Macedon BESS

Macedon BESS – Risk Management Plan

Macedon BESS Development Pty Ltd

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Document control record

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Executive Summary

Aurecon Australasia Pty Ltd (Aurecon) has been engaged by Macedon BESS Development Pty Ltd to facilitate the environmental and planning assessments and approvals for the large-scale Macedon Battery Energy Storage System (BESS).

The Project includes the development of a BESS on the Site located on Black Forest Drive (also referred to as Macedon-Woodend Road), Macedon (formally known as Lot 2 on Plan of Subdivision 444155). The construction phase is expected to span approximately 12-16 months.

All renewable energy projects within the Country Fire Authority (CFA) jurisdiction in Victoria are required to submit plans showing conformance with the CFA *Design Guidelines and Model Requirements for Renewable Energy Facilities v4 August 2023, updated as v4.4, June 2025* (CFA Guidelines) [1] as part of their planning permit applications. The CFA Guidelines [1] establish the risk assessment methodology and key emergency and safety mitigations for renewable energy installations, including BESS. Under these guidelines, there is a requirement for hazard identification and the determination of appropriate dangerous goods (DG) storage and handling. A Fire Safety Study (FSS) is required if:

- There is non-conformance to the CFA Guideline Model Requirements [1], or
- Requested by CFA for large-scale battery energy storage systems (BESS) exceeding 1 MWh, where the design, capacity, complexity, location or proposed operations necessitate an enhanced, detailed analysis of requirements for fire and explosion safety systems.

The requirements have been assessed in the form of a Risk Management Plan (RMP) – comprising a Dangerous Goods (DG) Screening Assessment, Hazard and Risk Impact Assessment with proposed recommendations and a Bushfire Hazard Assessment.

The Dangerous Goods Screening Assessment concluded that C1 combustible liquids are considered DGs in the context of Victorian *Dangerous Goods (DG) Storage and Handling Regulations 2022 (DG Regulations 2022)* [2]. C1 combustible liquids (56 kL of diesel) stored on site exceed placard quantity thresholds set out in Schedule 2 of the *Dangerous Goods (DG) (Storage and Handling) Regulations 2022* [2]. Additionally, sulphur hexafluoride (SF_6) stored on site also exceeds placard quantity thresholds. As the placard quantity thresholds for C1 combustible liquids and SF_6 as set out by Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022*[2] have been exceeded, placards are required.

The Hazard and Risk Impact Assessment indicates a potential for significant consequences; however, the implementation of risk controls will mitigate these consequences. The recommended technical and management safeguards proposed are intended to comply with the CFA Guidelines [1], reducing the residual risk so that no identified hazards pose a significant risk. These safeguards can be categorised under the following:

- General
- Facility Design
- BESS Design
- Design of the BESS systems
- Lithium-ion battery design
- Transformers and switchgear design
- Separation distances required to prevent the escalation of potential consequences
- Fire Safety
- Safety Management Systems
- Natural Hazards.

The noise impact is assessed and mitigated through the separate Noise and Vibration Impact Assessment (NVIA) for which noise walls will be constructed.

Further study and planning will be undertaken in accordance with CFA guidelines [1] during the detailed design phase. This Risk Management Plan is a preliminary draft that will be further developed as the project progresses to support the Emergency Plan and Fire Management Plan needed for construction and commissioning through to operations.

The Bushfire Hazard Assessment found that the Project Area is in a high bushfire risk landscape characterised by forested foothills, rural residential and agricultural land, and significant flammable vegetation such as eucalyptus forests and invasive Gorse (*Ulex europaeus*) weed. Historical fires and undulating terrain elevate the risk, with fast-moving fires possible under various weather conditions. Road access limitations increase evacuation challenges.The site is a mix of unmanaged grassland, forest patches dominated by several eucalypt species, and shrubland comprising a dense Gorse infestation. The eastern boundary adjoins a substation with a hardstand firebreak, and access is via Macedon-Woodend Road and Allison Lane. Vegetation classified under *Australian Standards Construction of buildings in bushfire-prone areas* (*AS3959*) [3] within 100 m includes forest, shrubland, and grassland types that place the BESS facility within a Bushfire Attack Level (BAL)-Flame Zone (FZ) due to proximity (within 19 m) to high-fuel forest vegetation. This designation indicates an elevated bushfire risk requiring specific mitigation.

The primary bushfire hazards arise from dense leaf litter, understorey vegetation in forest patches, unmanaged grasslands, and the flammable Gorse weed. The site is susceptible to ignition from human activity, natural causes, and roadside ignition sources, with potential for intense fire behaviour and spot fires. The assessment recommends situating the facility in the lowest-risk grassland zone; implementing a 10 m wide firebreak with an access track; designing infrastructure to resist ember attack; maintaining grass under 100 mm during fire danger periods; controlling invasive weeds; providing multiple emergency vehicle access routes; and equipping personnel with fire safety training. During construction and operation, risks from machinery, hot works, electrical faults, vehicle exhaust, accidental ignitions, and dangerous materials storage must be managed through permits, equipment checks, firefighting readiness, and adherence to CFA safety modules.

This Risk Management Plan concludes that the proposed BESS development should be provided with the required mitigations and controls to meet the model requirements of the CFA Guidelines [1].

Abbreviations

Term	Definition
The Applicant	Macedon BESS Development Pty Ltd
Aurecon	Aurecon Australasia Pty Ltd.
ADG	Australian Dangerous Goods
APZ	Asset Protection Zone
BAL	Bushfire Attack Level
BCC	Battery Cell Container
BESS	Battery Energy Storage System
BMO	Bushfire Management Overlay
BPA	Bushfire Prone Area
CBD	Central Business District
CFA	Country Fire Authority
CFA Guidelines	*Design Guidelines and Model Requirements: Renewable Energy Facilities* V4.4 (CFA, August 2023updated June 2025)
db	Decibel
db(A)	A-Weighted decibel
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEECA	Department of Energy, Environment and Climate Action
DELWP	Department of Environment, Land, Water and Planning (superseded by DEECA)
DG	Dangerous Goods
EES	Electrical energy storage
EVC	Ecological Vegetation Class
FSS	Fire Safety Study
GW	gigawatt
ha	hectares
HAZID	Hazard identification
HIPAP 2	Hazardous Industry Planning Advisory Paper No. 2
HSE	Health, Safety and Environmental
HVAC	Heating, Ventilation, and Air Conditioning
km	kilometres
kV	Kilovolt
LFP	Lithium-ion Phosphate
LGA	Local Government Area
LIB	Lithium-ion Batteries
LOC	Loss of Containment
LSIO	Land Subject to Inundation Overlay
m	metre
cm	centimetre
mm	millimetre
MTC	Medical treatment case
MW	Megawatts
MWh	Megawatt hours

Term	Definition
NCC	National Construction Code
NVIA	Noise Vibration Impact Assessment
OEM	Original Equipment Manufacturer
Project Area	The area in which construction will take place and for which approvals will be sought
RCZ	Rural Conservation Zone
RMP	Risk Management Plan, this document
RWC	Restricted work case
SDS	Safety Data Sheet
The Project	Macedon Battery Energy Storage System
The Proponent	Macedon BESS Development Pty Ltd, a subsidiary to South Energy Pty Ltd

1 Introduction

Aurecon Australasia Pty Ltd (Aurecon) has been engaged by South Energy Pty Ltd on behalf of Macedon BESS Development Pty Ltd (the Proponent), to facilitate the environmental and planning assessments and approvals for the Macedon Battery Energy Storage System (BESS) (the Project). The Project is located near New Gisborne in Central Victoria. As part of these assessments, the Proponent has commissioned Aurecon to prepare a Risk Management Plan (RMP), which includes bushfire risks and hazards. Note that this revision of the RMP is at a preliminary stage, reflecting the current status of the Project development. It is expected that the RMP will be updated during the detailed design stage of the Project.

1.1 Purpose

This RMP has been prepared to accompany a planning permit application for the development of the Project in accordance with the Macedon Ranges Planning Scheme:2018 [4], Victorian Planning Provisions [5] and the *Planning and Environment Act 1987* (P&E Act) [6]. Under this legislation, a BESS is classified as a 'utility installation'. This classification includes land used to transmit, distribute or store power. The Project is located within an area classified as Rural Conservation Zone 1 (RCZ1) [7]. Pursuant to Clause 35.06 (subclauses 35.06-1, 35.06-3, and 35.06-5) of the Macedon Ranges Planning Scheme:2018 [4], a planning permit is required for a utility installation and building construction of the site. The Project seeks planning approval from the Minister for Planning via the Development Facilitation Program, utilising the approval pathway provided by Clause 53.22 (Significant Economic Development) of the Planning Scheme.

Additionally, Clause 35.06-6 (Decision Guidelines for the Rural Conservation Zone) and Clause 65.01 (Approval of an Application or Plan) outline key considerations for the responsible authority in assessing the application. These include, but are not limited to:

- The effect on the environment, human health, and potential agricultural use of the area, and
- The degree of flood, erosion or fire hazard associated with the location of the land and the use, development or management of the land so as to minimise any such hazard.

These requirements have been addressed in the form of a Hazard and Risk Impact Assessment, with the proposed scope outlined in Section 1.2.

The purpose of the Bushfire Hazard Assessment is to describe bushfire hazards in the broader landscape and at the site level, the existing and likely future conditions on the land that influences the bushfire risk and identify the bushfire protection measures that are required for the proposed BESS facility and associated buildings to reduce the risk to life and property from bushfire to an acceptable level.

The Project must also comply with the Country Fire Authority (CFA) *Design Guidelines and Model Requirements for Renewable Energy Facilities v4.4, June 2025* (CFA guidelines) [1], which establishes the risk assessment methodology and key emergency and safety mitigations for renewable energy installations, including BESS facilities. The key legislative and regulatory requirements applicable to facilities in Victoria, as referenced in the CFA Guidelines [1], have also been summarised in Table 1-1. Refer to Appendix A for a summary of the gap assessment conducted for the Project against the CFA guidelines [1].

Table 1-1 Required Regulatory Compliance for the BESS Facility (CFA Guidelines) [1]

CFA Section	CFA Guideline	Relevant Regulation(s)
Section 2.3.1	All buildings on site are required to comply with the National Construction Code (NCC). Where fire safety matters listed under Regulation 129 in the *Building Regulations 2018* do not meet the 'deemed to satisfy' provisions of the NCC, the report and consent of the fire authority Chief Officer is required.	*Building Regulations 2018* [8]

CFA Section	CFA Guideline	Relevant Regulation(s)
Section 2.3.2	Where the facility includes a battery energy storage system or other significant quantities of dangerous goods, a request for emergency services written advice under Regulations 52 and/or 53 of the DG *Regulations 2022* [2] may be required. Regulation 52 and 53 states that "An occupier of premises where dangerous goods are stored and handled in quantities that exceed the relevant quantities specified" must: ■ request written advice of emergency services authority in relation to the design/alteration of the fire protection system ■ ensure that a written plan for dealing with any emergency associated with the storage and handling of dangerous goods on those premises is developed, implemented and maintained; and communicated to the relevant people	*Dangerous Goods (Storage and Handling) Regulations 2022* [2]
Section 3.1	Section 28 of the OHS Act [9] states the following in relation to the duty of designers: "A person who designs a building or structure or part of a building or structure who knows, or ought reasonably to know, that the building or structure or the part of the building or structure is to be used as a workplace must ensure, so far as is reasonably practicable, that it is designed to be safe and without risks to the health of persons using it as a workplace for a purpose for which it was designed." Persons who have management or control of workplaces have obligations under the OHS Act [9] to ensure the health and safety of people 'so far as is reasonably practicable'. This legislation requires consideration of risk control measures and safe systems of work, which for renewable energy installations may relate to the development of systems and activities for: ■ Housekeeping, including management of vegetation ■ Security (fencing, monitoring, alarms, etc.) ■ Undertaking hot works ■ Ignition source control ■ Vehicle, plant and equipment maintenance requirements.	*Victorian Occupational Health and Safety Act 2004 (OHS Act)* [9] *Occupational Health and Safety Regulations 2017* [10] [10]
Section 2.4	Sections 113A and 83BA of the Electricity Safety Act 1998 [11] require major electricity companies and specified operators of at-risk electric lines to prepare and submit a Bushfire Mitigation Plan to Energy Safe Victoria for acceptance. Sections 6 and 7 of *the Electricity Safety (Bushfire Mitigation) Regulations 2023* [12] contain the requirements for Bushfire Mitigation Plans.	*Electricity Safety (Bushfire Mitigation) Regulations 2023* [12]
Section 4.2.4	Substations should be surfaced to eliminate all vegetation including grasses. The Electricity Safety (Electric Line Clearance) Regulations 2020 [13] prescribe the vegetation clearance requirements for electric lines based on the assigned fire hazard rating for land established under Section 80 of the Electricity Safety Act 1998. Fire hazard ratings are available from CFA by request.	*Electricity Safety (Electric Line Clearance) Regulations 2020* [13]

1.2 Scope of Assessment

This report will review the Project against the requirements of the CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2024, updated as V4.4 June 2025 [1]. This assessment covers:

- Facility description, including infrastructure details, activities, and operating hours.
- A screening assessment to determine if the BESS facility triggers any specific screening criteria in relation to the storage and handling of dangerous goods and fire risk.
- Identification of CFA guideline requirements [1] requiring conformance for the Project during submission of the planning permit application.
- A desktop Hazard Identification exercise to identify hazards in accordance with the CFA Guideline [1] for renewable energy facilities.
- Assess the associated risks with the proposed BESS facility and potential mitigation measures.
- Review Fire System/Safety design requirements for conformance with good practice for BESS facilities.
- Recommend risk reduction measures to be applied during the design, construction and operations of the BESS.
- Description of the existing vegetation and bushfire hazards, including within the site and surrounding landscape.
- A site assessment of the proposed BESS and associated infrastructure to comply with the requirements of the *Australian Standard AS3959 (Construction of buildings in bushfire prone areas*) [3]. The site assessment records:
  - categorised vegetation on site, including:
    - vegetation type (e.g. Woodland, Scrub, Grassland etc.)
    - effective slope under vegetation
    - distance and slope between the proposed permanent or temporary buildings (such as any battery storage or construction site offices) and any mapped categorised vegetation.
  - any areas of excluded vegetation (as per Section 2.2.3.2 of *AS 3959*).
- Undertake a bushfire landscape hazard assessment in accordance with Bushfire Planning Clause 13.02-1 of the Gannawarra [14] and Loddon Planning Schemes [15] [16], to provide details of the bushfire hazards in the broader landscape considering bushfire scenarios as well as egress to built-up areas.
- Determine the Bushfire Attack Level (BAL) of the vegetation on site in accordance with AS 3959 [3]. BAL contour maps will be prepared, which will inform the bushfire risk and vegetation management requirements for the BESS and any temporary construction buildings.
- Outline key bushfire management measures identified in the CFA Guidelines [1] that are applicable to the site, detailing how the Project will implement these measures, specifically in relation to:
  - The proposed location and design of the infrastructure
  - Defendable space
  - Water supply
  - Access
  - Substation and transmission lines
  - Operational requirements.

The report provides input to key location/siting and layout/design and is intended to form the basis of the required future Risk Management Plan and Fire Management Plan for the Project. Fire risks associated with the infrastructure (Section 3.3.2.4 of the CFA guidelines [1]) and several components of the Project relating

to construction and commissioning requirements are also beyond the scope of this assessment. These shall be undertaken for the Project in consultation with the CFA during further stages of the Project development.

1.3 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- For the screening of dangerous goods against placard, manifest, and fire protection thresholds, as per the *Dangerous Goods (DG) Storage and Handling Regulations 2022* [2], the anticipated storage quantities of materials on site are based on a conservative estimate.
- It is assumed that fire suppression, thermal runaway prevention, and emergency response systems will be designed in accordance with best practice for BESS facilities.
- It is assumed that the facility will be managed via risk and emergency management plans. Should further information become available regarding the conditions at the site, the assessment, findings and recommendations in this assessment may change.
- The next steps and recommendations outlined in this report are based on publicly accessible information up to the point of its completion.
- The outcomes of this bushfire assessment are limited to the BESS site and immediate surrounds, and the proposed project definition as outlined in Section 2.3.
- While the measures identified in this assessment, when fully implemented, can help reduce the residual fire risk to the Project, they cannot guarantee that assets will survive a bushfire or grassfire on every occasion due to the unpredictable nature of bushfires and extreme weather. Continual evaluation and review of this document, fire risk conditions at the site and updating management practices may assist in further reducing the residual fire risk over the life of the Project.

1.4 Exclusions

The assessment exclusions are listed below:

- No fire safety study has been undertaken for this project. A Fire Safety Study (FSS) is required if:
  - There is non-conformance to the CFA Guideline Model Requirements [1], or
  - Requested by CFA for large-scale battery energy storage systems (BESS) exceeding 1 MWh, where the design, capacity, complexity, location or proposed operations necessitate an enhanced, detailed analysis of requirements for fire and explosion safety systems.
- The development of a site-specific Emergency Plan is excluded and will need to be addressed prior to construction.
- A Fire Management Plan has not been developed as part of this assessment and will need to be addressed prior to construction.

The link between the Project stage and the relevant Assessments and Plan Developments is shown in Figure 1 published by CFA below.

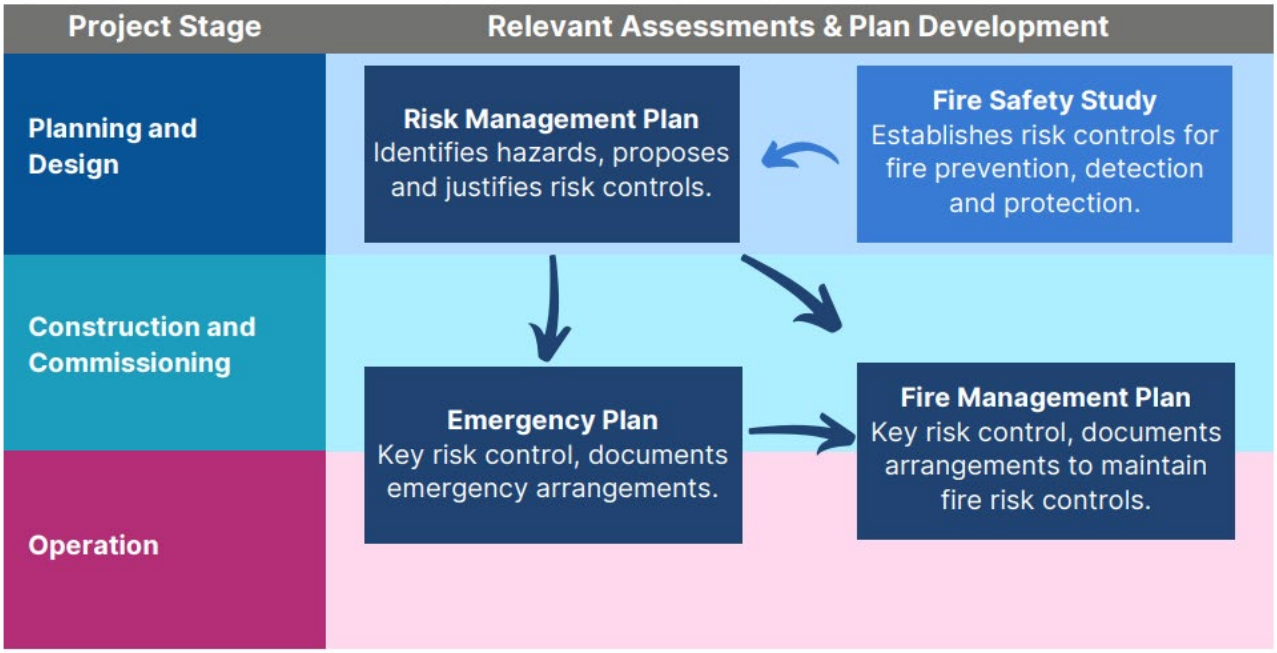

Figure 1 CFA Guideline Plans and Assessments for large-scale battery energy storage systems [1]

2 Project Site and Surrounds

2.1 Project Background

South Energy, as a part of the Growland Group, will deliver 3 GW of renewable energy projects with various technologies including wind, solar, battery energy storage and hydrogen over the next five years. The Client for this Project is a subsidiary of South Energy, named 'Macedon BESS Development Pty Ltd'. The planned BESS on the land known as Lot 2 PS444155 on Black Forest Drive (also referred to as Macedon-Woodend Road), Macedon, will form part of this suite of projects, and is planned to be operational by July 2028.

