred frequently in the industry	**Low (5)**	**Moderate (10)**	**Very High (18)**	**Extreme (23)**	**Extreme (25)**
	B	**Likely**	The event will probably occur in most circumstance / 50% - 75% / Has occurred frequently in the industry	**Low (4)**	**Moderate (9)**	**Very High (17)**	**Very High (20)**	**Extreme (24)**
	C	**Possible**	The event should occur at some time. Likely to occur some time / 25% - 50% / Has occurred in the industry.	**Low (3)**	**Moderate (8)**	**High (13)**	**Very High (19)**	**Very High (22)**
	D	**Unlikely**	The event could occur at some time. Unlikely but possible / 10% - 25% / Has occurred once or twice in the industry	**Low (2)**	**Low (7)**	**High (12)**	**High (15)**	**Very High (21)**
	E	**Rare**	The event may occur only in exceptional circumstances. Assumed it may not be experienced / 0% - 10% / Unheard of in the industry	**Low (1)**	**Low (6)**	**Moderate (11)**	**High (14)**	**High (16)**

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.

4.4.6 Risk analysis worksheets

The following worksheets have assessed the hazards identified in Chapter 4.4.4 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.

Table 12 - 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 BESS infrastructure. Hazards including battery faults, overcharging, rapid discharge, loss of remote monitoring systems, internal short circuits and overheating. These events may cause off gassing or thermal runaway.
LIKELIHOOD	Rare
JUSTIFICATION	The occurrence of electrical faults and/or hazards has occurred in the past and are likely to occur again in the future. The likelihood of an electrical fault escalating into an emergency such as a fire is unlikely due to the multiple layers of controls in place including sensors, 24/7 system monitoring and maintenance programs. There are examples of fires within BESS technology that indicates that when faults occur, they can escalate into challenging events including thermal runaway. To offset the likelihood of a fault within the BESS that creates a flammable atmosphere in and around the BESS, escalates to a fire, or a fire that affects adjacent infrastructure, the following mitigation treatments will be included: • Cooling systems that maintain the temperature of the Battery Units during day-to-day operations. • Safety systems that send alerts to the monitoring centre if a sensor is activated. • Internal barriers within the battery enclosures designed to reduce the possibility of thermal runaway events from spreading to adjoining Battery Units. • Separation distances between individual Battery Units and rows of batteries and other infrastructure in accordance with manufacture installation guidelines. • The BESS will be installed by qualified and competent people in accordance with the manufacturer's specifications and including compliance with *UL9540 – Energy Storage System Requirements* and *NFPA 855 - Standard for the Installation of Stationary Energy Storage Systems.* • The design and layout of the Battery Units are guided by the outcomes of the testing completed in accordance with UL9540A.
CONSEQUENCE	Moderate
JUSTIFICATION	The identification of a fault by the system monitoring process will result in early intervention. Intervention includes shut down, response from a technician and/or calling the fire brigade. The CFA Guideline requires a range of controls to be implemented and maintained including: • Non-combustible surface that will not support fire spread through vegetation accumulation. • SCADA monitoring system that will monitor the system performance including over charging, elevated temperatures and a range of other faults and send alerts to the monitoring centre • Compliance with UL9540 and subsequently UL9540A

	• Appropriate separation between Battery Units and other infrastructure If the fire escalates and the implementation of shut down procedures does not stop the battery entering the off gassing phase and the thermal runaway phase, it is unlikely for the fire to spread beyond the Battery Unit. The potential for a fire to occur and to then spread throughout the Battery Unit is highly unlikely. The implementation of the controls outlined above will support the prevention of faults from escalating into fires and if a fire does occur, limit the ability for the fire to spread into an adjoining battery enclosure. The provision of a communications system between the SCADA system and the monitoring centre with built in redundancies will ensure the site is monitored 24/7 thereby ensuring early notification and receipt of alerts. The site is in an area that provides access options depending on the location of the fire and the prevailing wind conditions. This ensures that firefighters can assess the conditions and select the most suitable access option.
RISK RATING	Moderate (11)

STRATEGY TO LOWER RISK	The requirements outlined within the response to the CFA Guidelines will be sufficient to ensure the risk is managed at an acceptable level. Other strategies outlined within the response to the CFA Guidelines that will also assist with managing the risk includes:
	
	• Development of an Emergency Management Plan that includes in addition to that required by CFA:
	  ○ A system to communicate effectively between a central 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, or a fault has been detected that may lead to an off gassing or thermal runaway event.
	• The SCADA system will be zoned to enable quick identification of the area of the facility that has caused an alarm.
	• Fire hydrant systems enabling firefighters to access firefighting water immediately.

RESIDUAL RISK	Low (6) (Rare/Minor)

Table 13 - 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 Battery Unit 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	Rare
JUSTIFICATION	The installed monitoring systems will send alerts to a central monitoring centre. These include sensors that are monitoring for over charging, elevated temperatures, and other faults. The day-to-day monitoring system will trigger an immediate response if alerted. The BESS system can be remotely operated, and this includes the commencement of shutdown procedures. 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. The site procedures will outline when a technician is required to attend the site to investigate faults or alerts. Operators within the monitoring centre may be able to access CCTV footage to enable them to gather additional information on the status of the faults at the site. Upon the system sensing a fault, the monitoring centre will determine an appropriate response which may include: • Notifying the on-call technician to attend the site. • Calling 000 and reporting the activation to the fire brigade in addition to notifying the on-call technician to attend. The Battery Units will be made of non-combustible material 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. Most of the infrastructure that supports the BESS is non-combustible or has low quantities of combustible materials. There are a small number of fire events within BESS technology where a fire has spread to an adjoining battery. The layout design incorporates spaces that will reduce the risk of fire spread occurring that is influenced by the outcomes of large scale fire testing.
CONSEQUENCE	Minor
JUSTIFICATION	If a fire does spread to another battery enclosure or other infrastructure it may cause additional issues including smoke management, dangerous goods leaks, fire water runoff management and exposure to electrical hazards. The ability for fire spread to occur is limited due to the many safety systems that are installed and maintained including sensors that generate alerts and 24/7 monitoring resulting in early detection and response. The firefighting hydrant system and water supply will enable firefighters to protect exposures for the duration of the fire event if this is deemed required. It is noted that the BESS manufacturers response guide advises fire agencies to not attempt to extinguish a fire and to allow it to burn out under direction from CFA. The layout design will be in accordance with the manufacturers specifications which will ensure there is suitable separation being provided between the battery enclosures and to other infrastructure. The separation distance requirements have been determined through fire engineering analysis and small to large scale fire testing.
RISK RATING	Low (6)

STRATEGY TO LOWER RISK	The requirements outlined within the response to the CFA Guidelines and complying with the manufacturer specifications that have been developed following UL9540A and large scale fire testing and will be sufficient to ensure the risk is managed at an acceptable level. Other strategies outlined within the response to the CFA Guidelines that will also assist with managing the risk includes:
	• 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 system will be zoned to enable quick identification of the area of the facility that has caused an alarm.

RESIDUAL RISK	Low (1) (Rare/Insignificant)

Table 14 - Risk assessment - Fire causing offsite impacts.

RISK	Fire causing offsite impacts.
CAUSE	Any fire on the property can spread to adjoining properties. This would most likely be through vegetation connectivity. If this occurs on an elevated fire danger day, the fire could spread into adjoining properties.
LIKELIHOOD	Possible

JUSTIFICATION	The likelihood of a fire occurring within the BESS footprint is outlined within Table 9 and 10. In addition to this, the compliance with CFA Guidelines also requires mitigation strategies implemented including:
	• Non-combustible surface under the Battery Units and other infrastructure.
	• Provision of a fire break and additional managed areas between the fire break and the boundary fence.
	• The batteries are contained within the metal cabinets and any fire activity will likely stay within the cabinets.
	• The requirement for a Fire Management Plan and Emergency Management Plan that will include prevention and preparedness activities that must occur annually prior to the fire danger period. These activities will include:
	  ○ Management of vegetation on the site.
	  ○ Evacuation exercising and training.
	• The Fire Management Plan will also provide clear direction on the maintenance of the various controls required to manage the fire risk.