The Project supports Victoria's transition towards renewable energy and will be a significant investment for central Victoria. The proposed BESS would connect to the adjacent Gisborne Substation and provide enough power for 35,000 households for a four-hour discharge. The project would enable a stable supply of renewable energy to the area.

2.2 Project Area

The proposed site is located on Black Forest Drive/Macedon-Woodend Road, Macedon, and is formally known as Lot 2 on Plan of Subdivision 444155 (refer to Figure 2). The Site has an area of approximately 7.28 ha and is in the Macedon Ranges Shire. Allison Lane borders the Site to the north-east, Black Forest Drive/ Macedon-Woodend Road to the east, the Gisborne Substation to the south and the Calder Freeway to the west.

The closest township is New Gisborne, approximately 2.3km to the south-east of the Site and is within the Macedon Ranges Shire Council, and approximately 59 km north-west of Melbourne's CBD.

The surroundings of the Site are characterised mainly by cleared, vacant land on the south side of Calder Freeway and agricultural land on the north side of Black Forest Drive/Macedon-Woodend Road. The Site is situated in a rural setting and away from established neighbourhoods.

Sensitive receptors in the proximity (<500m) of the Project include several rural residential plots, including:

- 62 Black Forest Drive, 60 m away from the Project site boundary
- 48 Black Forest Drive, 80 m away from the Project site boundary
- 32 Norton Rd, 280 m away from the Project site boundary
- 96 Black Forest Drive, 250 m away from the Project site boundary.

Other nearby receptors include the Calder Freeway, a transport corridor and the existing adjacent Power Station.

Figure 2 Project Site

2.3 Project Description

The following section provides a summary of the Project and should be read in conjunction with the accompanying Concept Design prepared by South Energy.

The Project will comprise the following:

- Site establishment works including removal of vegetation within the construction area.
- Construction of a BESS with a 501 MWh capacity featuring the following design components:
  - 123 Battery Containers (BCCs) and 41 Power Conversion Units (PCUs)
  - Ancillary electrical equipment including sub-station, control rooms, harmonic filter, and connecting ancillary equipment
- Construction of two site access points, which are provided via Allison Lane and Macedon-Woodend Road, respectively, and associated business identification signage.
- Underground or overhead cabling (66kV) to connect the onsite substation to the adjoining Powercor Gisborne Substation (66/22kV).
- An Operations and Maintenance (O&M) Facility.
- Temporary construction facilities including site offices and stores, laydown and hardstand area and construction carpark.
- Water storage including two water supply tanks and pump house.
- Fencing around the perimeter of the BESS and collector substation.
- Permanent car parking spaces for operational staff.
- Installation of a noise wall up to 4m in height on the north east boundary the BESS.
- Construction of two (2) lightning masts up to 21.4m in height adjacent to the collector substation.
- Construction of light poles up to 10.6m in height around the perimeter of the BESS.
- Construction of a firewater holding pond.

Figure 3 shows the proposed site layout (satellite overlay), while Figure 4 shows the detailed layout of the proposed Facility.

ADVERTISED PLAN

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NOTES
1. ANY ELECTRONIC FILE IS PROVIDED WITHOUT WARRANTY AND SHOULD BE USED ONLY IN CONJUNCTION WITH THE SUPPLIED PDF/PAPER COPY OF THIS PLAN.
2. NO BOUNDARY SURVEY HAS BEEN UNDERTAKEN. BOUNDARIES SHOWN ARE FROM KMZ FILE ONLY AND ARE SUBJECT TO CONFIRMATION BY BOUNDARY SURVEY.
3. THE SURVEY HAS BEEN CONDUCTED USING AERIAL IMAGING. ACCURACY IS +/-50mm VERTICAL IN OPEN, HARD FLAT AREAS AND +/-150mm ON GROUND FEATURES IN OPEN, HARD FLAT AREAS.
4. SERVICES SHOWN ARE INDICATIVE ONLY. POSITIONS ARE BASED ON SURFACE INDICATOR(S) LOCATED DURING FIELD SURVEY. CONFIRMATION OF THE EXACT POSITION SHOULD BE MADE TO THE RELEVANT AUTHORITIES PRIOR TO ANY EXCAVATION WORK. OTHER SERVICES MAY EXIST WHICH ARE NOT SHOWN.
5. BUILDINGS HAVE BEEN PLOTTED FOR DIAGRAMMATIC PURPOSES ONLY.
6. MAPPING SYSTEM IS MGA/2020-55 (ZONE 55, MGA 2020)
7. THE FIRE HYDRANT SYSTEM TO BE CONFIRMED WITH THE PROGRESS OF THE DESIGN
THE ROAD DESIGN TO BE CONFIRMED WITH THE PROGRESS OF THE DESIGN
8. REFER TO DRAWING EHV-MBESS-EL-DR-0102 FOR DETAILS.

PRELIMINARY ISSUE

1:1000 — 20 10 0 20 40 60 80 100m FULLSIZE

No	DESCRIPTION	DRAWN	CHKD	APPRD	DATE
A	ISSUED FOR REVIEW	G.L.S.	K.R.G.	P.N.	27/10/25

REVISIONS

DESCRIPTION	DRAWING No.
CADASTRAL OVERLAY	EHV-MBESS-EL-DR-0105
PROPOSED BESS & COLLECTOR SUBSTATION LAYOUT	EHV-MBESS-EL-DR-0102

REFERENCES

EHV CONSULTING AND DESIGN

South Energy

DRAWING TITLE
MACEDON BESS 188.6MW (501MWh) AND 66/33kV COLLECTOR STATION PROPOSED SITE LAYOUT

DESIGN	G.L.SMITH	DRAWN	G.L.SMITH	DATE	27/10/2025
A1 SCALE	1:1000	CAD FILE	EHV-MBESS-EL-DR-0109	FOLDER	MBESS
DRAWING NUMBER	EHV-MBESS-EL-DR-0109	SHEET NUMBER	1	OF 1	REV A

Figure 3 Proposed Site Layout (Satellite Overlay)

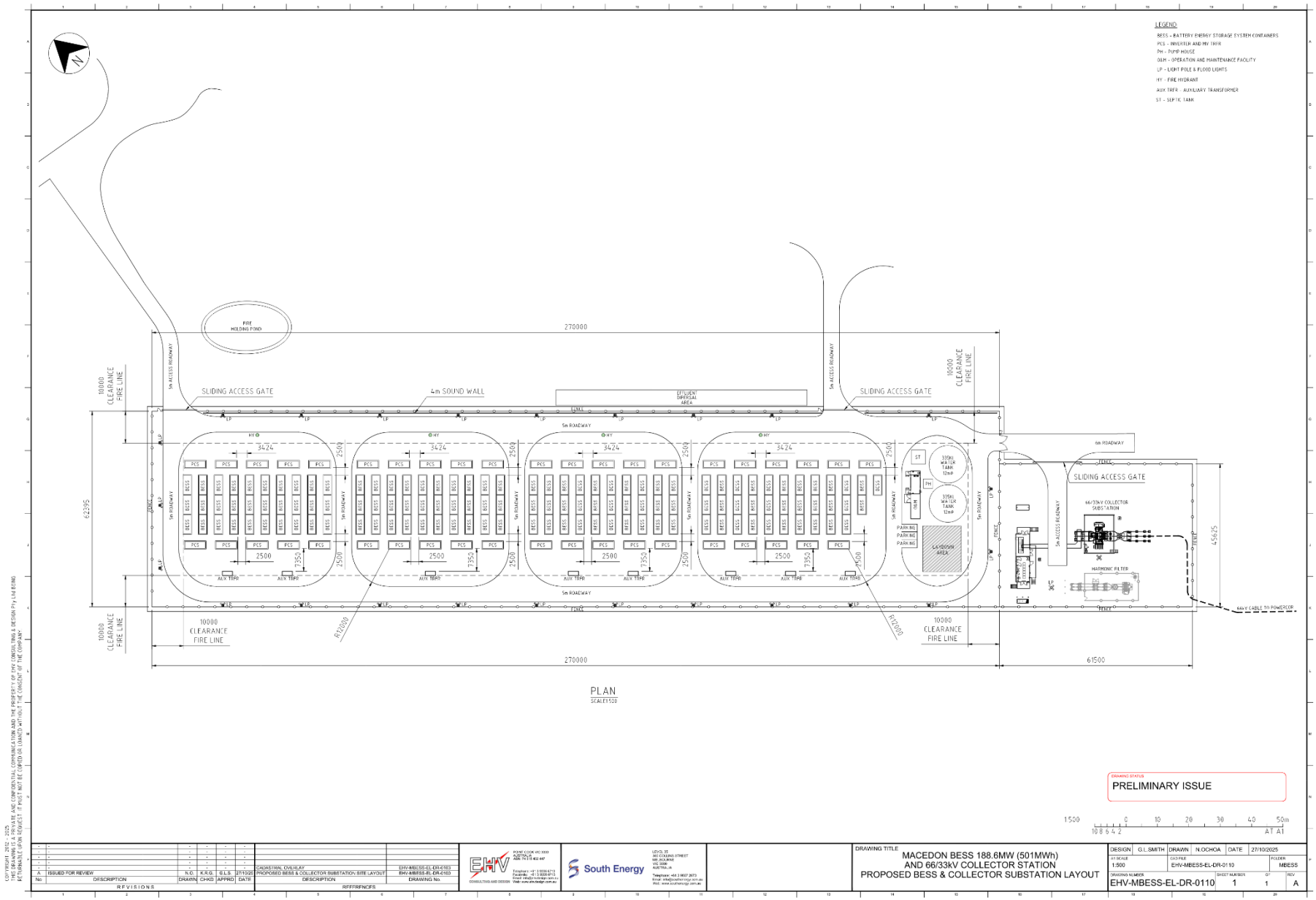

Figure 4 Proposed Site Layout (Detailed Layout)

2.4 Construction and Operational information

The anticipated construction phase for the Project is anticipated to last for approximately 12 months and the operational life of the Project is expected to be approximately 20 years.

3 Legislative and policy context

The following sections detail the legislation and policies applicable to this report.

3.1 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) [6] establishes the legal framework for land use planning in Victoria. Planning schemes, which operate under this Act, set out the controls governing how land may be used and developed and defines the proposed use as a utility installation. These controls include zones, overlays, particular provisions, and general provisions that determine whether planning approval is required for a given project.

The BESS facility proposed in this report requires planning approval under the relevant planning scheme—Macedon Ranges Planning Scheme—which is implemented under the P&E Act. This report supports a planning permit application by addressing the hazard and risk considerations relevant to the responsible authority's decision-making process, including compliance with Clause 52.22 (Significant Economic Development) and other applicable decision guidelines.

3.2 Occupational Health and Safety Act 2004

The *Occupational Health and Safety Act 2004* (OHS Act) [9] sets out the legal duties for ensuring workplace health and safety in Victoria. This Act is relevant to the Project as it outlines the obligations for managing risks associated with the construction, operation, and maintenance of the BESS facility.

Under the OHS Act [9], duty holders, including designers, developers, and operators, must:

- Identify hazards associated with the storage and operation of lithium-ion batteries and wind turbines, including fire, structural failure, and electrical hazards.
- Implement risk control measures to eliminate or reduce risks so far as reasonably practicable.
- Ensure that workers, contractors, and emergency responders are adequately trained and informed about site-specific risks and mitigation measures.

The Hazard and Risk Impact Assessment in this report aligns with the OHS Act [9] requirements by identifying the hazards and assessing the risks associated with fire safety, dangerous goods handling, and emergency management at the BESS facility.

3.3 Dangerous Goods Act 1985 and Dangerous Goods (Storage and Handling) Regulations 2022

The *Dangerous Goods Act 1985* and the *Dangerous Goods (DG) (Storage and Handling) Regulations 2022* [2] regulate the safe storage, handling, and transport of dangerous goods and hazardous materials, including any spare lithium-ion batteries used in the BESS.

This legislation is relevant as:

- The Project may contain dangerous goods classified under the Act, requiring compliance with storage and handling regulations.
- Operators must ensure safe work practices and emergency response preparedness in accordance with WorkSafe Victoria guidelines.

The batteries within the BESS in this Project are connected for use and are therefore exempt from this legislation.

3.4 Country Fire Authority Act 1958 and CFA Guidelines for Renewable Energy Facilities

The *Country Fire Authority Act 1958* governs fire risk management in Victoria, particularly in rural and regional areas. The CFA Design Guidelines and Model Requirements for Renewable Energy facilities, v4.4 2025 [1] outlines specific fire risk assessment and mitigation requirements for BESS installations.

This report considers fire risk management using the CFA Guidelines [1] by:

- Identifying fire hazards associated with BESS facilities.
- Assessing bushfire risks and fire spread potential.
- Reviewing fire system design requirements, including fire breaks, access roads, and emergency response provisions.

The RMP ensures the Project aligns with CFA fire safety requirements, particularly in addressing fire prevention, suppression, and emergency planning measures.

4 Methodology

The assessment is conducted in four tasks. These include:

- Section 4.1: Task 1 Methodology used for the Dangerous Goods Screening
- Section 4.2: Task 2 Methodology for the Hazard and Risk Impact Assessment
- Section 4.3: Task 3 Project Recommendations basis
- Section 4.4: Task 4 Methodology for the Bushfire Hazard Assessment and resulting recommendations.

The recommended process (outlined below) aligns with the WorkSafe Victoria Risk Control Plan Guidelines, as shown in Figure 5.

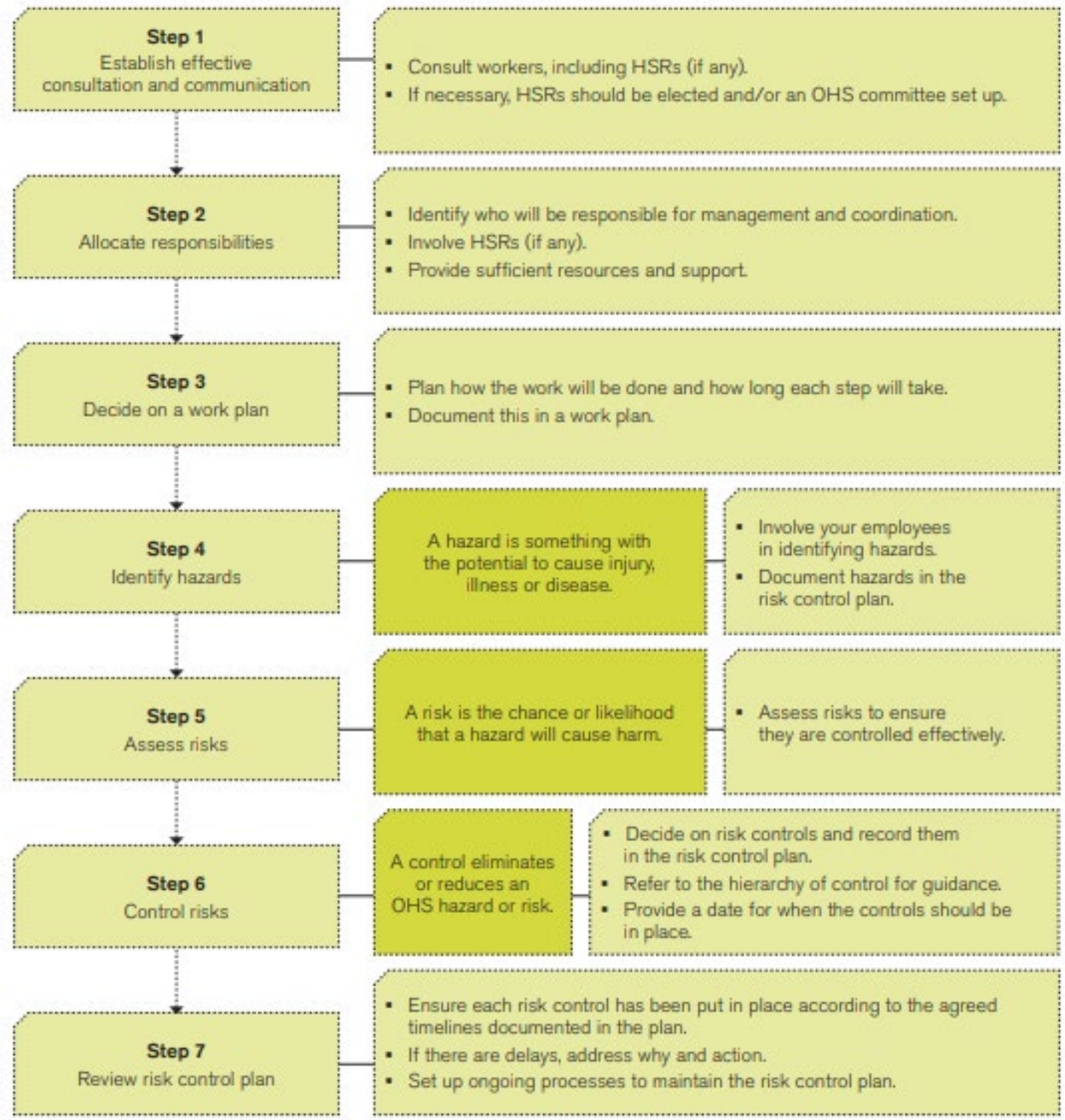

Figure 5 WorkSafe Victoria Risk Control Plan Guidelines

4.1 Task 1: Dangerous Goods Screening

The screening evaluates the storage of dangerous goods against thresholds set by the *Dangerous Goods (Storage and Handling) Regulations 2022* [2].This screening compares the quantities of Dangerous Goods stored and handled with the Placarding Quantity, Manifest Quantity and Fire Protection Quantity thresholds defined in Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2].

If the storage quantities exceed the thresholds for placarding, manifests, or fire protection, the relevant Dangerous Goods regulatory requirements will be provided in Section 5.3.1.

4.2 Task 2: Hazard and Risk Impact Assessment

Following the screening assessment, a Hazard and Risk Impact Assessment will be conducted.

The Hazard and Risk Impact Assessment will focus on major incident scenarios that may result in impacts beyond the facility boundary, defined as “offsite”. In this context, “impact” is defined as the potential to cause fatalities. The analysis will focus on identifying and evaluating these scenarios to ensure that any risks with the potential to extend offsite are appropriately managed and mitigated.

WorkSafe Victoria’s guide, “A Guide to Risk Control Plans” [17], provides a methodology that can be applied to the risk assessment for the proposed facility (refer to Figure 5). The approach includes:

- **Hazard Identification**: Identifying significant on-site and off-site hazards that may pose off-site risks, including potential fire sources and operational risks (e.g. electrical faults, chemical releases, bushfires, floods).
- **Risk Documentation**: Developing a risk assessment table to document key hazards, detailing the nature and characteristics of each risk, and applying controls based on the hierarchy of controls and industry best practices.
- **Consequence Analysis**: Assessing the consequences of identified hazards to determine their potential impact on adjacent facilities or sensitive receptors. Hazards with no significant impacts are screened out, while those with possible impacts are carried forward.
- **Frequency Analysis**: Evaluating the frequency of hazards that have been carried forward from the consequence assessment.
- **Risk Assessment and Evaluation**: Assessing the overall risk by combining the consequence and frequency analyses for hazards with potential off-site impacts.

For this assessment, a qualitative approach was assumed to be appropriate and sufficient to evaluate the potential impacts on neighbouring land uses based on the following:

- The expected types and quantities of chemicals stored and handled at the Project (primarily lithium-ion batteries, diesel, transformer oil and lube oil) are not expected to pose significant off-site risks
- There is no sensitive surrounding land use (i.e. no schools, hospitals, aged care and childcare facilities, within 500 m of the Project)

Additionally, risk assessment is a continuous and iterative process. The RMP should be regularly reviewed and updated throughout each stage of the project to address any emerging risks and ensure ongoing safety.

4.3 Task 3: Recommendations

Based on the findings from the Hazard and Risk Impact Assessment, recommendations will be made if necessary. These recommendations will be informed by relevant Australian standards and guidelines such as:

- CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023, updated as V4.4, June 2025 [1]
- AS/NZS 5139: Electrical installations – Safety of battery systems for use with power conversion equipment

- AS 1940: The storage and handling of flammable and combustible liquids.

The identified recommendations and mitigation measures should be considered during the detailed design phase and when developing the Emergency Plan for the Project.

4.4 Task 4: Bushfire Hazard Assessment

The following sources of information were reviewed to inform the preparation of this bushfire hazard assessment:

- VicPlan [18]
- Victorian Planning Provisions [19]
- NatureKit [20]
- Loddon Mallee Region – Central Victoria Mapping Tool [21]
- *Regional Bushfire Planning Assessment – Loddon Mallee Region* [16]
- *CFA Design Guidelines and Model Requirements: Renewable Energy Facilities* [1]
- *Planning Permit Application Bushfire Management Overlay – Technical Guide* [22].

For the purposes of bushfire hazard assessment, areas of vegetation considered to pose a bushfire threat are classified according to the vegetation classes defined as per AS 3959 [3]. Under Clause 2.2.3 and Table 2.3 of AS 3959, vegetation is classified into the following classes:

- **Forest**: includes tall open forest, woodland and low open forests which includes trees up to or over 30m tall and 30%-70% foliage coverage. This category also includes mature pine plantations.
- **Woodland**: includes trees up to 30m high with a 10% - 30% foliage coverage.
- **Shrubland**: includes heath that is found in wet areas, poor soil conditions and 1m-2m high, as well as low shrubland that is <2m high, 30% foliage coverage and has an understorey.
- **Scrub**: includes closed and open scrub which can range from wet or rocky areas with poor soil conditions and contain a mixed species composition.
- **Mallee/Mulga**: includes low trees or tall shrubs, usually >2m tall with sparse grassy understorey.
- **Rainforest**: includes trees with a >90% foliage cover, mixed species understorey and is not dominated by eucalypts.
- **Grassland**: includes all forms of grasses (except tussock moorlands) and where managed in a minimal fuel condition and non-curing cropland is regarded as a low threat vegetation.
- **Tussock Moorland**: includes all forms for vegetation where the overstorey is dominated by Button-grass.

AS 3959 [3] also describes situations where vegetation is classified as 'low threat' due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, non-curing cropland, maintained lawns, golf courses, maintained public reserves and parklands, nature strips and windbreaks, etc.

Details of the bushfire hazards within the Project Area, including the presence and type of classified vegetation and topography, were determined during a field assessment undertaken on 2 May 2025. Bushfire hazards situated beyond the Project Area were determined based on observations from publicly accessible locations during the site inspection and aerial photo interpretation.

5 Task 1: Screening Assessment

5.1 Dangerous Goods Storage and Transport Requirements

Dangerous Goods screening of the proposed development was conducted to determine if the development must adhere to specific requirements under Victorian legislation. The following regulations and codes were reviewed against the proposed hazardous materials and quantities:

- *Dangerous Goods (Storage and Handling) Regulations 2022* [2]
- *Occupational Health and Safety Act 2004* [9]
- *Australian Dangerous Goods Code* [23]

The hazardous chemicals on site (i.e. Class 9 lithium-ion batteries, diesel, transformer oil) are not listed in Schedule 14 of the Occupational Health and Safety Regulations 2017 and hence, their storage quantities do not trigger a major hazard facility classification.

The Dangerous Goods (Storage and Handling) Regulations [2] set out the requirements for the use, handling, and storage of hazardous chemicals at a workplace. Specifically, this report assesses requirements for exceeding placard, manifest and fire protection quantities found in Schedule 2 of the Regulation.

A summary of the expected hazardous materials to be stored and handled on site for the Project is listed in Table 5-1 and Table 5-2. These have been compared to the thresholds provided in Schedule 2 of the Dangerous Goods (Storage and Handling) Regulations 2022 [2] for placarding, manifest, and fire protection.

Where the storage quantities exceed the thresholds for placarding, manifests, or fire protection, the relevant DG regulatory requirements will be provided in Section 5.3.1.

5.2 Dangerous Goods on Site

The hazardous materials being screened have been separated into two categories; BESS hazardous materials and other possible hazardous materials.

Table 5-1 below details the hazardous materials associated with BESS battery units.

The current design is based on installation of Wartsila / SMA BESS units. These units are expected to be delivered pre-assembled, meaning all substances required by the units are built into the battery enclosure and do not need to be added at the time of installation at the Site.

Table 5-2 provides a list of non-battery hazardous materials which are expected to be present in various quantities on site and may be part of adjacent infrastructure (e.g. transformers). In cases where the packing group is ambiguous, the worst-case scenario is assumed.

5.3 Summary of Dangerous Goods and Threshold Quantities

Table 5-1 Threshold Quantities for BESS Hazardous Materials

Material	UN No.	DG Class	Category	Packing Group	Battery Provider	Project Storage Quantities and Movements	Dangerous Goods Threshold			Exceedance
							Placarding	Manifest	Fire Protection	
Lithium-ion Batteries	3480	9	Miscellaneous dangerous goods and articles	II	Wartsila	**Battery Storage** No batteries stored on site	1,000 kg	10,000 kg	20,000 kg	N/A
						Batteries in Use Total on site is **3,171,240 kg**[2] **(345 kg x 9,192 modules)**	N/A[1]	N/A[1]	N/A[1]	N/A[1]

Notes:

1. Lithium-ion batteries **in use** are not subject to the requirements of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2]as per Regulation 6 (c) and, hence, do not have a prescribed storage threshold under Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2].
2. The weight provided is the total BESS Enclosure weight rather than the total weight of the batteries.

Table 5-2 Threshold Quantities for Other Possible Hazardous Materials

Material	UN No.	DG Class	Category	Packing Group	Project Storage Quantities	Dangerous Goods Threshold			Exceedance
						Placarding	Manifest	Fire Protection	
HFC-32 Refrigerant	3252	2.1	Flammable gas	N/A	**Construction:** Total on site is **39 L** **Operations:** Total on site is **39 L**	500	5,000	5,000	No exceedance
SF_6	1080	2.2	Non-flammable, non-toxic gas	N/A	**Construction:** Total on site is **6,667 L** **Operations:** Total on site is **6,667 L**	5,000 L^3	10,000 L^3	20,000 L^3	Placarding threshold exceeded.
R134a Refrigerant	3159/3252	2.2	Non-flammable, non-toxic gas	N/A	**Construction:** Total on site is **62 L** **Operations:** Total on site is **62 L**				

Material	UN No.	DG Class	Category	Packing Group	Project Storage Quantities	Dangerous Goods Threshold			Exceedance
						Placarding	Manifest	Fire Protection	
HFC-125 Refrigerant	3220	2.2	Non-flammable, non-toxic gas	N/A	**Construction:** Total on site is **31 L** **Operations:** Total on site is **31 L**				
Diesel	1202	N/A	C1 Combustible Liquids are not classified as DGs for transport purposes[1]. However, they are classified as DGs in the context of storage and handling.	N/A	**Construction:** Total on site is **56,000 L** **Operations:** Total on site is **5,000 L**	10,000 L	100,000 L	100,000 L	Placarding threshold exceeded.
Transformer Oil	Various	N/A	C2 Combustible Liquid[2]	II	**Construction:** Total on site is **114,000 L** **Operations:** Total on site is **114,000 L**	N/A	N/A	N/A	N/A
Lube Oil	Various	N/A	C2 Combustible Liquid[2]	N/A	**Construction:** Total on site is **200 L** **Operations:** Total on site is **300 L**				
Ethylene glycol	3082	N/A	C2 Combustible Liquid[2]	N/A	**Construction:** Total on site is **10,400 L** **Operations:** Total on site is **10,400 L**				

Notes:

1. No placarding is required by the ADG Code [23] on a portable tank or tank vehicle transporting only C1 liquid.
2. As per Regulation 6(g) of Clause 6(c) of *the Dangerous Goods (Storage and Handling) Regulations 2022* [2], "dangerous goods that are combustible liquids other than C1 combustible liquids;" are exempt from the regulations.
3. As per Schedule 2 Regulation 2(c) *the Dangerous Goods (Storage and Handling) Regulations,* this volume refers to the storage capacity of the containers of Class 2 DGs.

5.3.1 Lithium-Ion Batteries

Lithium-ion batteries are classified as Class 9 Miscellaneous Dangerous Goods. However, Clause 6(c) of *the Dangerous Goods (Storage and Handling) Regulations 2022* [2] states that the regulations do not apply to "*dangerous goods that are batteries while they are in use".*

The facility is not expected to store lithium-ion batteries (additional BESS units) on site (i.e. for repair or replacements), all batteries on site will be in use.

Once installed and connected, lithium-ion batteries are not considered Dangerous Goods. As such, lithium-ion batteries that are in use within the facility are excluded from the requirements of Schedule 2, and only lithium-ion batteries in storage are required to be assessed against the General Screening Thresholds in Table 5-1. However, the quantities of lithium-ion batteries in use have been included in this RMP for the sake of completeness.

The content of the battery, lithium, poses little threat to people or property. However, the potential of thermal runaway effects may lead to fire and explosion hazards [24]. As such, the risks of lithium batteries in use have been considered as part of this study and mitigation measures of lithium-ion batteries in are further discussed in Section 7.3

5.3.2 Diesel (Combustible Liquid)

Diesel is not classified as a DG by the Australian Dangerous Goods (ADG) Code [23].

Additionally, in accordance with the Special Provision No. AU02 of the *Australian Dangerous Goods Code* (ADG Code) [23], "*GAS OIL or DIESEL OIL or HEATING OIL, LIGHT or PETROLEUM DISTILLATE is not subject to this Code if it does not meet the criteria of Chapter 2.3* [of the ADG Code] [23] *for assignment to Class 3; i.e., if the flash point is more than 60°C and the substance is not offered for transport at a temperature above its flash point. Such substances will normally be C1 combustible liquids which are not classified as dangerous goods for transport purposes*". Thus, diesel will not be considered a dangerous good (DG) for transportation.

Moreover, it is expected that the risk associated with diesel transportation to be low. This is due to the low annual movements expected, as diesel will only be used in generators when back-up power is required. However as per Clause 6(g) and Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], C1 combustible liquids are classified as dangerous goods in the context of storage and handling. Recommendations have therefore been made for the storage of diesel in Section 7.1.

During the construction phase, diesel consumption is expected to range from approximately 37,000 L to 56,000 L, mainly for generators and machinery. In the operational phase, this would likely reduce to 2,000 L to 5,000 L, primarily for backup purposes if emergency diesel generators are included.

5.3.3 Transformer Oil

Transformer oil is classified as C2 combustible liquid. As per Regulation 6 of the Regulation 6(g) of the Clause 6(c) of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], "dangerous goods that are combustible liquids other than C1 combustible liquids;" are exempt from the regulations and have been excluded from this study (Task 1 and Task 2). However, quantities for anticipated storage have been detailed for completeness.

The total estimated transformer oil requirement, considering one 120 MVA main transformer, two auxiliary transformers, and 41 dedicated 8.8 MVA step-up transformers (one per process control system (PCS)), is between 161,000 L and 180,000 L. This oil remains in place for both the construction and operation phases.

5.3.4 Lube Oil

Lube oil is classified as C2 combustible liquid. As per Regulation 6 of the Regulation 6(g) of the Clause 6(c) of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], "dangerous goods that are combustible liquids other than C1 combustible liquids;" are exempt from the regulations and have been

excluded from this study (Task 1 and Task 2). However, quantities for anticipated storage have been detailed for completeness.

Lubricating oil would only be needed for the diesel generators, estimated at 100 L to 200 L during construction and up to 300 L annually during operations.

5.3.5 Sulphur Hexafluoride

Sulphur hexafluoride (SF_6) is a gaseous electrical insulator. It is non-flammable, non-combustible, and non-toxic, and is classified as a UN Class 2.2 material. For the preliminary screening assessment, it was assumed that SF_6 on site was stored in bulk, as this would be the worst-case scenario for SF_6 storage.

The anticipated storage quantity of SF6 has been assessed against the thresholds for placard, manifest and fire protection quantities for UN Class 2.2 materials included in Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2].

The use of SF_6 and its quantity will depend on whether GIS (gas-insulated switchgear) is adopted in the final electrical design. If used, a preliminary estimate of 10 to 40 kg may be assumed, which would remain constant throughout the asset's lifecycle unless major equipment changes are made.

The thresholds for Class 2 dangerous goods are based on the capacity (volume) of the containers of the DG. The capacity of the containers was estimated by considering the maximum anticipated storage mass (40 kg).and the density of the SF_6 at 25°C (i.e. 0.006 g/L [25]). The anticipated capacity of the container was determined to be 6,667 L. Note, this does not consider the storage pressure of the gas, which would further reduce the estimated volume of gas stored.

5.3.6 BESS Coolant (Ethylene Glycol)

Ethylene glycol is classified as C2 combustible liquid. As per Regulation 6 of the Regulation 6(g) of the Clause 6(c) of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], "dangerous goods that are combustible liquids other than C1 combustible liquids;" are exempt from the regulations and have been excluded from this study (Task 1 and Task 2). However, quantities for anticipated storage have been detailed for completeness.

Battery enclosures for both providers are assumed to use liquid cooling systems. As per the specification sheets for the BESS enclosures for both providers, the coolant used will be an ethylene glycol-water mixture. Assuming that the conservative estimate for ethylene glycol stores on site would be based on a 100% ethylene glycol coolant, the anticipated storage of ethylene glycol is 10,400 L.

5.3.7 HVAC Refrigerant (R134a or R410a)

1,1,1,2-Tetrafluoroethane (refrigerant gas R134a) is non-flammable, non-combustible and non-toxic and is classified as a Class 2.2 material. The refrigerant R410a is a mixture of 50% difluoromethane (HFC-32) and 50% pentafluoroethane (HFC-125). HFC-32 is a flammable gas and is classified as a Class 2.1 material. HFC-125 is non-flammable, non-combustible and non-toxic and is classified as a Class 2.2 material.

Refrigerant use for Heating, Ventilation, and Air Conditioning (HVAC) systems (e.g. R134a or R410a) may range from 45 kg to 75 kg, depending on the final HVAC design. To assess the storage quantities of the refrigerants against the thresholds in Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022,* the volumes of the refrigerants were estimated using the densities of the refrigerants at standard temperature and pressure conditions. Note, this does not consider the storage pressure of the gas, which would further reduce the estimated volume of gas stored.

Table 5-3 shows a summary of the calculations for the estimation of refrigerant volume.

Table 5-3 Anticipated Storage Volumes of Refrigerants

Refrigerant	Components	Maximum Storage Quantity	Density	Component Volume	Refrigerant Volume
		(kg)	(g/L)	(L)	(L)
R134a	N/A- not a mixture	75	1210 [26]	62	62
R410	H-32	37.5	961 [27]	39	70
	H-125	37.5	1218 [28]	31	

As per Regulation 6(j) of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], "compressed gas of UN Class 2.1 or UN Class 2.2 and compressed oxygen that are in one or more containers with an aggregate capacity of not more than 50 L" are exempt from the regulations and have been excluded from this study (Task 1 and Task 2). However, the quantities for anticipated storage of refrigerants R134a and R410a have been detailed for completeness. These quantities have been assessed against the thresholds for placard, manifest and fire protection quantities for UN Class 2.1 and UN Class 2.2 materials included in Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], assuming the worst-case scenario of the aggregate capacity of the refrigerants exceeding 50 L. The thresholds for Class 2 dangerous goods are based on the capacity (volume) of the containers of the DG.

5.4 Dangerous Goods Regulatory Requirements

5.4.1 Placard Quantities

Diesel (Combustible Liquid)

The maximum allowable placard quantity of diesel as per Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2] is 10 kL. The proposed quantity of **56 kL** to be stored at the site exceeds the placard quantity; therefore:

- In accordance with Regulation 46 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], “HAZCHEM” outer warning placards are to be displayed at every entrance for road vehicles. The placard must display the word "HAZCHEM" in red letters not less than 100 mm high and of the style shown in Figure 6, on a white or silver background. Note: Red means the colour Signal Red in accordance with AS 2700S.

Figure 6 Form and dimensions on outer warning placard

- Specifically, the placard for C1 combustible liquids in bulk must:
  - Display the words “COMBUSTIBLE LIQUID” in the style shown in Figure 7
  - The words must be in black letters that are not less than 100 mm high, be in the style shown in Figure 7 and on a white or silver background

Figure 7 Placard for C1 combustible liquids in bulk

Sulphur Hexafluoride (SF_6)

The maximum allowable placard quantity of SF_6 as per Schedule 2 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2] is 5 kL. The proposed quantity of **6.67 kL** to be stored at the site exceeds the placard quantity; therefore:

- In accordance with Regulation 46 of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2], "HAZCHEM" outer warning placards are to be displayed at every entrance for road vehicles. The placard must display the word "HAZCHEM" in red letters not less than 100 mm high and of the style shown in Figure 8, on a white or silver background. Note: Red means the colour Signal Red in accordance with AS 2700S.
- In accordance with Regulation 47 *Dangerous Goods (Storage and Handling) Regulations 2022* [2], packaged goods other than C1 combustible liquids must—
  - have the form shown in Figure 8; and
  - be of sufficient size to accommodate the labels to be displayed on it.

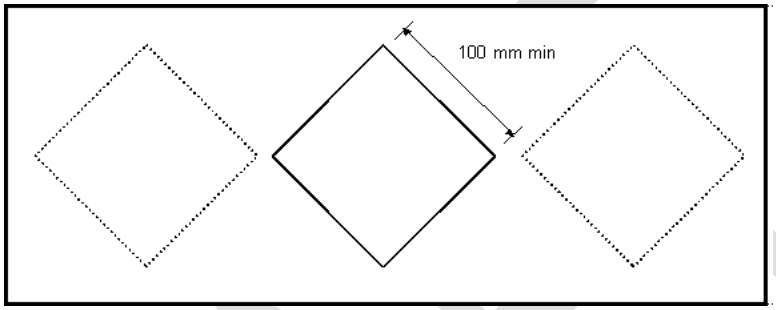

Figure 8 Form and dimensions of placard for storages of packaged dangerous goods

- The placard must have a white or silver background.
- The placard must display—
  - for dangerous goods present in the storage area (other than goods too dangerous to be transported)—
    - the corresponding Class label for each UN Class of dangerous goods present in a quantity that exceeds the quantity specified in column 4 in the table in Schedule 2; and
    - if the total quantity of mixed UN Classes of dangerous goods exceeds the mixed UN Classes quantity specified in column 4 in item 4 of the table in Schedule 2—

      a Class label for each UN Class of dangerous goods present that exceeds 50% of the quantity specified for the UN Class in item 1, 2 or 3 of the table; or

      if no other Class label is required, a mixed Class label; and
    - for C1 combustible liquids and fire risk dangerous goods in an aggregate quantity exceeding 1000 kg or L—a UN Class 3 Class label.

6 Task 2: Hazard and Risk Impact Assessment

Section 4(2) of the Victorian Occupational Health and Safety Act 2004 [9] states "*persons who control or manage matters that give rise or may give rise to risks to health or safety are responsible for eliminating or reducing those risks so far as is reasonably practicable*". This requirement of the Victorian Occupational Health and Safety Act 2004 has been met in the form of the Hazard and Risk Impact Assessment prepared for the Project and detailed in Section 6 and Appendix B: Hazard and Risk Impact Assessment.

6.1 Hazard Identification

Hazard Identification (HAZID) aims to identify all reasonably foreseeable hazards and associated events that may arise due to the operation of the facilities and defining the relevant controls through a systematic and structured approach.

All potential significant hazards that may pose a risk to the Project or an off-site risk were identified and documented in a Hazard and Risk Impact Assessment (Appendix B) The consequences of each of the identified hazards were assessed to determine if such consequences may impact off-site adjacent facilities or sensitive receptors.