	In addition to the CFA Guideline, the manufacturer specifications will outline the separation requirements that must be implemented through the layout design including separation from adjoining properties.
CONSEQUENCE	Minor
JUSTIFICATION	The surrounding landscape is dominated by grassland with space woody vegetation. The closest area of concentrated woody vegetation is located more than 500m from the BESS infrastructure. With the setback distances being provided from the adjoining boundaries, there is sufficient space to limit the potential for fire spread to occur. In the event of a fire and smoke is being generated, the Emergency Management Plan will require the site operators to immediately engage with their neighbours to inform them of the fire and the suggested actions they should take. The fire agency also has access to a system that can warn or alert the surrounding area of the fire and provide advice as to actions they can take.
RISK RATING	Moderate (8)
STRATEGY TO LOWER RISK	Any vegetation growth on the property surrounding the Project will be managed and removed, as required to maintain a 10m fire break. The details of this will be outlined within the Fire Management Plan. During the fire danger period, additional inspections will occur to ensure that all vegetation is removed from the fire break and within the Project footprint. Any on site works during construction or operations will enact standard Occupational Health and Safety policies and procedures including Hot Works, use of naked flames on the property, smoking management, induction of new staff and contractors and contractor management. The induction procedure will include a requirement to ensure people are aware of their obligations of not creating fire risks during their day-to-day activities.
RESIDUAL RISK	Low (7) (Unlikely/Minor)

Table 15 - Risk assessment - Offsite fire impacting on the site.

RISK	Offsite fire impacting on the site.
CAUSE	A fire burning in the surrounding landscape can enter the property and threaten the infrastructure by potentially starting new fires through ember attack or flame contact.
LIKELIHOOD	Unlikely
JUSTIFICATION	Due to the surrounding landscape, there is the potential for bushfires to impact the Project. Due to the setbacks, the likely bushfire impact is through embers landing on and around the property. The site includes fire breaks and managed areas that will limit the ability for a fire to burn on the property. The Fire Management Plan will outline the management arrangements and the maintenance requirements. The ongoing removal of vegetation and other combustible materials in and around the BESS area will be specified within the Fire Management Plan. The design of the battery enclosures will likely prevent fires from entering the Battery Units. The enclosures are designed to prevent dust, insects and birds from entering. The

	enclosures are also fitted with internal climate control systems that will result in fires likely to self-extinguish due to the cool temperatures.
CONSEQUENCE	Minor
JUSTIFICATION	The ability for a vegetation fire to generate sufficient radiant heat to impact on the Battery Units 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 or radiant heat to impact on the BESS from a fire in the surrounding area.
RISK RATING	Low (7)
STRATEGY TO LOWER RISK	Within the Emergency Management Plan ensure the following is included: • When elevated fire danger conditions are forecast, ensure all vegetation maintenance activities have occurred. • If a fire is occurring in the surrounding landscape, engage with CFA to ascertain any actions that should be undertaken to protect the BESS infrastructure.
RESIDUAL RISK	Low (6) (Rare/Minor)