Hazards are grouped by component; all hazards are listed along with causes and consequences in Appendix B. Hazards at the BESS facility include:

- BESS (Lithium-Ion Battery)
- Transformer and Electrical Network Hazards
- Combustible Liquid Hazards
- Natural Hazards
- Other Hazards.

6.1.1 BESS Hazards (Lithium-Ion Battery Hazards)

The primary hazard for lithium-ion batteries is thermal runaway, which can lead to a fire, explosion, and release of toxic and flammable gases. A thermal runaway event may also propagate to other batteries and cause further incident escalation. Various factors may contribute to a thermal runaway event, including operating outside of safe temperature ranges, improper charging/discharging practices, and physical damage.

In most cases, the temperature of the lithium-ion batteries should be controlled to prevent thermal runaway, which causes propagation of increasing temperatures, pressures, and fire toward neighbouring cells. Similarly, the temperature of the lithium-ion batteries, should not drop too low to prevent lithium plating around the anode during charging, which can cause internal shorts.

Although the choice of anode-cathode chemistry can result in different thermal stability and volatility, all lithium-ion batteries are flammable when exposed to fire. Lithium-ion fires are a unique class of fire and may result in emissions of large volumes of toxic or combustible gases, which must be managed accordingly. These hazards are described in Appendix B.

An internal or external short circuit can cause significant overheating and provide an ignition source resulting in fire, including surrounding materials or materials within the cell or battery. Under normal conditions of use, the electrode materials and electrolyte they contain are not exposed, provided the battery integrity is maintained, and seals remain intact. The risk of exposure may occur only in cases of abuse (mechanical, thermal and/or electrical).

Prolonged exposure of the product to conditions of abuse (mechanical, thermal and/or electrical) may increase the potential of thermal runaway and result in a fire. Exposure of battery packs to localised heat sources such as flames may result in cell thermal runaway reactions and should be avoided [29].

6.1.2 Transformer and Electrical Network Hazards

Access to equipment, safe operation and maintenance, safe personnel egress, equipment clearance, electrical safety and fire safety systems need to be considered for transformer installations. AS 2067: *Substations and high voltage installations exceeding 1 kV a.c.* [30] outlines the risks and safety measures for these hazards. Contact with live parts, arc flashing, and transformer fires are the most common hazards associated with transformers. As this area involves high voltages, the site must comply with the *Electricity Supply Act 1995* [31]

The causes of fire hazards relating to transformers are typically categorised as one of the following:

- Plant and equipment containing combustible insulating liquids may rupture due to internal failure; there may be an explosion, and ignition may occur with a serious fire risk.
- Plant and equipment without combustible insulating liquids may rupture due to internal failure; there may be an explosion and modest fire risk.
- Other plant and equipment such as cables, batteries, and drainage pipes may catch fire and spread the fire.

6.1.3 Combustible Liquid Hazards

Diesel may be present at the Project as a fuel for various pieces of equipment, especially during construction. Diesel is classified as a C1 Combustible Liquid. A Loss of Containment (LOC) of diesel may accumulate and pose a fire risk if ignited. If ignited, the LOC may result in a pool fire; however, given diesel's high flashpoint, the probability of ignition is low.

A similar hazard is present for various oils and lubricants used at the Project Site. However, these are stored in much smaller quantities and are unlikely to cause a significant incident escalation if a LOC is ignited.

6.1.4 Natural Hazards

Several potential natural hazards may pose a risk to the Project. These hazards include extreme ambient temperatures, bushfires, seismic activity, flooding, wind, subsidence, and lightning.

6.1.5 Other

Other hazards associated with the Project for potential off-site consequence were also considered, including hazards such as vehicle collision / congestion and loss of containment (e.g. of waste, contaminated water, and refrigerant). These hazards are described further in the Hazard and Risk Impact Assessment located in Appendix A.

6.2 Risk Analysis

In this study, risk is defined as the likelihood of a specified undesired event occurring within a specified period or in specified circumstances. It may be either a frequency (the number of specified events occurring in a unit of time) or a probability (the probability of a specified event following a prior event) depending on the circumstances.

The matrices set out in Table 6-1, Table 6-2, Table 6-3 are a generic framework and were used to complete a qualitative risk assessment of the identified hazards. Consistent with standard risk assessment methodology, the risk rating for a given hazard is a product of the likelihood and consequence of its occurrence.

As such, the potential consequence for each identified hazard carried forward due to posing significant off-site risk was first assessed (Table 6-1), followed by an assessment of their estimated likelihood of occurrence (Table 6-2). Finally, the overall current risk rating was then calculated by using likelihood and consequence as inputs (Table 6-3).

Table 6-1 Hazard Consequence Assessment Matrix

Consequence	Safety	Reputation	Environment
5 – Catastrophic	Fatality	International media exposure, critical impact on business reputation	Destruction of sensitive environmental features
4 – Major	Permanent disabling injury &/or extended time off work	National media exposure, significant impact on business reputation	Long term impact of regional significance on sensitive environmental feature
3 – Moderate	Injury requiring rehabilitation and time off work	State media exposure, moderate to small impact on business reputation	Short term impact on sensitive environmental feature
2 – Minor	Injury requiring medical treatment – no lost time	Some impact on reputation, adverse news in local media	Impacts flora and fauna – immediate regulator notification
1 – Incidental	Minor injury – First Aid treatment	Little public awareness and no concern – no media coverage	Negligible, reporting as routine protocols

Table 6-2 Hazard Likelihood Assessment Matrix

Probability	Safety	Reputation	Environment
A – Almost Certain	Expected to occur in most circumstances	Expected to occur in most circumstances	Expected to occur in most circumstances
B – Likely	Could occur in most circumstances	Could occur in most circumstances	Could occur in most circumstances
C – Possible	Has occurred here or elsewhere	Has occurred here or elsewhere	Has occurred here or elsewhere
D – Unlikely	Has not occurred yet but could	Has not occurred yet but could	Has not occurred yet but could
E – Rare	May occur in exceptional circumstances	May occur in exceptional circumstances	May occur in exceptional circumstances

Table 6-3 Risk Rating Matrix

		Consequence				
		1 - Incidental	**2 - Minor**	**3 - Moderate**	**4 - Major**	**5 - Catastrophic**
Probability	**A - Almost Certain**	Medium	High	Critical	Critical	Critical
	B - Likely	Medium	Medium	High	Critical	Critical
	C - Possible	Low	Medium	Medium	High	Critical
	D - Unlikely	Low	Low	Medium	Medium	High
	E - Rare	Low	Low	Low	Medium	Medium

The risk rating matrix presented in the table above is a conservative iteration of the risk rating matrix presented in *AS/NZS 5139:2019 – Electrical installations – Safety of battery systems for use with power conversion equipment*.

6.3 Hazard and Risk Impact Assessment

The identified hazards, events, applicable infrastructure and relationships with causes, consequences and controls are summarised in the Hazard and Risk Impact Assessment (Appendix B).

Importantly, the consequences of these events are not anticipated to lead to significant off-site impacts, including serious injury or fatality to the public or off-site population.

The risk assessment has shown that, whilst there is potential for major consequences, implementing risk controls will make these consequences unlikely, particularly for off-site effects. The recommended technical and management safeguards set out in Appendix B are intended to reduce the residual risk so that no identified hazards pose a significant risk.

6.4 Other risk factors

A review of other risk factors was also carried out to identify any hazards that may be outside the scope of the screening. It was noted that the project would not involve:

- Storage or transport of incompatible materials (i.e., hazardous and non-hazardous). Hazardous materials will be stored in dedicated areas and storage protocols in accordance with standards and guidelines will be followed.
- Generation of hazardous waste.
- Possible generation of dust within confined areas.
- Type of activities involving hazardous materials with the potential to cause significant off-site impacts (i.e. multiple fatalities outside the site boundary).
- Incompatible, reactive, or unstable materials and process conditions that could lead to uncontrolled reaction or decomposition.
- Storage or processing operations involving high (or extremely low) temperature and/or pressures.
- Hazardous materials and processes with known past incidents (or near misses) that resulted in significant off-site impacts at BESS and wind energy facilities.

7 Task 3: Recommendations

Several Australian and international standards govern the best practice design and installation of BESS facilities. The following recommended technical safeguards are expected to reduce the residual risk to the extent that no identified hazards pose a significant risk.

7.1 Dangerous Goods and Environmental Recommendations

General recommendations for risk reduction due to dangerous goods on site shall include:

- Under Clause 53.10-1 of the Victoria Planning Provisions [32], an application for a utility installation must be referred to the Environment Protection Authority (EPA) as there is no specific land use threshold distance provided in the planning scheme. This referral is required under Section 55 of *Planning and Environment Act 1987* [6], and ensures that the EPA reviews the potential environmental impacts of the proposed use and provides recommendations or conditions for mitigating any adverse effects.
- Buildings shall be designed to the relevant applicable codes for the range of natural hazards listed in Table 7-1.
- While the ADG code [23] does not classify diesel as dangerous goods, it is a C1 combustible liquid for the purposes of the *Dangerous Goods (Storage and Handling) Regulations 2022* [2]. Given their classification as C1 combustible liquids and the commonplace use of diesel, compliance with AS 1940 *The Storage and Handling of Flammable and Combustible Liquids* is considered sufficient to mitigate this risk.

7.2 CFA Guideline Recommendations

7.2.1 General

In accordance with CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023 updated as V4.4, June 2025 [1], it is recommended that the following requirements shall be met:

- Early consultation with CFA's Specialist Risk and Fire Safety Unit, before developing a planning permit application.
- The Risk Management Plan for the facility shall be further developed following detailed design, in consultation with CFA, before development starts.
- An Emergency Plan shall be developed for the construction and commissioning phase of the facility.
- A Fire Management Plan shall be developed for the facility, in consultation with CFA, before development starts.
- Appropriate demarcation of arc boundaries to at least 10 m from power conversion unit (PCU) arc flash outlet flaps (blow-out panels) shall be provided.
- Appropriate monitoring for facility infrastructure shall be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.
- An Emergency Plan shall be developed for the operational phase, specific to the facility, in consultation with CFA, before development starts.
- An Emergency Information Book shall be developed and available to emergency responders. Emergency Information Books shall be located in Emergency Information Containers, provided at each vehicle entrance the facility.

7.2.2 Facility Design

Emergency vehicle access

In accordance with CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023 updated as V4.4, June 2025 [1], it is recommended that the following requirements shall be met:

- Construction of a minimum four (4) metre perimeter road within the perimeter fire break.
- Roads shall be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g. no compacted earth).
- Constructed roads shall 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 trucks.
- The average grade shall 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.
- Dips in the road shall have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.
- Roads shall incorporate passing bays at least every 600 metres, which shall be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay shall be incorporated
- Road networks shall enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure.
- The provision of at least two (2) but preferably more access points to each part of the facility.

Firefighting Water Supply

In accordance with CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023 updated as V4.4, June 2025 [1], it is recommended that the following requirements shall be met:

- Water access points shall be clearly identifiable and unobstructed to ensure efficient access.
- Static water storage tank installations shall comply with AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning.
- The static water storage tank(s) shall be an aboveground water tank constructed of concrete or steel.
- The static water storage tank(s) shall be capable of being completely refilled automatically or manually within 24 hours.
- The static water storage tanks shall be located at vehicle access points to the facility and shall be positioned at least ten (10) metres from any infrastructure.
- The hard-suction point shall be provided with a 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance.
- The hard-suction point shall be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.
- An all-weather road access and hardstand shall be provided to the hard-suction point. The hardstand shall be maintained to a minimum of 15 tonne GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.
- The road access and hardstand shall be kept clear at all times.
- The hard-suction point shall be protected from mechanical damage where necessary.
- Where the access road has one entrance, an eight (8) metre radius turning circle shall be provided at the tank.

- An external water level indicator shall be provided to the tank and be visible from the hardstand area.
- Signage indicating 'FIRE WATER' and the tank capacity shall be fixed to each tank.
- Signage shall be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).

Fire Detection and Suppression Equipment

In accordance with CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023 updated as V4.4, June 2025 [1], it is recommended that the following requirements shall be met:

- Provision of suitable fire detection and suppression equipment for on-site buildings and structures, according to the requirements of the National Construction Code.
- Provision of suitable fire detection and suppression equipment for storage of dangerous goods, according to the requirements of any Australian Standards for the storage and handling of dangerous goods.
- For electrical installations, a minimum of two suitable fire extinguishers shall be provided within 3 m-20 m of each PCU.
- In all vehicles and heavy equipment, each vehicle shall 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.

Fire Breaks

In accordance with CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023 updated as V4.4, June 2025 [1] it is recommended that the following provision of fire break facility design requirements shall be met:

- Around the perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.
- Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite.
- Of a width of at least 10m.

7.2.3 BESS Design

In accordance with CFA Design Guidelines and Model Requirements: Renewable Energy Facilities V4 August 2023 updated as V4.4, June 2025 [1], it is recommended that the following requirements shall be met:

- Where reticulated water is available, the provision of a fire hydrant system that meets the requirements of AS 2419.1: Fire hydrant installations, Clause 3.9: Open Yard Protection, and Table 2.2.5(D): Number of Fire Hydrants Required to Flow Simultaneously - Open Yards.
- Where no reticulated water is available, provision of a fire water supply in static storage tanks, where:
    i. The fire water supply shall be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1: Fire hydrant installations, flowing for a period of no less than four hours at 20L/s, whichever is the greater.
    ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1: Fire hydrant installations, Table 2.2.5(D).
    iii. Fire hydrants shall be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.
    iv. The fire water supply shall be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings).

v. The fire water supply shall 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).

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

- The provision of a fire break around battery energy storage systems and related infrastructure.
- The design of the facility shall incorporate:

a) A separation distance that prevents fire spread between battery containers/enclosures and other site elements.

b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m.

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.

- BESS shall be:

a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).

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).

c) Provided with in-built fire and gas detection systems.

b) Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.

c) Provided with suitable ember protection.

d) Provided with suitable access roads for emergency services vehicles.

e) Installed on non-combustible surfaces.

f) Provided with suitable ventilation.

g) Provided with suitable impact protection.

h) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.

i) Provided with spill containment that includes provision for management of fire water runoff.

7.3 Lithium-ion Battery Recommendations

The primary reference standards are *IEC 62619 Safety Requirements for Secondary Lithium Cells and Batteries, for use In Industrial Applications* [33] and IEC 62485-5: *Safety requirements for secondary batteries and battery installations – Part 5: Safe operation of stationary lithium-ion batteries* [34].

These standards outline safety and protection measures for lithium-ion batteries, addressing the major hazards identified in this risk and hazard assessment. They provide requirements for installation, operation, maintenance, and end-of-life management of lithium-ion batteries in BESS. Contractors and suppliers shall adhere to these standards for BESS component installation, operation, maintenance, and disposal.

Design of the Lithium-Ion BESS shall consist of modular, insulated battery cells and the container shall be kept free of extraneous and combustible materials to mitigate the risk of fire or thermal overload spreading to multiple battery cells. These units need to account for adequate separation to prevent fire propagation

considering the findings from the 2021 Victorian Big Battery fire incident [35] where fire propagation to the roof of the adjacent BESS sub-unit occurred.

7.4 Transformer and Switchgear Recommendations

AS 2067*: Substations and high voltage installations exceeding 1 kV a.c.* [30] outlines the risks and safety measures for primary hazards presented by transformers which includes live contact, arc flashing, and fire and explosions. The BESS (including transformers) shall be designed in line with and comply with this standard. All transformers shall have separation distances away from other transformers, control rooms and office complexes that exceed the required distances in the standard. Details of the requirements for this standard is listed below:

- Protection against live contact of a transformer is generally achieved with the following mitigation measures:
  - protection by enclosure
  - protection by barrier
  - protection by obstacle
  - protection by placing out of reach.
- Protection against arc faults between transformers and other equipment or people is generally achieved with the following mitigation measures:
  - Protection against operating error through:
    - load break switches
    - short-circuit rated fault-making switches
    - interlocking device
    - noninterchangeable key locks.
  - Operating aisles as short (length), high (height), and wide (aisle width) as possible
  - Solid covers as an enclosure or protective barrier
  - Equipment tested to withstand internal arc fault
  - Arc protection to be directed away from operating personnel and vented outside the building if necessary
  - Use of current limiting devices
  - Very short tripping time
  - Operating of the plant from a safe distance
  - Prevention of reenergisation by use of manually resettable devices which detect internal equipment faults, and which incorporate pressure relief and provide external indication.
- To mitigate the risks associated with transformer fire, the following steps shall be followed:
  - Minimise the risk of a fire starting:
    - The transformer specification shall consider insulation levels, operating temperatures, cooling systems, protection systems, operation (including the effect of prolonged overloading) and maintenance practices
  - Minimise the risk of transformer failure developing into an oil fire:
    - Consideration shall be given to insulating liquid type, tank strength, low explosion risk bushings, and pressure relief
  - Minimise the impact of a transformer fire on the environment, other assets, and humans.

- The following control measures shall always be in place to minimise the damage resulting from a transformer fire.
  - Minimise risk of loss of life and injury to humans by:
    - providing adequate clearance around transformers, particularly those with sound enclosures
    - providing adequate access for firefighting equipment
    - providing adequate egress routes
  - Minimise the risk of the fire spreading or causing damage to adjacent transformers, control building, structures and other items of plant and equipment.
    - providing passive protection systems in the form of adequate separation distances, fire barriers, construction buildings of fire resisting materials
    - providing active suppression systems such as deluge, water mist, or gas flooding
  - Minimise contamination and damage to the environment by provision of oil containment systems and bunding.

7.5 Separation Distances Recommendations

Additional safeguarding includes designing to Australian Standards and industry best practice to minimise the risk of fire through inherently safe design such as onsite separation of BESS units (i.e., obtaining vendor test results of the battery enclosures for fire propagation is recommended).

Recommendations for separation distances are as follows:

- The design of BESS and auxiliary infrastructure shall consider:
  - Surface Water and Groundwater Assessment to determine special flood considerations
  - Provision for water retention facility.
- The layout shall be developed to accommodate the anticipated number of BESS enclosures and the necessary separation distances to mitigate the spread of fires. The BESS installation will also adhere to fire and safety codes and standards such as NFPA 855, UL 9540, and UL 9540A.
- The separation of the buildings, including switch rooms, control room and workshop shall be in accordance with AS 2067*: Substations and high voltage installations exceeding 1 kV a.c.* [30] and the National Construction Code. Additional discussion on the separation from the transformers is noted within Section 7.3 of this report.
- Lithium-ion batteries are considered DGs while in storage and not connected to the grid. *AS/NZS The Storage and Handling of Class 9 (miscellaneous) Dangerous Goods and Articles* [36] outlines requirements for Class 9 DGs (i.e., lithium-ion batteries and battery enclosures) which shall be followed while battery enclosures are onsite and not connected to the grid.

Since the final dimensions of the enclosures and associated clearances may vary depending on the final detailed design, the supplier appointed will be required to finalise the detailed design in accordance with the above design considerations for the appropriate management and minimisation of fire risk. The battery enclosure supplier will advise the safe separation demonstrated by tests within battery enclosures to prevent fire propagation should an incident occur involving the battery cells.

7.6 Fire Safety Recommendations

Where the Model Requirements within the CFA design guideline for renewable facilities [1] are not fully met, CFA expects a Fire Safety Study (FSS) to be conducted. CFA recommends that the FSS be conducted in line with the NSW *Hazardous Industry Planning Advisory Paper No. 2* (HIPAP 2) *Fire Safety Study Guidelines* [37] as described in *CFAs Fire Safety Studies for Battery Energy Storage Systems* [38] and provided to CFA's Specialist Risk and Fire Safety Unit.

There were no departures from the CFA Guideline model requirements identified at this stage of the design. Therefore, preparation of a Fire Safety Study is not required at this stage. However, it is noted that the fire water system design is yet to be finalised. The system will be designed in accordance with the model requirements of the CFA guideline. If not possible for the design to meet the model requirements, a Fire Safety Study must be completed to assess and document the effectiveness of fire prevention, detection, and mitigation measures specific to the site's hazards, ensuring compliance with fire safety standards and reducing risks to people and property.

Additionally, the CFA design guideline for renewable facilities [1] states that the management of fire water runoff shall also be addressed. CFA recommends that infrastructure is provided for the containment and management of contaminated fire water runoff from battery energy storage systems. Infrastructure may include bunding, sumps and/or purpose-built, impervious retention facilities. A fire water management plan may consist of the containment and disposal of contaminated fire water.

The CFA guideline [1] also recommends a containment and management capacity equivalent to the on-site fire protection system. Containment is to be provided as per *AS 4681: The storage and handling of class 9 dangerous goods* (Section 7.3.9: Control of run-off) [36].

7.7 Safety Management System Recommendations

The following recommendations relate to Safety Management Systems which shall be implemented to ensure safe operation of the Project.

7.7.1 Construction Phase Recommendations

The construction contractor is to prepare an adequate safety management system and documentation for the Project construction phase (e.g., various management plans, emergency plans, traffic management plans, procedure for removal of contaminated land and remediation as required).

The following additional construction phase recommendations were made in the Hazard and Risk Impact Assessment:

- Construction shall be scheduled during dry season to account for light and heavy vehicles in heavy rain/flooding events.
- A Construction Waste Management Plan shall be developed for the Project.

7.7.2 Operational and Maintenance Recommendations

The BESS shall be installed correctly and commissioned / tested to ensure safe function. The safety testing of the lithium-ion BESS shall be conducted under the guidance of *IEC 62619*: *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications*.

The following additional operation and maintenance recommendations were made in the Hazard and Risk Impact Assessment:

- HVAC systems shall be correctly installed and maintained.
- Remote isolation shall be provided for non-manned facility.
- Appropriate signage and site manifest shall be developed to identify hazardous chemicals associated with the contents of BESS.
- Commissioning procedures shall be developed and implemented in accordance with manufacturer's procedures.
- Operating plant manuals (OPM) shall be implemented.
- Strategy for life of plant shall be developed and implemented.
- Regular and appropriate operations and maintenance covering inspections of the facilities shall be conducted.

- The transformers shall be maintained as per OEM recommended regime, including regular insulation and function testing
- The switchgear functionality shall undergo regular maintenance and testing.

7.7.3 Safety Management Plan Recommendations

The assessment recommends that a safety management system is implemented prior to the commencement of commissioning or operation of the Project.

The following safety management plans shall specifically address the BESS and be in place prior to commencement of operation of the Project:

- Work Health and Safety Management Plan, compliant with AS 5577: Electricity network safety management systems.
- Emergency Plan shall be prepared as per the CFA guidelines [1] prior to commissioning and shall consider:
  - Details of the electrical safety hazards
  - Details of the effects of fire on the battery energy storage system
  - The shut-down procedures if the batteries are involved in fire
  - A plan for partial and full decommissioning of the BESS in the event of an emergency incident that renders the facility inoperable or unsafe, prior to its anticipated end-of-life
  - A Fire Management Plan to minimise fire risks
  - An Emergency Information Book within the Emergency Information (Manifest) Container; including the following:
    - The safe operating conditions (e.g. temperature) of the BESS
    - The details of any emissions or toxic gases, including during a fire,
    - All dangerous goods stored on-site shall have a current Safety Data Sheet (SDS).
    - Other manifest requirements as listed in the *Dangerous Goods (Storage and Handling) Regulations 2022* [2].
- Asset Management Plans and assurance activities. A comprehensive and regular program of maintenance and inspections, covering the BESS and related infrastructure (i.e., transformers, HVAC, civil structures) to ensure the system is serviced and maintained as per the manufacturer's requirements, including measures to vet contractor appointments to ensure batteries are designed and installed to appropriate standards.
- A stormwater management plan shall be developed.
- Waste management plans for construction and operation of the Project shall be developed.
- Provisions shall be in place for identification and removal of any contaminated land during construction.
- Housekeeping procedures shall be developed for construction and operation.
- Development and implementation of plant operating and maintenance procedures.
- Pest control/management is to be implemented.
- Adequate safeguards are to be implemented for hazards related to working in proximity to a HV substation.
- An audit system shall also be developed to ensure regular review and update of the safety management plans.

7.8 Natural Hazard Recommendations

The following recommendations in Table 7-1 relate to Natural Hazards which shall be implemented to ensure safe operations of the Project.

Table 7-1 Natural hazard recommendations

Natural hazard	Description	Recommendation
Extreme Temperatures	The maximum and minimum temperatures recorded at the closest weather station with data up to 2025, Wallan (Kilmore Gap) weather station (088162) (located ~35 km away) with similar elevation to Macedon, between 1993 to 2025 were 25.2 °C and 4.0°C[39] [39].	■ Batteries shall be designed to operate beyond the maximum temperature range with allowance for higher maximum temperatures of approximately 1.5 to 2ºC to account for the likely effects of global warming. ■ Electrical design in accordance with AS/NZS 3000. ■ Battery enclosures shall have suitable enclosure design for the environment.
Bushfire	The Project is located with a Bushfire Prone Area (BPA) and has sections subject to a Bushfire Management Overlay (BMO). See Section 8 for further details.	■ Refer to Section 8 for recommendations and Appendix A for proposed controls.
Seismic Activity	According to the National Seismic Hazard Assessment 2023, the peak ground acceleration for a 10% probability of exceedance in 50 years of mean hazard levels is 0.02-0.04 m/s^2 [40]. Risk of seismic activity is assumed to be minimal.	No recommendations are proposed.
Flooding	Flood risk shall be considered in planning to avoid intensifying any impacts of flooding. Design to consider flood planning areas.	■ A Surface Water and Groundwater Assessment shall be conducted to determine special flood considerations. ■ Construction shall occur during dry season, to account for light and heavy vehicles in heavy rain/flooding events.
Excessive Wind	The Project Area within the A1 Wind Region as per Figure 3.1 of AS/NZS 1170.2[41].	■ Project infrastructure shall be designed in accordance with AS/NZS 1170.2. ■ Housekeeping schedule shall be maintained regularly to ensure debris is cleared.
Lightning	The average annual ground lightning flash density in Project Area is around 1 to 2 events / km^2 / year[42].	■ A lightning protection study shall be conducted. ■ BESS equipment shall not be located underneath powerlines. ■ An earthing system shall be implemented. ■ The Project shall be designed in accordance with AS 1768.
Subsidence	The Project Area will be located above ground and away from any areas prone to subsidence (e.g. abandoned mines). Other design mitigations (e.g. grouting) will be determined during detailed design if infrastructure cannot be located away from such areas.	Ground surveying shall be completed to confirm risk of subsidence.

8 Task 4: Bushfire Hazard Assessment

8.1 Assessment of the Planning Scheme Requirements

To ensure fire risk management can be effectively assessed by the CFA, the CFA expects that all planning applications address all relevant aspects of fire safety, including landscape and bushfire hazards, and hazards to and from the proposed technologies. The following sections provide a tailored response to requirements set out in Section 2.2.2 of the CFA guidelines [1] and Clause 13.02 of the Victoria Planning Provisions [19] based on the Project description in Section 2.3.

8.1.1 Victorian Planning Provisions

Clause 13.02-1S (Bushfire Planning) [19] outlines the State's objectives in managing bushfire risk to life and property through appropriate hazard identification and strategic planning. Clause 13.02 (Bushfire) includes strategies for bushfire hazard identification and applies to all development in a designated BPA, BMO or any development that may create a bushfire hazard. The CFA Guidelines [1] also require appropriate consideration of Clause 13.02-1S. Table 8-1 below and subsequent sections provide responses to each of the strategies within Clause 13.02-1S.

Table 8-1 Addressing information requirements within Clause 13.02-1S of the Victoria Planning Provisions [19] in relation to bushfire hazard identification

Bushfire hazard identification and assessments	Response
Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard.	A site visit was conducted on 2 May 2025 and vegetation was assessed in accordance with *AS 3959* [3].
Considering the best available information about bushfire hazard including the map of designated bushfire prone areas prepared under the *Building Act 1993* or regulations made under that Act.	Mapping confirms that the Project Area is within a BPA (Figure 9) and fire history maps have been sourced from DEECA.
Applying the Bushfire Management Overlay to areas where the extent of vegetation can create an extreme bushfire hazard.	Mapping confirms that the Project Area is not within a BMO (Figure 9).
Considering and assessing the bushfire hazard on the basis of: ■ 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.	A description of the Project Area and the surrounding landscapes are provided below and shown in the bushfire landscape hazard assessment map (Figure 10). ■ Landscape, local and neighbourhood conditions (refer to sections directly below this table) ■ The site for development (refer to Section 8.1.2 and 8.1.3) **Note:** DELWP requirements on landscape and site bushfire hazard assessment have been used in providing a response to these conditions [22].
Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.	Early CFA Consultation has been undertaken to inform the design of the Project. Ongoing consultation will occur with CFA throughout the planning application and in developing documentation prior to commissioning of the facility.

Bushfire hazard identification and assessments	Response
Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals properly assess bushfire risk and include appropriate bushfire protection measures.	This assessment identifies the bushfire risks within the Project Area and surrounding landscape and includes bushfire protection measures that should be employed in the site layout and design (refer to Sections 8.2, 8.3 and 8.5).
Not approving development where a landowner or proponent has not satisfactorily demonstrated that the relevant policies have been addressed, performance measures satisfied, or bushfire protection measures can be adequately implemented.	The Project Area is considered to have a low bushfire risk and contains suitable access and egress options (refer to Section 8.1.2). The BESS and associated infrastructure will also incorporate fire protection measures through design, construction, and operation (Section 7.2.2).

Landscape condition and bushfire hazards

The broader landscape surrounding the Project Area is predominately characterised by a mix of rural residential properties, agricultural land, and public reserves, including Macedon Regional Park and Mount Macedon. The mix of land use includes rural living zones, small-scale agricultural land, and larger grazing properties, interspersed with areas of remnant native vegetation and windbreak plantings. Agricultural activities in the region include cattle farming, hobby farming, and vineyards. These land uses are interspersed with forested areas, which comprise Eucalyptus-dominated vegetation, including both wet and dry sclerophyll forests, which are highly flammable and contribute to the area's significant bushfire risk. Additionally, the topography of the landscape includes hilly terrain and varying slopes, which adds to the bushfire risk.

Bushfire history indicates that the region is susceptible to significant fire events. One of these events included the 1983 Ash Wednesday fires, which affected large parts of Victoria, including Macedon, and resulted in broad-scale destruction and extensive forest burns. More recently, in December 2024, a bushfire occurred in Bullengarook, south-west of Macedon, adjacent to Lerderderg State Park, where the fire's progression southwards was influenced by grasslands. Several other smaller fires occurred throughout the area between 2014-2024. Half of the bushfires in the area have been human-induced (e.g. unattended campfires) [21]. Hot, dry summers lead to very dry fuels, so Central Victoria can experience destructive bushfires even on days that are not classified as higher fire danger [21]. Destructive fast-running grassfires can occur on days with light winds and temperatures as low as 20^0C [21].

In the Loddon Mallee Regional Bushfire Planning Assessment [16], Macedon is mentioned as an area of highest bushfire risk because it contains large areas of forest on the north and west sides of the communities with houses surrounded by forest. Road access through this area is also limited, making escape once a bushfire is in the area dangerous. The primary landscape bushfire risk stems from the surrounding forested areas, which provide continuous fuel loads and can facilitate rapid fire spread under conducive weather conditions. Particularly from the prevailing bushfire directions of the north-west and south-west [22], there is significant forest and woodland vegetation that could post a potential fire risk. The combination of highly flammable vegetation, steep terrain, and variable weather patterns contributes to the overall bushfire hazards in the landscape. Consequently, based on the condition of the landscape, extreme bushfire behaviour is considered possible. There is potential risk from spot fires in the event of bushfires from the north and north-west from woodland and forested areas. The broader landscape is Type Two [22] as:

- The type and extent of vegetation located more than 150 metres from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site.
- Bushfire can only approach from one aspect and the site is located in a suburban, township or urban area managed in a minimum fuel condition.
- Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area.

In 2021, Forest Fire Management Victoria (FFMV) conducted planned burns at Macedon-Campey Road and Macedon-Bawden Road [43]. These burns were part of a broader fuel management strategy to reduce bushfire risk in the area.

Overall, there are significant bushfire hazards present in the surrounding landscape. A landscape bushfire hazard assessment in accordance with CFA guidelines [1] has been developed and is provided below in Figure 10.

Local and neighbourhood conditions bushfire hazards

The local and neighbourhood conditions surrounding the Project Area are similar in terms of surrounding vegetation and infrastructure and therefore can be considered together in a single assessment, outlined below.

The Project Area (approximately 7.5 ha) is bounded to the east by Macedon-Woodend Road (also referred to as Black Forest Drive), to the south-east by the Gisborne Substation, to the south-west by the Calder Freeway, and to the north by Allison Lane. The Project Area mainly comprises of private land, though includes the adjoining road reserves of Macedon-Woodend Road (western side of road only) and Allison Lane (southern side of road only). The site occurs approximately 3 km south-east and 4.5 km north-west of the township of Macedon and Gisborne, respectively. Several reserves occur within 5 km of the Project Area in all directions, excluding the south-east, including:

- Gisborne Flora Reserve
- Wombat State Forest
- Macedon Plantation
- Macedon Regional Park
- Devonshire Lane Roadside Reserve
- Mount Charlie Flora Reserve
- T Hill Flora Reserve
- Conglomerate Gully Flora Reserve.

Mature forest vegetation surrounds the site boundaries, with the central portion comprising unmanaged grasslands and a large patch of shrubby weeds. Within the neighbourhood area, there is mainly rural properties and small-scale agricultural land interspersed with areas of remnant forest, woodland and windbreak plantings. Many of these linear patches are connected, however, minor interruptions to connectivity occur where roads cross and there are large entrances into private land.

The Loddon Mallee Regional Bushfire Planning Assessment places the site in ‘small lots in or close to hazard (0-0.4 ha)’ [16]. It is part of a cluster of small lots south of Macedon in a bushfire hazard area associated with remnant vegetation. The Project Area is considered to exhibit only a few low-risk environmental attributes as per the CFA Guidelines [1], including:

- Generally flat topography, some undulation may be present
- Slopes are less than 5 degrees
- No Bushfire Management Overlay applies
- No Land Subject to Inundation Overlay applies.

The Project Area lacks the following low-risk environmental attributes as per the CFA Guidelines [1], including:

- No continuous other vegetation types within 1-10 km of the project site
- The land is primarily grassland
- Good road access with multiple routes available to and from the project site.

Overall, the surrounding local and neighbourhood conditions are considered a significant bushfire risk and extreme bushfire behaviour is considered possible.

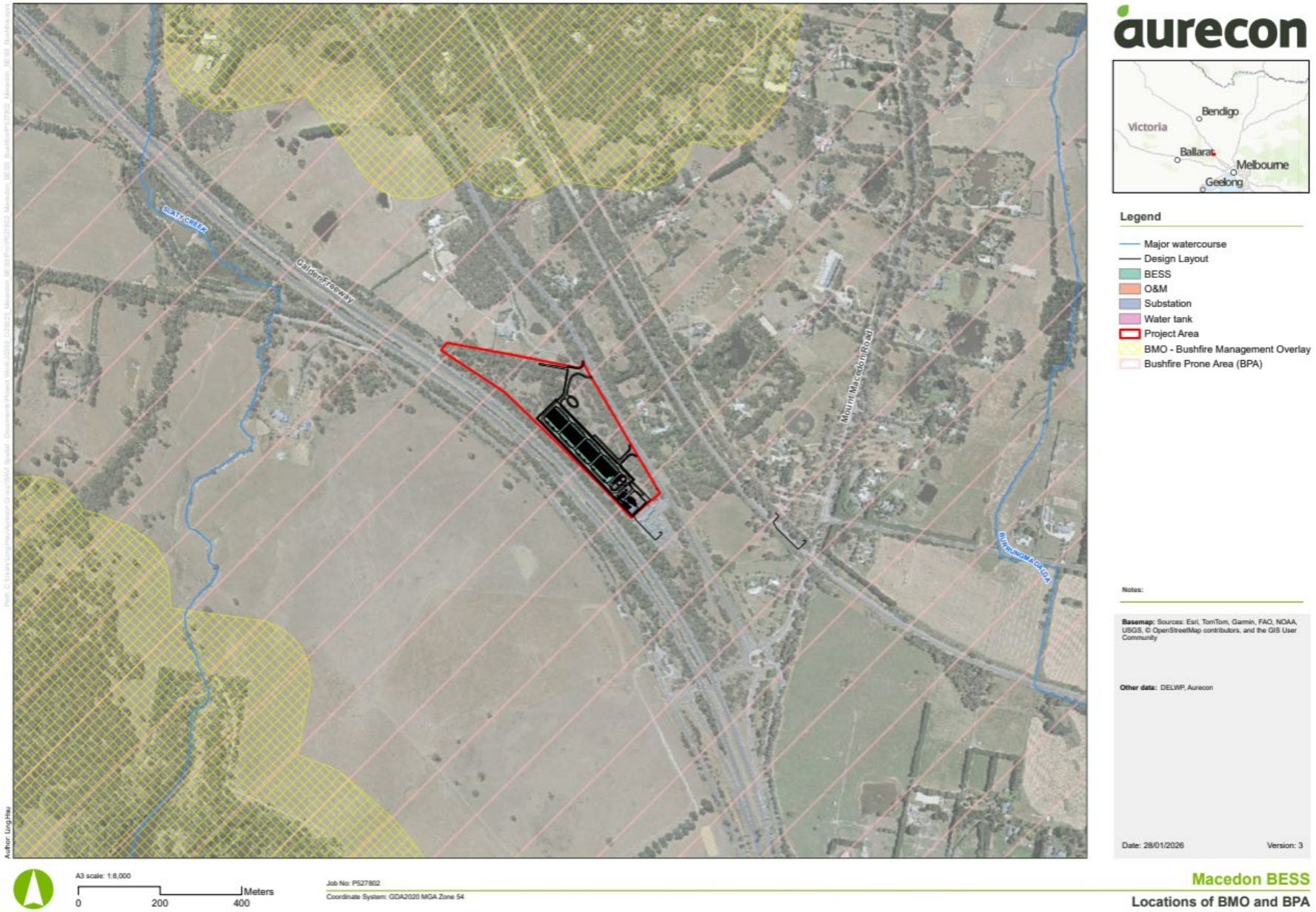

Figure 9 Locations of BMO and BPA

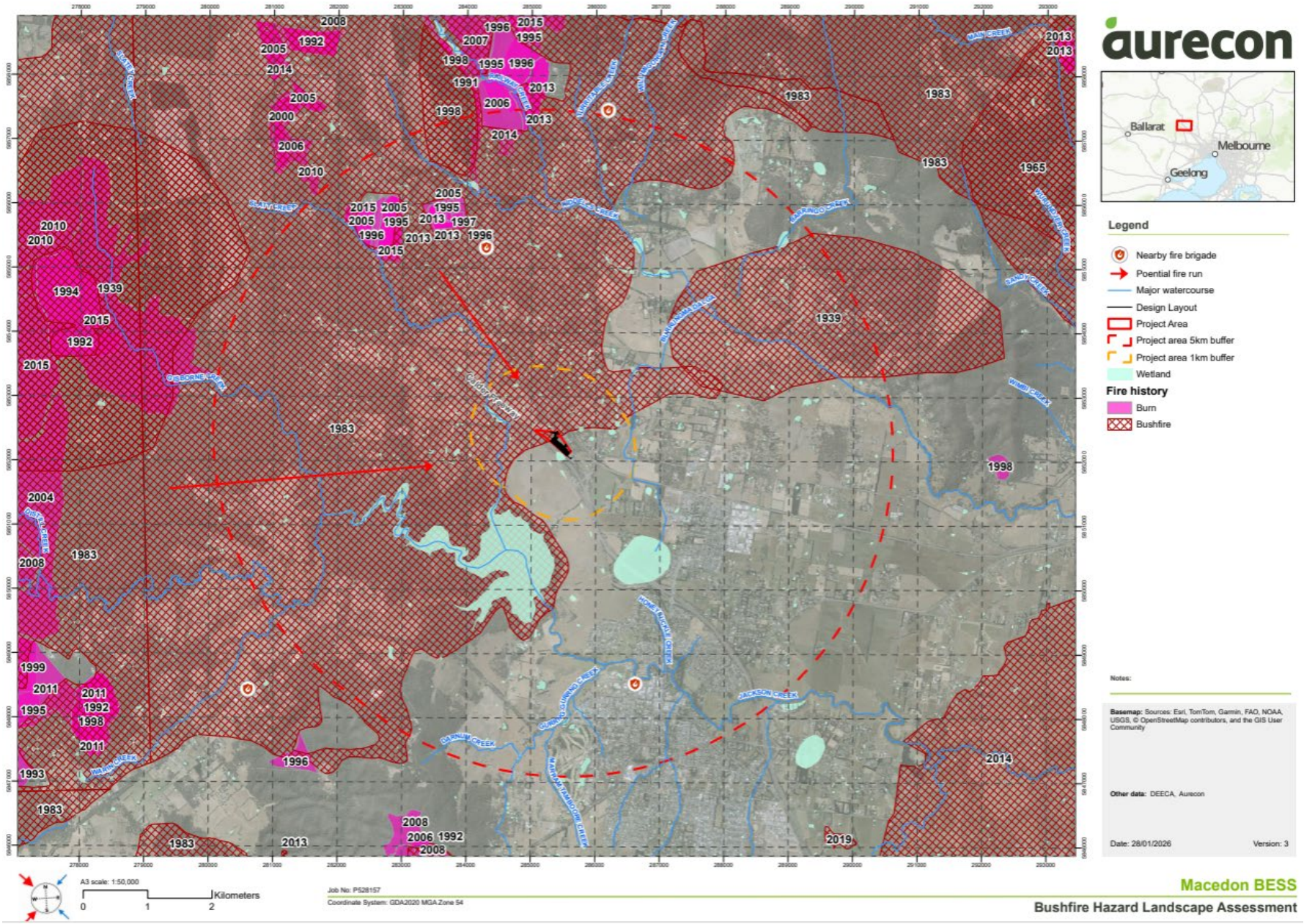

Figure 10 Bushfire Hazard Landscape Assessment

8.1.2 Site for Development

Site description

The Project Area consists of a mix of forest, unmanaged grassland, and weed-infested zones. Roughly half the area is dominated by grassland and weed infestations, while the remaining half features forest with varying species composition and quality. The forested sections support a healthy canopy primarily composed of stringybark and rough-barked eucalypt species, including Messmate Stringybark (*Eucalyptus obliqua*), Narrow-leaved Peppermint (*Eucalyptus radiata*), and Broad-leaved Peppermint (*Eucalyptus dives*), with occasional Manna Gum (*Eucalyptus viminalis*).