Table 16 - Dangerous Goods

RISK	Dangerous Goods not stored safely resulting in health impacts
CAUSE	With reference to the Dangerous Goods (Storage and Handling) Regulations 2012, there are quantities of Dangerous Goods at the Site within various components. There is the potential for a Dangerous Goods leak to occur that may cause a threat to people, the environment or be involved in a fire.
LIKELIHOOD	Unlikely
JUSTIFICATION	Dangerous Goods are located within the Battery Units and the transformers. The Dangerous Goods are largely installed within the components/equipment during the manufacturing process which means that they are contained and sealed and not readily accessible at the site. Following transportation to the site, any infrastructure with Dangerous Goods will be inspected to ensure it has not been damaged during transportation. If infrastructure with Dangerous Goods is to be stored at site prior to installation, it will be stored in line with manufacturer's specifications to ensure its integrity. Infrastructure will be installed in line with manufacturer's specifications (including inspection and testing). Together, these measures will prevent the likelihood of leaks outside the BESS Site. The design of the BESS including the installation of impact protection devices, such as bollards, around the perimeter of the BESS will prevent vehicles from impacting the infrastructure and potentially causing a leak. The products classified as a Dangerous Good located within the Project will be listed within the Site's Dangerous Goods register and the site operators will be aware of the locations and quantities of Dangerous Goods. Maintenance programs will be enacted to ensure all infrastructure that contains Dangerous Goods within the Project will be maintained in accordance with the

	manufacturer's specifications and the relevant Australian Standards. This will include checking for physical and electrical faults that could result in leaks. Due to the manufacturing and installation procedures, the potential for a Dangerous Good incident to occur is unlikely.
CONSEQUENCE	Moderate
JUSTIFICATION	The assessment of the dangerous goods quantities at the BESS identified infrastructure with quantities of dangerous goods that will likely exceed the Schedule 2 requirements as outlined within the Victoria Dangerous Goods legislation. The largest quantity of Dangerous Goods will be the Lithium Ion (Class 9). Other Dangerous Goods may include refrigerant and oils. These will be assessed when the final design has been endorsed. The final quantities will be confirmed once the equipment specifications have been finalised. The Dangerous Goods referred above, are stored in separate components within the Battery Units, or in separate infrastructure. It is therefore unlikely for the total quantities of Dangerous Goods on the site to be involved in an incident at the Site at the same time. There are other dangerous goods that may be utilised and stored on the site, but it would be expected that these would be in small quantities.
RISK RATING	High (12)
STRATEGY TO LOWER RISK	In accordance with the Dangerous Goods (Storage and Handling) Regulations (2021), the CFA's views must be sought if the quantities have exceeded the fire protection amounts listed in Schedule 2 as is the case for the Lithium-Ion. The CFA will be aware of the presence of Dangerous Goods in relation to the Proposal. Further consultation with CFA to confirm the outcomes of this assessment will occur prior to construction and will be ongoing throughout the life of the Project. The Emergency Management Plan will include details of the hazards associated with dangerous goods and appropriate procedures in response to this RMP, including leak management and other response arrangements to Dangerous Goods related emergencies.
RESIDUAL RISK	Moderate (11) (Rare/Moderate)

Table 17 - Risk assessment - Fire water runoff

RISK	Fire water runoff causing pollution or contamination of the surrounding areas.
CAUSE	In the event of a fire, firefighters will respond and may use water to either extinguish or cool the surrounding area until the infrastructure is deemed safe. If the fire water comes into contact with burning materials or smoke, it may become contaminated.
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 Project and the extensive use of non-combustible materials. The infrastructure is monitored 24/7 and will alert technicians and if required, the fire brigade to the site early. If a fire occurs, it will likely be contained to a single battery container. Firefighting water can be used to cool the adjoining areas and will be considered largely clean as it has not been exposed to fire or smoke. BESS manufacturers advice is to not attempt to extinguish the Battery Unit that is on fire. The safest and most effective firefighting strategy is to let the Battery Unit burn out under CFA direction..
CONSEQUENCE	Minor
JUSTIFICATION	Any fire water that is used at the site will be contained until testing can occur and then in conjunction with EPA determine the most effective disposal method. The Emergency Management Plan will include procedures to capture fire water and then if required, disposal arrangements.
RISK RATING	Low (7)
STRATEGY TO LOWER RISK	Onsite staff will be trained in the fire water runoff management procedures. They will then be available to assist firefighters with managing fire water runoff. The requirement to regularly check the fire water runoff pond will be contained within the Fire Management Plan.
RESIDUAL RISK	Low (6) (Rare/Minor)