Along the eastern edge of the Project Area, adjacent to Macedon-Woodend Road, the forest contains sparse shrub cover and a grassy understorey with a moderate layer of leaf litter (Photo 1). In contrast, the forest on the western edge near Allison Lane has a dense midstorey of shrubs - mainly Black Wattle (*Acacia mearnsii*) and Blackwood (*Acacia melanoxylon*) - along with a substantial leaf litter layer (Photo 2).

The central portion of the Project Area is primarily grassland, interspersed with smaller, isolated patches within the forest. Evidence of kangaroo grazing was observed, keeping these areas in a low-fuel state despite the absence of active management. These grassland areas lack tree canopy and are dominated by native grasses, particularly Kangaroo Grass (*Themeda triandra*), Spear Grass (*Austrostipa* spp.), and Wallaby Grass (*Rytidosperma* spp.) (Photo 3). A significant Gorse (*Ulex europaeus*) infestation runs diagonally through the central grassland patch as a narrow strip (Photo 4).

The eastern edge of the Project Area abuts the Gisborne Substation which is within a hard stand area surrounded by a 5m firebreak (Photo 5). The two road reserves which occur within the Project Area comprise of forest which has a similar composition to the eastern forest patch but with a significant amount of leaf litter and organic matter (Photo 6).

More detailed vegetation descriptions in accordance with the *AS 3959* [3] vegetation classifications can be found in Section 8.4.

Photo 1. Eastern forest patch, facing north

Photo 2. Western forest patch, facing south

Photo 3. Grassland patch, facing east

Photo 4. Gorse infestation, facing west

Photo 5. Gisborne Substation on the eastern edge of the Project Area

Photo 6. Macedon-Woodend Road reserve, facing north

Existing access

The Project Area is accessible via two roads: one to the north, the minor Allison Lane, and one to the north-east, the major Black Forest Drive/Macedon-Woodend Road.

Site bushfire assessment

Using *AS 3959* [3], classified vegetation within and adjacent to the Project Area comprises grassland, forest and shrubland. Grassland (Figure 11) includes the unmanaged pasture grasses within the centre of the Project Area (Photo 7 and Photo 8). These areas are classified as tussock grassland as the overstorey foliage cover is <10% and there were some grasses between 0.5-1m high which were left ungrazed.

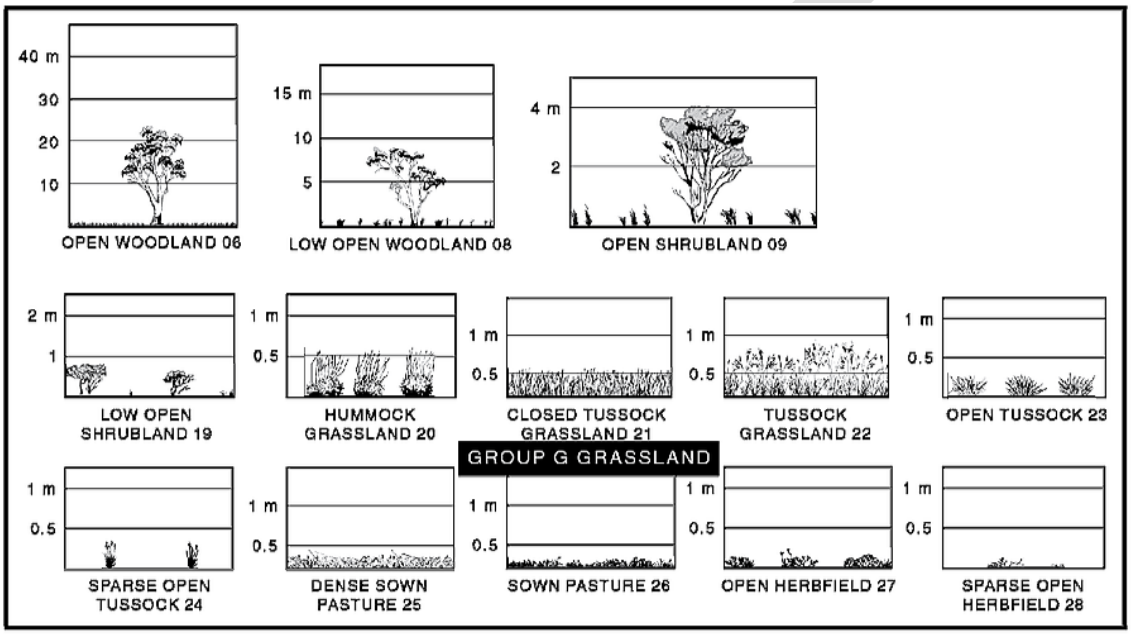

Figure 11 Classification of vegetation: Grassland [3]

Photo 7 Grassland patch, facing west

Photo 8 Grassland, patch facing east

Forest (Figure 12) includes the treed areas around the borders of the Project Area and within some portions of the site. The vegetation within these patches conforms to the Ecological Vegetation Class (EVC) Grassy Forest, which matches the description of open forest (3), comprising trees to 30m high, with 30-70% foliage cover and is typically dominated by eucalypts, melaleuca or callistemon (Photo 9 and Photo 10).

Photo 9. Forest patch, facing south

Photo 10. Forest patch, facing north-west

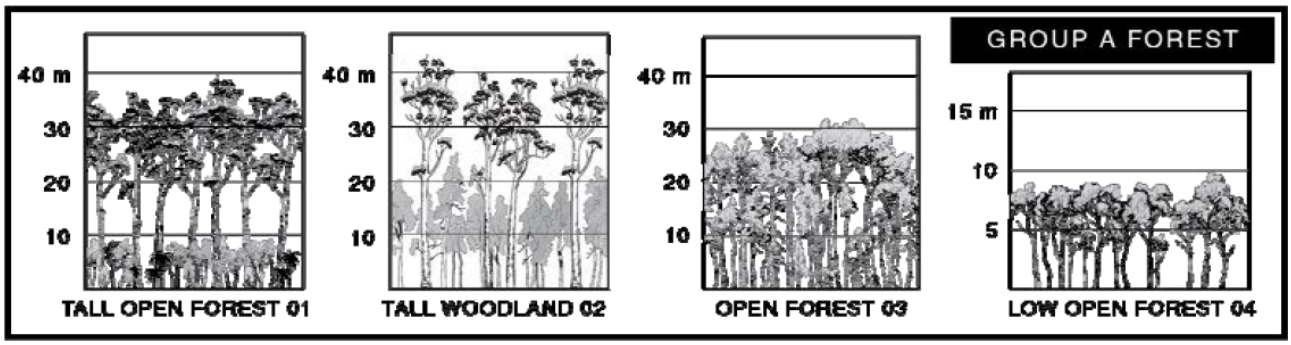

Figure 12 Classification of vegetation: Forest [3]

Shrubland (Figure 13) includes the diagonal strip of Gorse through the centre of the Project Area. This vegetation matches the description of low shrubland [3] which includes shrubs <2m high, with >30% foliage cover and understoreys that may contain grasses and often dominated by *Acacia sp.* and *Casuarina sp.* (Photo 11).

Photo 11. Shrubland patch, facing west

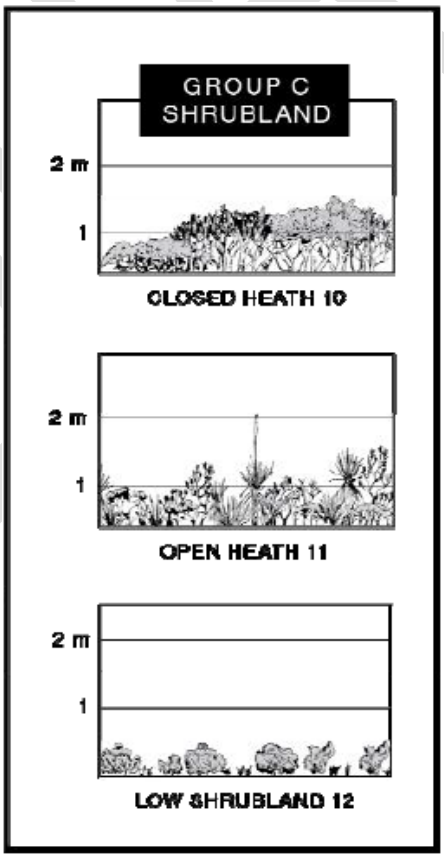

Figure 13 Classification of Shrubland [3]

The Project is proposing to remove all trees within the impact area which includes the BESS site, access tracks and associated infrastructure.

The BAL contours surrounding the BESS site are provided in Figure 14.

8.2 Addressing Risk to the BESS from the Landscape (Bushfire/Grassfire)

8.2.1 Overall bushfire/grassfire risk

As mentioned in Section 8.1.1, due to the surrounding forested areas, close proximity to large areas of remnant vegetation, hilly terrain and limited road access, the overall potential bushfire risk is considered high.

Potential bushfire hazards within and surrounding the Project Area primarily stem from forest patches with elevated fuel loads, largely due to dense leaf litter and understorey vegetation. A significant risk is also posed by the Gorse (*Ulex europaeus*) infestation in the centre of the site. Gorse is a highly flammable weed known for igniting easily and burning intensely - similar in behaviour to the native Yarra Burgan (*Kunzea leptospermoides*), which is present in adjacent forest patches. Together, these fuel sources increase the likelihood of rapid ignition and intense fire behaviour in the event of a bushfire.

The large, unmanaged grassland area in the centre of the site further contributes to the bushfire risk. Although these grasslands currently remain in a relatively low-fuel condition due to kangaroo grazing, the absence of active management increases the potential for fuel build-up over time.

External factors also heighten the site's vulnerability. Forested areas to the north-west, including those within the Macedon Ranges, are known bushfire-prone landscapes and have historically experienced fires, often human-induced, making spot-fire ignition within the Project Area a possibility. Additionally, the site is bordered by several roadways, including the Calder Freeway, a major transport corridor where roadside ignitions are a recognised fire risk. Fires starting along these roadways could quickly spread into adjacent forest patches along the site's boundaries.

While the Project Area is not likely to generate a large fire run due to its size and vegetation arrangement, it remains susceptible to high-intensity fires, particularly under hot, dry, and windy conditions. To mitigate this risk, the weed infestation should be controlled, the grassland actively managed, and a suitable firebreak established around the BESS to create adequate separation from major fire hazards.

As the overall bushfire risk to or from the Project is high, the measures adopted from the CFA Guidelines [1] outlined in the following section will:

- further reduce the likelihood of a fire starting at the wind energy facility, particularly around the more hazardous infrastructure (BESS, substations and terminal station).
- mitigate and manage the risk to life and property in the event of a fire entering or spreading from the BESS.

Overall, significant bushfire hazards have been identified within the Project Area.

8.2.2 Addressing bushfire risks to the BESS

Table 8-2 provides a description of control measures to address bushfire/grassfire risk to the proposed BESS facility.

Table 8-2 Summary of measures to manage fire risk

Consideration	Project design response
Location	The facility is situated in the lowest-risk part of the Project Area - the grassland zone - where surrounding forest patches are located upslope of the site. The site is easily accessible via Macedon-Woodend Road and Allison Lane. The site is within a BPA but not a BMO.

Consideration	Project design response
	The site environment meets some of the attributes described in Section 4.1 of the CFA Guidelines [1], namely: ■ generally flat topography, some undulation may be present ■ slopes are less than 5 degrees ■ good road access with multiple routes available to and from the Project site ■ no BMO applies ■ no Land Subject to Inundation Overlay applies.
Design	The facility will be designed to withstand ember attack.
Layout	A 10 m wide firebreak around the perimeter of the site, with access track, will be incorporated into the site layout.
Administration, permits and training	Fire risk management is to be implemented by adhering to any conditions during the Fire Danger Period. Conditions include remaining on designated tracks for driving and restricted smoking areas. Appropriate permits (such as hot work permit) to be obtained if required. Site personnel to be equipped with first aid and fire mitigation training including CFA's training modules for bushfire safety. An Emergency Management Plan should be prepared as per the CFA guidelines [1].
Emergency vehicle access	Primary access and a secondary access will be provided via Allison Lane and Macedon-Woodend Road, respectively. A perimeter access road around the battery storage area and substation will be included within the 10 m firebreak. Access roads will be constructed as per CFA guidelines [1], including for construction type, width and grade.
Firefighting water supply	The site is proposed to have two 335 Kilolitre (kL) firewater storage tanks, a fire water holding pond, firewater pumps and a hydrant/ring main to protect the facility.
Firebreaks	A 10 m wide firebreak around the perimeter of the site, with access track, will be incorporated into the site layout. Firebreaks will be maintained to be free of flammable materials.
Landscape	No screening vegetation is currently proposed. If required during stakeholder consultation any screening will consider vegetation with fire-retardant properties as per CFA planting guidelines [44] at a suitable distance from the facility. Fire breaks may need to be expanded to at least 20 m to allow for screening vegetation.
Vegetation and fuel management	The grass on site will be maintained at or below 100 mm during Fire Danger Period. All vehicles will be equipped with appropriate firefighting equipment.

8.3 Addressing risks from the BESS to the landscape

Project-related ignition sources have the potential to ignite adjacent vegetation and structures, pose a risk to life and assets, and require mitigation. Prior to mitigation and management of impacts, the risk of ignition and fire spread from construction of the Project is highest near the vegetated areas and unmanaged grasslands. The most significant bushfire risk for the Project is during construction (Table 8-3), where potential ignition sources occur adjacent to vegetated areas.

8.3.1 Construction risks

Table 8-3 Project-related ignition sources: construction

Ignition source	Description
Construction equipment and hot works	Construction equipment including bulldozers and excavators, and construction activities involving hot works (such grinding, welding, and cutting) are a potential ignition risk, as they may result in sparks from plant or equipment. Sparks can be accidentally produced when steel blades encounter rocks and can spread via wind. Sparks are a high ignition risk to adjacent vegetation, where mitigation and control measures are not applied. Fires igniting adjoining vegetation may spread quickly under adverse conditions such as elevated fire danger days, potentially impacting life, and property.
Electrical faults in equipment	Electrical faults in equipment are a potential ignition risk to adjacent vegetation. Equipment should be checked for potential faults or visible weaknesses regularly to reduce the potential for failure in accordance with manufacturers' specifications.
Motor vehicles	Motor vehicle exhaust systems are a potential ignition risk to adjacent grassland and other vegetation. The highest risk is from diesel powered trucks and light vehicles with pollution controlling exhaust devices, which may emit burning diesel particles. Vehicles may also collide with equipment or infrastructure, which may result in spilt fuel, or sparks that may be an ignition risk to adjacent vegetation.
Accidental ignitions	Accidental ignitions include smoking, are non-deliberate ignitions occurring from accidents or error, and not specified under any other ignition risk. Accidents and error are a potential ignition risk to adjacent vegetation.
Dangerous materials	Dangerous materials include chemicals, explosives, or otherwise flammable materials. Inappropriate storage of dangerous materials, and insufficient fuel-free buffers around work sites, are a potential ignition risk to adjacent vegetation. Ignition risk occurs through increased risk of chemical fire or explosion, or a risk from a grass or bushfire burning a storage area and igniting dangerous materials.

8.3.2 Operational risks

Bushfire impacts from the operation of the Project are assessed in terms of Project-related ignition sources (Table 8-4). Project-related ignition sources have the potential to ignite adjacent vegetation and structures, pose a risk to life and assets, and require mitigation. Prior to mitigation and management of impacts, the risk of ignition and fire spread from operation of the Project is highest near the vegetated areas and unmanaged grasslands.

Table 8-4 Project-related ignition sources: operation

Ignition source	Description
Maintenance and hot works	Hot works (such grinding, welding, and cutting) are a potential ignition risk, as they may result in sparks from plant or equipment and could increase the risks of bushfire ignition. Sparks can spread via wind, posing a high ignition risk to dry vegetation. Fires igniting adjoining vegetation may spread quickly under adverse conditions such as elevated fire danger days, potentially impacting life, and property.
Electrical faults in equipment	Electrical faults in equipment are a potential ignition risk to adjacent vegetation. Risk of sparks and ignition from electrical faults would generally be associated with maintenance works on infrastructure. Equipment should be checked for potential faults or visible weaknesses regularly to reduce the potential for failure in accordance with manufacturers' specifications.

Ignition source	Description
Motor vehicles	Motor vehicle exhaust systems are a potential ignition risk to adjacent grassland and other vegetation. The highest risk is from diesel powered trucks and light vehicles with pollution controlling exhaust devices, which may emit burning diesel particles. Vehicles may also collide with equipment or infrastructure, which may result in spilt fuel, or sparks that may be an ignition risk to adjacent vegetation.
Accidental ignitions	Accidental ignitions include smoking, are non-deliberate ignitions occurring from accidents or error, and not specified under any other ignition risk. Accidents and error are a potential ignition risk to adjacent vegetation.
Dangerous materials	Dangerous materials include chemicals, explosives, or otherwise flammable materials. Inappropriate storage of dangerous materials, and insufficient fuel-free buffers around work sites, are a potential ignition risk to adjacent vegetation. Ignition risk occurs through increased risk of chemical fire or explosion, or a risk from a grass or bushfire burning a storage area and igniting dangerous materials.

8.4 Bushfire Attack Level assessment

All vegetation within 100 m of the site was classified in accordance with Clause 2.2.3 of *AS3959* [3]. Each distinguishable vegetation plot with the potential to determine the BAL is summarised in Table 8-5 below.

Table 8-5 Vegetation classifications

Plot no.	Vegetation Type	Location	Average Vegetation Height (m)	Foliage Cover (%)	Total fuel load (t/ha)	Effective Slope (degrees)
1	Forest Type A	N, NW, SE	10	30-70	35	1-5 (upslope)
2	Grassland Type G	N, E, S, W	0.3	Overstorey <10%	4.5	1-5 (upslope)
3	Shrubland Type C	N, E, SE	1.5	>30%	15	-5 (upslope)
4	Grassland Type G	NW	0.3	Overstorey <10%	4.5	1-5 (upslope)
5	Forest Type A	NE	10	30-70	35	1-5 (upslope)
6	Forest Type A	E	10	30-70	35	1-5 (upslope)
7	Forest Type A	SE	10	30-70	35	1-5 (upslope)
8	Forest Type A	SE	10	30-70	35	1-5 (upslope)
9	Forest Type A	S, SW	10	30-70	35	1-5 (upslope)
10	Forest Type A	SW	10	30-70	35	1-5 (upslope)

All remaining areas within 100 m of the site that do not comprise classified vegetation are classified as '*exclusions – low threat vegetation and non-vegetated areas*' as outlined in Clause 2.2.2.3 of *AS3959* [3]. These areas comprised of maintained lawns within nearby properties (excluded 2.2.3.2 (f)) and the hardstand area within the Gisborne Substation and the asphalt roads (excluded 2.2.3.2 (e)).

Site inputs used for the BAL calculation include:

- **FDI:** 100
- **Classified Vegetation:** Forest Type A
- **Slope Class/Topography:** All upslopes and flat land (0 degrees)

Note: the BAL contours have been mapped with reference to the current design. This includes the assumption that all buildings will be located behind the proposed 10 m Asset Protection Zone (APZ), labelled 'Clearance Fire Line' on the site layout drawing.

Based on the above parameters, BAL contours displaying estimated radiant heat levels are presented in Figure 14. The BESS facility falls into a BAL-Flame Zone (FZ) under *AS3959* [3], due to it being located within 19 m of forest type vegetation. This BAL rating indicates an elevated bushfire risk for the site due to nearby vegetation with a high fuel load. Management of this vegetation should be addressed within the Project's Emergency Management Plan and Fire Management Plan.

Annual vegetation management requirements for the APZ and the associated buildings (such a removal of vegetation from the surrounds, roofs and gutters) should be in accordance with Table 6 of Clause 53.02-5 (see Section 7 below) and CFA Guidelines *Landscaping for Bushfire – Garden Design and Plant Selection* [44].

8.5 Bushfire management recommendations

As outlined in Section 8.2.2, a 10 m fire break around the BESS and associated infrastructure is to be implemented as part of the Project's detailed design which is in line with Section 4.2.5 of the CFA Guidelines (Fire Detection and Suppression Equipment) [1]. Additionally, in order to reduce the bushfire risk further it is recommended that the following defendable space requirements from Table 6 of the Macedon Ranges Planning Scheme 53.02-4.2 are adhered to for the duration of each fire season in perpetuity:

- Grass must be short cropped (<100 mm in height) and maintained during the declared fire danger period.
- All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period.
- Within 10 m of a building, flammable objects must not be located close to the vulnerable parts of the building.
- Plants greater than 10 cm in height must not be placed within 3 m of a window or glass feature of the building.
- Shrubs must not be located under the canopy of trees.
- Individual and clumps of shrubs must not exceed 5 m^2 in area and must be separated by at least 5 metres.
- Trees must not overhang or touch any elements of the building.
- The canopy of trees must be separated by at least 5 m.
- There must be a clearance of at least 2 m between the lowest tree branches and ground level.

Additionally, vegetation management should also be undertaken in accordance with the CFA guidelines *Landscaping for Bushfire – Garden Design and Plant Selection* [44].

Figure 14 BAL mapping

9 Applicable Standards

A list of standards and codes applicable to the identified hazards to be applied to the design of the Project are listed below:

- *AS 1530.4: 2014 Methods for fire tests on building materials, components, and structures – Fire-resistance tests for elements of construction.*
- *AS 1554.1:2014 Structural steel welding - Welding of steel structures*
- *AS 1603:2018 Automatic fire detection and alarm systems*
- *AS 1670:2024 Fire detection, warning, control and intercom systems*
- *AS 1725.1:2010 Chain-link fabric security fences and gates*
- *AS 1768:2021 Lightning protection*
- *AS 1940:2017 The storage and handling of flammable and combustible liquids*
- *AS 2067:2016 Substations and high voltage installations exceeding 1 kV a.c.*
- *AS 2374.1.2:2003 Power transformers Part 1.2 Minimum Energy Performance Standard requirements for distribution transformers*
- *AS 3000:2018 Electrical installations (known as the Australian/New Zealand Wiring Rules)*
- *AS 3008.1:2017 Electrical installations – Selection of cables*
- *AS 3011.2:2019 Electrical installations - Secondary batteries installed in buildings Sealed cells*
- *AS 3786:2021 Smoke Detectors*
- *AS 3959:2018 Construction of buildings in bushfire-prone areas*
- *AS 4086.1:1993 Secondary batteries for use with stand-alone power systems General requirements (where applicable)*
- *AS 4417.1:2012 Regulatory compliance mark for electrical and electronic equipment*
- *AS 4428:2020 Fire detection, warning, control and intercom systems Control and indicating equipment*
- *AS 4681:2000 The Storage and Handling of Class 9 (miscellaneous) Dangerous Goods and Articles*
- *AS 2700S: 2011 Colour standards for general purposes*
- *AS / IEC 60076:2014 Power Transformers Package*
- *AS 61558.1:2018 Safety of Power Transformers, Power Supplies, Reactors and Similar Products - General requirements and test*
- *AS / IEC 62271-200:2019 High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*
- *IEC 63056:2020 Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems*
- *AS 60529:1989 Degrees of protection provided by enclosures (IP Code)*
- *AS 61439:2016 (Series)- Low-voltage switchgear and control gear*
- *NFPA 855:2025 Standard for the Installation of Stationary Energy Storage Systems*
- *UL 1642 Certification of Lithium-ion Battery*
- *UL 1741 Inverters, converters, controllers and inter-connection system equipment for use with distributed energy resources*
- *UL 9540:2023 ANSI/CAN/UL Standard for Energy Storage Systems and Equipment*

- *UL 9540A:2025 ANSI/CAN/UL Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.*
- *NFPA 70:2025 National Electrical Code*

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Appendix A: Gap Analysis against CFA Renewable Energy Facilities Guidelines

A gap analysis was conducted against the CFA guideline checklist (within Appendix A of the CFA guidelines [1]) to identify what actions need to be considered to ensure the Project is able to satisfy all CFA requirements.

CFA Section	Guideline Requirement	Project Assessment
Section 2: Consultation	Consulting with CFA Early consultation with CFA's Specialist Risk and Fire Safety Unit, before developing a planning permit application?	Early CFA Consultation has been undertaken to inform the design of the Project. Ongoing consultation will occur with CFA throughout the planning application and will be considered during the next phase of the project, in line with planning permit requirements. The Preliminary Risk Assessment contained in this draft RMP identifies key fire risks and mitigation measures, which can inform further discussions with CFA's Specialist Risk and Fire Safety Unit at a later stage.
Section 3: Fire Risk Management	Risk Management A Risk Management Plan must be developed for the facility, in consultation with CFA, before development starts	This RMP will be further developed as per CFA guidelines during detailed design, building upon this draft RMP.
Section 4: Facility Location	Landscape Risk to Facility An assessment against policy at VPP Clause 13.02-1S (Bushfire Planning) [19] that considers: a) The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets. b) The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	The Project is within a designated Bushfire Prone Area therefore, Clause 13.02-1S (Bushfire Planning) applies. A Bushfire Hazard Assessment has been prepared and included in this RMP to assist in meeting the requirements of the *Design Guidelines and Model Requirements: Renewable Energy facilities v4 August 2023 updated as v4.4* June 2025, including addressing design and model requirements, fire-fighting requirements (such as access and water supply) operational and maintenance requirements. It should be noted that some plans, required before commissioning, are generally not required at the planning stage and are not included.
	Facility Risk to Landscape As assessment of the fire risk from the proposed facility to the landscape.	There is minimal offsite risk (See Appendix B) and the project area and surrounding land is classified as Rural Conservation Zone 1 with the nearest residential area approximately 2.3 km away (New Gisborne). The nearest dwelling is 65 m east of the Project. The facility is not expected to lead to a significant increase in risk to adjacent land. Additionally, the site shall be designed to comply with NFPA 855 [2025] which outlines battery separation, containment, fire detection and suppression systems and explosion control system requirements. The BESS will be equipped with a Battery Management System (BMS). Fire safety study results will also be incorporated to the final design to reduce risks at the site to an acceptable level.
Section 4: Facility Design	Emergency Vehicle Access a) Construction of a minimum four (4) metre perimeter road within the perimeter fire break. b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g. no compacted earth). 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 trucks. 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. e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle. f) Roads must incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure. h) The provision of at least two (2) but preferably more access points to each part of the facility	The model requirements (i.e. accessible fire service infrastructure and safe evacuation points) from Section 4.2.1 (Emergency Vehicle (Fire Truck) Access) of the CFA guidelines [1] shall be incorporated into final design and layout of the facility. The current layout of the facility has accounted for the following model requirements: ■ The proposed perimeter road within the perimeter fire break is 5 m wide. ■ The proposed roads have been designed to be 5 m wide and have no vertical obstructions. The proposed fencing does not encroach upon the access routes and will allow for the width of fire trucks ■ The proposed road and access route network for the Project has been designed to enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure. ■ The Project has been provided two (2) access points to the facility, one at the north-eastern end of the facility and the other at the eastern end of the facility.
	Additional Requirements for Battery Energy Storage Systems The provision of at least two access points into each section where battery energy storage systems are located.	The Project has been provided two (2) access points to the facility, one at the north-eastern end of the facility and the other at the eastern end of the facility.
	Firefighting Water Supply a) Water access points must be clearly identifiable and unobstructed to ensure efficient access. b) Static water storage tank installations must comply with AS 2419.1 [45]. c) The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	The fire water system is yet to be fully designed. The final design will incorporate the model requirements from Section 4.2.2 of CFA (Firefighting Water Supply) including fire hydrant model requirements [1]. The current layout design contains the following firefighting water provisions: ■ Two (2) x 335,000 L above-ground water tanks. ■ A turning radius of 12 m has been provided for turns in the access roadway network, which exceeds the minimum requirement of 8 m turning radius.

CFA Section	Guideline Requirement	Project Assessment
	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. f) The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance. 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. 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. i) The road access and hardstand must be kept clear at all times. j) The hard-suction point must be protected from mechanical damage where necessary. k) Where the access road has one entrance, an eight (8) metre radius turning circle must be provided at the tank. l) An external water level indicator must be provided to the tank and be visible from the hardstand area. m) Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. n) Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).	
	<u>Additional Requirements for Battery Energy Storage Systems - Centralised BESS</u> a) Where reticulated water is available, the provision of a fire hydrant system that meets the requirements of AS 2419.1 [45]-, Clause 3.9: Open Yard Protection, and Table 2.2.5(D): Number of Fire Hydrants Required to Flow Simultaneously - Open Yards. **OR** b) Where no reticulated water is available, provision of a fire water supply in static storage tanks, where: i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1 [45]: Fire hydrant installations, flowing for a period of no less than four hours at 20L/s, whichever is the greater. ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1 [45]: Fire hydrant installations, Table 2.2.5(D). iii. Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet. iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings). v. The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (E.g., Fire water tanks are to be located closer to the site entrance that the battery energy storage system). vi. The fire water supply must comply with AS 2419.1 [45]: Fire hydrant installations, Section 5: Water storage tanks.	The fire water system is yet to be designed. The final design will incorporate the model requirements from Section 4.2.2 of CFA (Firefighting Water Supply) [1]and any additional requirements for BESS.
	<u>Fire Detection and Suppression Equipment</u> a) For on-site buildings and structures, according to the requirements of the National Construction Code. b) For storages of dangerous goods, according to the requirements of any Australian Standards for the storage and handling of dangerous goods. c) For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. 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.	The fire detection and suppression system is yet to be designed; however, the final design shall align with the model requirements outlined in Section 4.2.3 of the CFA Guidelines (Fire Detection and Suppression Equipment) [1]. Fire hazards may arise during construction and commissioning. These risks shall be mitigated through the implementation of appropriate de-energising and isolation systems as part of the detailed design phase, ensuring compliance with NFPA 855 [2025]. Additionally, the site shall be designed in accordance with NFPA 855, which specifies requirements for battery separation, containment, fire detection and suppression, and explosion control systems. The BESS will be equipped with a BMS to monitor and manage operational risks.
	<u>Fire Breaks</u> The provision of fire breaks: a) Around the perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary. (N/A for wind energy facilities.) b) Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. c) Of a width of at least 10m.	A 10 m fire break has been implemented as part of the current layout design for the Project, in line with Section 4.2.5 of the CFA Guidelines (Fire Detection and Suppression Equipment) [1].
	<u>Additional Requirements for Battery Energy Storage Systems</u> The provision of a fire break around battery energy storage systems and related infrastructure	A 10 m fire break has been implemented as part of the current layout design for the Project, in line with Section 4.2.5 of the CFA Guidelines (Fire Detection and Suppression Equipment) [1].

CFA Section	Guideline Requirement	Project Assessment
	<u>Design Specific to Facility Type - Requirements for Battery Energy Storage Systems</u> 1. Facility design that incorporates: a) A separation distance that prevents fire spread between battery containers/enclosures and other site elements. b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m. 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. 3. Battery energy storage systems must be: a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles). 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.) c) Provided with in-built fire and gas detection systems. d) Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels. e) Provided with suitable ember protection. f) Provided with suitable access roads for emergency services vehicles. g) Installed on a non-combustible surface. h) Provided with suitable ventilation. i) Provided with suitable impact protection. j) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection. k) Provided with spill containment that includes provision for management of fire water runoff.	The final design shall incorporate the model requirements for a BESS facility type from Section 4.2.6.3 of the CFA Guidelines (Battery Energy Storage Systems) [1].
Section 5: Facility Construction and Commissioning	<u>Emergency Plan</u> An Emergency Plan must be developed for the construction and commissioning phase of the facility.	An Emergency Plan shall be developed for the construction and commissioning phase of the facility during detailed design.
Section 6: Facility Operation	<u>Fire Management Plan</u> A Fire Management Plan must be developed for the facility, in consultation with CFA, before development starts.	A Fire Management Plan shall be developed for the facility, in consultation with CFA, during detailed design.
	<u>Bushfire and Grassfire</u> If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan.	The facility is located in a bushfire prone area. The Fire Management Plan for the facility shall detail prevention and preparedness activities.
	<u>Vegetation Management</u> Facility operators must undertake the following measures during the Fire Danger Period: a) Grass must be maintained at or below 100mm in height during the declared Fire Danger Period. b) Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. c) Restrictions and guidance must be adhered to during the Fire Danger Period, days of High (and above) fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au).	A 10 m fire break around the BESS and associated infrastructure is to be implemented as part of the Project's detailed design which is in line with Section 4.2.5 of the CFA Guidelines (Fire Detection and Suppression Equipment) [1]. Additionally, in order to reduce the bushfire risk further it is recommended that the following defendable space requirements from Table 6 of Clause 53.02-4.2 of the Macedon Ranges Planning Scheme are adhered to for the duration of each fire season in perpetuity: ■ Grass must be short cropped (<100 mm in height) and maintained during the declared fire danger period. ■ All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period. ■ Within 10 m of a building, flammable objects must not be located close to the vulnerable parts of the building. ■ Plants greater than 10 cm in height must not be placed within 3 m of a window or glass feature of the building. ■ Shrubs must not be located under the canopy of trees. ■ Individual and clumps of shrubs must not exceed 5 m^2 in area and must be separated by at least 5 metres. ■ Trees must not overhang or touch any elements of the building. ■ The canopy of trees must be separated by at least 5 m. ■ There must be a clearance of at least 2 m between the lowest tree branches and ground level. Additionally, vegetation management should also be undertaken in accordance with the CFA guidelines *Landscaping for Bushfire – Garden Design and Plant Selection* [44].

CFA Section	Guideline Requirement	Project Assessment
	Arc Flash Hazard Management Where required, appropriate demarcation of arc boundaries to at least 10m from PCU arc flash outlet flaps (blow-out panels) must be provided.	The facility design has not yet incorporated arc flash hazard controls in the initial design phase. The final design shall incorporate appropriate demarcation of arc boundaries, ensuring at least 10 m from PCU arc flash outlet flaps (blow-out panels). Signage, barriers, and mitigation measures will be implemented during the detailed design phase to reduce personnel exposure and ensure compliance with applicable safety standards.
	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, and any fire is notified to 000 immediately	The site shall be designed to comply with NFPA 855 [2025] which outlines battery separation, containment, fire detection and suppression systems and explosion control system requirements. The BESS will be equipped with a BMS. Fire safety study results will also be incorporated to the final design.
	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	Maintenance shall be conducted to meet Australian standards and manufacturers requirements. Any work that may create an ignition source will be under ‘hot work’ permits.
Section 7: Emergency Planning	Emergency Plan (Operational) An Emergency Plan must be developed for the operational phase, specific to the facility, in consultation with CFA, before development starts.	An Emergency Plan shall be developed for the operational phase, specific to the facility, in consultation with CFA, before development starts
Section 8. Provision of Emergency Information	Developing an Emergency Information Book 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 shall be developed during detailed design.