Table 18 - Risk assessment – Staff and firefighters

RISK	Injury to staff and responding 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	Possible
JUSTIFICATION	There is the potential for firefighters and/or staff and contractors to be present during an emergency event and not be familiar with the site. The CFA Guidelines impose a variety of controls onto the management of the site through the Emergency Management Plan and how the CFA interacts with the site if they are called to a fire.

	Whilst a low risk that a fire will occur, if a fire 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. The layout of the site will ensure that firefighters will likely initially access the site from the Princes Freeway, which is where the Emergency Information Container will likely be located. Firefighters may then assess the situation and determine if alternate access is required.
RISK RATING	High (13)
STRATEGY TO LOWER RISK	The arrangements for monitoring the SCADA system through the 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 Project. 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 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	Moderate (8) (Possible/Minor)

Table 19 -Risk assessment – Smoke and gas

RISK	Exposure to smoke and gas from a thermal runaway or fire event
CAUSE	As a result of a fire involving a BESS unit, the production of gases and smoke can occur.
LIKELIHOOD	Unlikely
JUSTIFICATION	As discussed previously, the likelihood of a fire starting within a BESS Unit is considered Low. If a fire does ignite, there may be the production of smoke and gases depending on the stage of the thermal runaway event. A thermal runaway event on its own may generate gases that will likely be contained within the battery enclosure. The monitoring systems will detect any faults including smoke and gas releases and the BMS will commence shut down procedures.
CONSEQUENCE	Minor
JUSTIFICATION	The production of smoke or gases depending on the weather conditions may spread from the site and into neighbouring areas. Due to the slow progression of a fire within a BESS Unit, the production of smoke and gases will likely be influenced by the weather conditions causing dispersal to occur rapidly.

	The types of smoke and gases are consistent with a fire within a structure such as a dwelling, though specific differences may exist depending on the materials within the BESS unit.
RISK RATING	Low (7)
STRATEGY TO LOWER RISK	The mitigations outlined in previous assessments will limit the likelihood and consequence of a fire occurring within and externally of a BESS Unit. In addition to the mitigation treatments outlined previously, in support of future emergency management planning a detailed smoke and gas consequence analysis will be undertaken to enable responding firefighters to be aware of the likely dispersion of smoke and gas. The emergency management agencies also operate an emergency warning system that could be utilised if they deem the smoke and gas dispersion to be a concern.
RESIDUAL RISK	Low (6) (Minor/Rare)

5 Conclusion

The assessment of risk for the Bunyip North BESS has found that the indicative design and layout can meet the requirements of the CFA Guidelines and adequately manage the fire risk to an acceptable level.

The Project Area sits within the BPA, and overlaps with the BMO. However the BESS area of the Indicative Development Footprint is 220 m away from the BMO.

This RMP will be updated to confirm these findings once detailed design has commenced including the selection of a BESS supplier, prior to construction.

The reduction in risk is driven by compliance with the CFA Guidelines, which will be confirmed once the selection of a BESS supplier has been finalised. All the model requirements outlined within the CFA Guideline can be achieved with this Project as illustrated by the indicative layout and design.

The risk assessment along with the assessment against the CFA Guideline (Chapter 4.2) has identified the Project can achieve compliance. The systems and procedures that will be implemented during design, construction (including commissioning) and operation will ensure that any risk is managed to an acceptable level.

Historically, fire events involving these types of facilities are due to inappropriate procedures that include having not considered the risk of fire effectively. This RMP has considered these examples in the development of risk mitigation treatments for the Bunyip North BESS.

BESS facilities 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 A – UL9540A test sequence

Figure 1.1
Schematic of Test Sequence