Appendix B: Hazard and Risk Impact Assessment

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
1.	Lithium-ion Battery	Arcing or short-circuit	Cable or equipment fault. Cable Thermal Failure Dust ingress	Electrocution resulting in injury or fatality	No (in terms of electrical shock hazard is expected to be localised)									
2.	Lithium-ion Battery	Battery cell fire	Equipment fault and ignition of combustible materials used in the storage system. BESS module arc flash induced fire. A installation error – reverse polarity connection. Dust ingress.	Personnel injury due to burns or smoke/chemical inhalation. Damage/ destruction of battery cell. Overheating/ electrical fault potentially leading to thermal runaway.	Potential	C – Possible	4 – Major	High	HVAC systems AS compliant. Battery enclosures will be located outdoors Battery enclosures include a thermal management system that provides active cooling and heating to the internal battery enclosure components. Battery systems modular and compartmentalised to minimise damage. Battery enclosures minimum distancing applied Adequate spacing of battery modules. Batteries and associated balance of plant certified and designed to Australian Standards, particularly IEC 62485-5, IEC 62933-5-1, IEC 62933-5-2, AS/NZS 5139 and AS 4681. Battery Management System to provide functional safety of electronic safety-related systems certified to IEC 61508 e.g., fail safe function. BESS design location sufficient distance from other infrastructure. Fire protection and suppression system to be included in BESS design. Emergency shutdown incorporated into BESS design. Containers/infrastructure for BESS located to be directly accessible to emergency responders. Thermal overtemperature detection and prevention in battery enclosures design. Cell overpressure detection and protection in battery enclosures design. Remote monitoring. Access controls for HV areas (arc flash risk). Hydrant to be located proximal to BESS. Dangerous goods risk assessment. Storage and handling of BESS / Li-batteries according to AS 4681. Fire modelling study to be conducted as part of design to ensure fire radiation effects do not impact on adjacent infrastructure. Fire Risk Evaluation to be conducted to provide fire safety recommendation and required firefighting equipment. Electronic safety-related systems should be installed at both a hardware and software level, designed to applicable standards, to allow for safe isolation of electrical energy in the event of a failure.	HVAC systems correctly installed and maintained. Safety system maintenance, testing and inspections. Safety Management Plans. Trained operators/maintainers. Plant operating and maintenance procedures. Remote isolation for non-manned facility. Appropriate signage and site manifest to identify hazardous chemicals associated with the contents of BESS.	E – Rare	4 – Major	Medium	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
3.	Lithium-ion Battery	Battery cell thermal hazard	Chemical properties of the battery materials and thermal runaway. Propagation of adjacent battery fire (escalation event).	Personnel injury due to burns or smoke/chemical inhalation. Damage/ destruction of battery cell.	Potential	C – Possible	4 – Major	High	HVAC systems AS compliant. Battery enclosure will be located outdoors Battery enclosure includes a thermal management system that provides active cooling and heating to the internal Battery enclosure components Battery systems modular and compartmentalised to minimise damage. Adequate spacing of battery modules. Battery enclosures minimum distancing applied Batteries and associated balance of plant certified and designed to Australian Standards, particularly IEC 62485-5, IEC 62933-5-1, IEC 62933-5-2, AS/NZS 5139 and AS 4681. Battery Management System to provide functional safety of electronic safety-related systems certified to IEC 61508 e.g., fail safe function. BESS design location sufficient distance from other infrastructure. Fire protection and suppression system to be included in BESS design. Emergency shutdown incorporated into BESS design. Containers/infrastructure for BESS located to be directly accessible to emergency responders. Thermal overtemperature detection and prevention in Battery enclosure design. Cell overpressure detection and protection in Battery enclosure design. Remotely accessible fire, smoke and flammable gas leak monitoring. Access controls for HV areas (arc flash risk). Hydrant to be located proximal to BESS. Fire Safety Study to be conducted as part of design to ensure fire radiation effects do not impact on adjacent infrastructure. Fire Risk Evaluation to be conducted to provide fire safety recommendation and required firefighting equipment. Electronic safety-related systems should be installed at both a hardware and software level, designed to applicable standards, to allow for safe isolation of electrical energy in the event of a failure.	HVAC systems correctly installed and maintained. Safety system maintenance, testing and inspections. Safety Management Plans. Trained operators/maintainers. Plant operating and maintenance procedures. Remote isolation for non-manned facility. Lessons learnt from previous battery fire incidents.	E – Rare	4 – Major	Medium	Unlikely
4.	Lithium-ion battery	Battery cell equipment failure	Loss of cooling fluid/ Coolant leak from equipment attributable to design fault/. Improper installation/ commissioning. Lack of maintenance or collision or impact on the BESS.	Battery overheats and thermal runaway. (refer to thermal hazard)	Potential	C – Possible	4 – Major	High	Installation of coolant leak alarms. Ensure all telemetry, fault monitoring and electrical safety protection devices remain active regardless of keylock switch position or system state. Active monitoring and control of the pyro disconnect's power supply circuit. Required clearance between Battery enclosures for maintenance access as per BESS provider recommendations. Electronic safety-related systems should be installed at both a hardware and software level, designed to applicable standards, to allow for safe isolation of electrical energy in the event of a failure.	Development and implementation of commissioning procedures in accordance with manufacturer's procedures. Safety system maintenance, testing and inspections. Development and implementation of safety management plans. Trained operators/maintainers. Plant operating and maintenance procedures. Implementation of operating plant manuals.	E – Rare	4 – Major	Medium	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
5.	Lithium-ion battery	Battery cell operational hazard	Control breakdown from equipment fault; design fault/error. Improper installation/ commissioning Lack of maintenance or collision or impact on the BESS.	Battery overheats and thermal runaway. (refer to thermal hazard)	Potential	C – Possible	4 – Major	High	Ensure all telemetry, fault monitoring and electrical safety protection devices remain active regardless of keylock switch position or system state. Active monitoring and control of the pyro disconnect's power supply circuit. Required clearance between battery enclosures for maintenance access as per BESS provider recommendations. Electronic safety-related systems should be installed at both a hardware and software level, designed to applicable standards, to allow for safe isolation of electrical energy in the event of a failure.	Development and implementation of commissioning procedures in accordance with manufacturer's procedures. Safety system maintenance, testing and inspections. Development and implementation of safety management plans. Trained operators/maintainers. Plant operating and maintenance procedures. Implementation of operating plant manuals.	E – Rare	4 – Major	Medium	Unlikely
6.	Lithium-ion Battery	Battery cell chemical hazard	Fault or failure and release of corrosive and/or toxic materials	Personnel injury from burns or gas inhalation. Environmental damage.	Potential (biophysical damage)	D – Unlikely	4 – Major	Medium	Equipment designed to be compliant with applicable Australian/International Standards, particularly IEC 62485-5, IEC 62933-5-1, IEC 62933-5-2, AS/NZS 5139 and AS 4681. Preferably modular design. Spill containment design.	Material SDS to be consulted. Emergency Response Plan to be developed to define actions in unlikely event of potential hazards. Trained operators/maintainers. Plant operating and maintenance procedures.	E – Rare	4 – Major	Medium	Unlikely
7.	Lithium-ion Battery	Explosion Hazard	HVAC failure (loss of cooling system) and/or overcharging of battery causing rapid expansion and confinement of gases	Personnel injuries or fatalities. Damage / destruction of battery cell.	Potential	D – Unlikely	5 – Catastrophic	High	Batteries and associated balance of plant certified to relevant international standards (e.g. UL1976, UL9540). BESS installed outdoors with sufficient distance from infrastructure and people. Explosion risk assessment to be undertaken on selected BESS plant as part of the Fire Safety Study to ensure overpressure does not impact adjacent infrastructure. Battery Management System to provide functional safety of electronic safety-related systems certified to IEC 61508 e.g., fail safe function. Emergency shutdown incorporated into BESS design. Containers/infrastructure for BESS located to be directly accessible to emergency responders. Thermal overtemperature detection and prevention in battery enclosure design. Cell overpressure detection and protection in battery enclosure design. Remote monitoring. Electronic safety-related systems should be installed at both a hardware and software level, designed to applicable standards, to allow for safe isolation of electrical energy in the event of a failure.	HVAC systems correctly installed and maintained. Safety system maintenance, testing and inspections. Safety Management Plans. Trained operators/maintainers. Plant operating and maintenance procedures.	E – Rare	5 – Catastrophic	Medium	Unlikely
8.	Lithium-ion battery	Release and dispersion of flammable and toxic gases	Fire hazard arising from combustible materials used in the storage system. Incomplete combustion of gases generated during initial	Personnel injury due to burns or smoke/chemical inhalation. Vapour cloud explosion. Environmental contamination (Hydrogen	Potential	D – Unlikely	5 – Catastrophic	High	HVAC systems AS compliant. BESS installed outdoors. Battery cooling systems. Battery components isolated. Battery systems modular and compartmentalised to minimise damage. Adequate spacing of battery modules and heat shields.	HVAC systems correctly installed and maintained. Safety system maintenance, testing and inspections. Development and implementation of safety management plans. Trained operators/maintainers.	E – Rare	5 – Catastrophic	Medium	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
			battery cell thermal runaway phase.	Fluoride contacts with water)					Remote emergency shutdown and monitoring of the BESS. ESD buttons located at the BESS and site office. Fire detection and protection/suppression included in the design of the BESS. BESS designed in accordance with UL 9540. Batteries and associated balance of plant certified and designed to Australian Standards, particularly IEC 62485-5, IEC 62933-5-1, IEC 62933-5-2, AS/NZS 5139 and AS 4681. Battery Management System to provide functional safety of electronic safety-related systems certified to IEC 61508 e.g., fail safe function. BESS design location sufficient distance from other infrastructure. 24-hour monitoring and installation of alarms. Access controls for HV areas (arc flash risk). Hydrant to be located proximal to BESS. Dangerous goods risk assessment. Storage and handling of BESS / Li-batteries according to AS 4681. Fire Safety Study to be conducted as part of design to ensure fire radiation effects do not impact on adjacent infrastructure. Fire Risk Evaluation to be conducted to provide fire safety recommendation and required firefighting equipment.	Plant operating and maintenance procedures. Implementation of operating plant manuals (OPM). Develop and implement strategy for life of plant. Pest control/management.				
9.	Lithium-ion battery	Exposure to EMF	Differences in electric or magnetic fields around the BESS (transformer, powerlines).	Danger to personnel.	No Potential (local impact)									
10.	Lithium-ion Battery	Dropping of battery cell(s) during installation	Faulty equipment or procedure during battery installation	Personnel injury. Damage to battery cell.	No Potential (local impact))									
11.	Lithium-ion Battery	Malicious damage to BESS	Unauthorised access, few staff onsite. Compromised cybersecurity system.	Damage to battery cell and/or other infrastructure. Electrolyte emission. Electrocution resulting in injury or fatality. Mal-operation from external digital access of control systems.	Potential	D – Unlikely	5 – Catastrophic	High	BESS and auxiliary equipment to be surrounded by fencing as per AS 1725, locked gates and other security measures as necessary (e.g. CCTVs, continuous remote monitoring). Consultation with cybersecurity experts should also be conducted to implement appropriate security measures for the computer control systems.	Regular and appropriate operations and maintenance covering inspections of the facilities.	E – Rare	5 – Catastrophic	Medium	Unlikely
12.	Transformer	Transformer arcing / fire / explosion	Insufficient insulating oil maintenance, equipment fault	Electrocution resulting in injury or fatality. Damage to transformer.	Potential	D – Unlikely	5 – Catastrophic	High	Transformers to be designed to AS 2067:2016. Sufficient separation between transformers and the BESS, other transformers, and structures / fence. Transformers to be self-bunded. Using dry type transformer oil is recommended	Maintain transformer as per OEM recommended regime, including regular insulation and function testing.	E – Rare	5 – Catastrophic	Medium	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
				Ignition source for BESS fire.					Fire modelling to be conducted as part of the Fire Safety Study to ensure fire radiation effects do not impact on adjacent infrastructure.					
13.	Transformer	Loss of containment (oil)	Maintenance operations (failure of pipe). Equipment fault or arc fault Design fault/error.	Pool fire (if ignited). Personnel injury due to burns or smoke/chemical inhalation.	Potential	D – Unlikely	4 – Major	Medium	Transformers to be designed to AS 2067:2016. Transformers are self-bunded. Fire modelling to be conducted as part of the Fire Safety Study to ensure fire radiation effects do not impact on adjacent infrastructure / fence. Security fencing around transformer. Safeworks system. Remote operation of equipment. Non HV-transformer oil is FR3 which has higher fire point.	Safety system maintenance, testing and inspections. Safety procedures (training, PPE). Works undertaken by authorised personnel (inducted, licenced and trained). Development and implementation of safety management plans. Trained operators/maintainers. Plant operating and maintenance procedures. Implementation of operating plant manuals.	E – Rare	4 – Major	Medium	Unlikely
14.	Transformer	Live contact with transformer	Insufficient enclosure or barricading	Electrocution causing injury or fatality.	No Potential									
15.	Transformer	Transformer fire	Transformer cooling system/s failure Cooling system/s control system failure	Damage to infrastructure Injury Loss of life	Potential	D - Unlikely	5 - Catastrophic	High	Transformers to be designed to AS2067. Fire modelling to be conducted as part of the Fire Safety Study to ensure fire radiation effects do not impact on adjacent infrastructure. Non HV-transformer oil is FR3 which has higher fire point.	Maintain transformer as per OEM recommended regime, including regular insulation and function testing.	E – Rare	5 – Catastrophic	Medium	Unlikely
16.	Transformer / switchgear	Loss of containment (sulphur hexafluoride [SF6]).	Maintenance operations (failure of pipe). Equipment fault. Design fault/error.	Release toxic gas. Personnel injury.	Potential	D – Unlikely	3 – Moderate	Medium	Design transformers and switchgear in accordance with AS IEC 62271.4. Gas leak and high/low pressure alarms. Continuous monitoring of gas flow.	Safety system maintenance, testing and inspections. Safety procedures (training, PPE). Works undertaken by authorised personnel (inducted, licenced and trained). Development and implementation of safety management plans. Trained operators/maintainers. Plant operating and maintenance procedures. Implementation of operating plant manuals.	E – Rare	3 – Moderate	Low	Unlikely
17.	Switchyard	Live contact with conductor	Insufficient enclosure or barricading around conductor	Electrocution causing injury or fatality.	No Potential									
18.	Switchgear	Outdoor switchgear failure	Arc-flashing induced fire Switchgear insulator failure Operation failure causing continued arcing Surge arrestor failure	Damage to infrastructure Electrocution Injury Loss of life	Potential	D - Unlikely	5 - Catastrophic	High	The design should comply with the Electricity Supply Act 1995 No 94 [11] and Regulations 2013 AS 5139 Electrical installations - Safety of battery systems for use with power conversion equipment should be consulted for design. Fire modelling to be conducted as part of the Fire Safety Study to ensure fire radiation effects do not impact on adjacent infrastructure.	Regular maintenance and testing of switchgear functionality	E – Rare	5 – Catastrophic	Medium	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
19.	Natural Hazard	Grass or mallee fire Stray ember induced fire	Bushfire Hot work Lightning strike Vandalism	Damage to BESS. Significant environmental damage.	Potential	C – Possible	4 – Major	High	10 m wide defendable space surrounding the BESS development footprint. Minimum 20 kL water tank or other reticulated water source designed in accordance with the requirements of AS 2419.1 [45] and CFA for fire-fighting purposes. Remote monitoring. BESS and auxiliary equipment to be surrounded by fencing as per AS 1725, locked gates and other security Lightning protection design for BESS and electrical equipment, transformers etc Fire Safety Study to be conducted as part of design to ensure fire radiation effects do not impact on adjacent infrastructure. Fire Risk Evaluation to be conducted to provide fire safety recommendation and required firefighting equipment. Ensure the layout of site infrastructure that minimises the potential for grassfire and/or bushfire to impact the BESS. Fire protection system must incorporate at least one static firewater storage tank of at least 45,000L effective capacity at each site entrance. Install additional static fire water storage tanks of at least 45,000L effective capacity must also be incorporated.	Development of a Fire Management Plan with appropriate mitigations to minimise risks. Development and implementation of safety management plans (e.g., permit to work).	D – Unlikely	4 – Major	Medium	Unlikely
20.	Natural Hazard	Extreme ambient temperature (high humidity)	Extreme temperatures	Personnel injury due to burns or smoke/chemical inhalation. Damage/ destruction of battery cell.	Potential	D – Unlikely	4 – Major	Medium	Batteries designed to operate beyond maximum temperature range with allowance for higher maximum temperatures of approximately 1.5 to 2ºC to account for the likely effects of global warming. Electrical design in accordance with AS/NZS 3000. Battery enclosures have suitable enclosure design for the environment.	-	D – Unlikely	4 – Major	Medium	Unlikely
21.	Natural Hazard	Seismic activity	Failure to design the BESS to the correct earthquake loading code to account for seismic activity Earthquake	Damage to battery casings, cells and other infrastructure.	No Potential									
22.	Natural Hazard	Flooding	Drainage system failure Fire-fighting activity Failure to account for flooding during foundation construction	Damage to battery casings, cells and other infrastructure.	Unlikely	E – Rare	4 – Major	Medium	Surface Water and Groundwater Assessment to be conducted to determine special flood considerations.	Schedule construction during dry season to account for light and heavy vehicles in heavy rain/flooding events.	E – Rare	4 – Major	Medium	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
23.	Natural Hazard	Excessive wind	Storms (hail and extreme winds).	Damage to battery casings, cells and other infrastructure.	Unlikely	E – Rare	3 – Moderate	Low	The site is located in an A1 wind region. The BESS should be designed in accordance with AS/NZS 1170.2.	Housekeeping schedule should be maintained to ensure debris is cleared	E – Rare	3 – Moderate	Low	Unlikely
24.	Natural hazard	Ambient weather (lightning) striking	Failure to design the BESS to the correct isokeraunic level to account for lightning strikes	Resulting in structural damage, fires and tower collapse [1]	Potential	E – Rare	5 – Catastrophic	Medium	Conduct a lightning protection study. Ensure no BESS equipment is located underneath powerlines. Implement an earthing system. Design the BESS facility in accordance with AS 1768.	-	E – Rare	5 – Catastrophic	Medium	No
25.	Natural Hazard	Subsidence	Collapse of pillars within abandoned underground mine and mine roof	Ground instability resulting in damage to BESS units and infrastructure.	Potential	D – Unlikely	3 – Moderate	Medium	Ground surveying shall be completed to confirm risk of subsidence.		E – Rare	3 – Moderate	Low	Unlikely
26.	Other	Loss of containment (contaminated water)	Spent fire water runoff. Runoff from site. Failure of process waste piping.	Harm to the environment (flora and fauna).	Potential	D – Unlikely	3 – Moderate	Medium	Installation of oily water interceptors. Design and Installation of containment infrastructure/impervious retention facilities, ponds and such with adequate capacity. Bunded transformers. Use of mineral oils.	Stormwater Management Plan. Operations and maintenance of retention facilities/ponds. Continuous monitoring and alarms. Emergency response plan/procedure	E – Rare	3 – Moderate	Low	Unlikely
27.	Other	Exposure to contaminated land	Construction activities exposing contaminated material from legacy works.	Harm to personnel and the environment.	Potential	D – Unlikely	3 – Moderate	Medium	-	Identification and testing of any contaminated land. Development and implementation of procedure for removal of contaminated land and remediation. Removal of contaminated land before construction. Tracking of contaminated land removal.	E – Rare	3 – Moderate	Low	Unlikely
28.	Other	Vehicle collision / congestion	Construction activities (increased heavy vehicles). Driver fatigue.	Personnel injury/fatality.	Potential	D – Unlikely	5 – Catastrophic	High	-	Traffic Management Plan, including fatigue management.	E – Rare	5 – Catastrophic	Medium	Unlikely
29.	Other	Loss of containment (waste/fuel)	Commissioning activities.	Harm to personnel and the environment.	Potential	D – Unlikely	3 – Moderate	Medium	BESS and auxiliary equipment to be surrounded by fencing as per AS 1725, locked gates and other security	Waste Management Plan Construction Waste Management Plan Emergency Management Plan	E – Rare	3 – Moderate	Low	Unlikely

No.	Source	Hazard	Cause	Consequence	Potential to Pose Significant Risk Offsite?	Inherent Risk			Proposed Controls – Technical / Design	Proposed Controls – Safety Management	Residual Risk			Potential to Pose Significant Risk Offsite?
						Likelihood	Consequence	Risk Rating			Likelihood	Consequence	Risk Rating	
30.	Other	Fire	Other dangerous goods / incompatible materials	Impinged fire to BESS/Fire propagation from BESS Harm to personnel and the environment	Unlikely	D – Unlikely	3 – Moderate	Unlikely	Adequate separation from BESS to fence/ other DGs Minor storage quantities of other DG Dangerous Goods risk assessment to be conducted. Fire Safety Study to be conducted as part of design to ensure fire radiation effects do not impact on adjacent infrastructure. Fire Risk Evaluation to be conducted to provide fire safety recommendation and required firefighting equipment Where reticulated water is available for centralised BESS, the provision of a fire hydrant system that meets the requirements of AS 2419.1 [45] Clause 3.9 and Table 2.2.5(D). Where no reticulated water is available for centralised BESS, provision of a fire hydrant system water supply in static storage tanks that complies with AS 2419.1 [45], where: i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1 [45]: Fire hydrant installations, flowing for a period of no less than four hours at 20L/s, whichever is the greater. ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1 [45] Table 2.2.5(D). iii. Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10 m hose stream issuing from a nozzle at the end of a 60 m length of hose connected to a fire hydrant outlet. iv. The fire water supply must be located at vehicle entrances to the facility, at least 10 m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings). v. The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (Eg., Fire water tanks are to be located closer to the site entrance that the battery energy storage system). vi. The fire water supply must comply with AS 2419.1 [45], Section 5. A fire break must be established and maintained around BESS and related infrastructure. A fire break must be established and maintained around the base of wind turbines.	Safety system maintenance, testing and inspections. Safety Management Plans. Remote isolation for non-manned facility. Emergency response plan/procedure	E – Rare	3 – Moderate	Low	Unlikely

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