Fire Risk Assessment (Risk Management Plan)

for the proposed

Grahamvale Battery Energy Storage System

at 221 Grahamvale Road and 305 Verney Road

Grahamvale VIC 3631

Prepared for

AE BESS 3 Pty Ltd

June 2026

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Terramatrix project code: BeveridgeWilliams-2024-03 BESS_RMP_FMP-Shepparton
Report prepared by Terramatrix for AE BESS 3 Pty Ltd as trustee for AE BESS 3 Unit Trust

Cover photo – Aerial image of the site and surrounds.

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Version control

Version	Date	Comments	Distribution
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Spatial data was supplied by the State Government of Victoria. Care was taken with the creation of maps used in this report, however the accuracy cannot be guaranteed. Users of the maps should make appropriate enquiries to ascertain the useability of this information.

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Glossary

AS 3959:2018	AS 3959:2018 *Construction of buildings in Bushfire Prone Areas.*
AFDRS	Australian Fire Danger Rating System
BAL	Bushfire Attack Level
BEMP	Bushfire Emergency Management Plan
BESS	Battery Energy Storage System
BMO	Bushfire Management Overlay
BMS	Battery Management System
BPA	Bushfire Prone Area
CFA	Country Fire Authority
EVC	Ecological Vegetation Class
FDI	Fire Danger Index
FFMV	Forest Fire Management Victoria
FMP	Fire Management Plan
FRV	Fire Rescue Victoria
HVAC	Heating, ventilation and air cooling
MW	Megawatt
MWh	Megawatt hour
NCC	National Construction Code
NERAG	National Emergency Risk Assessment Guidelines
RHF	Radiant heat flux
RMP	Risk Management Plan

1 Introduction

This Fire Risk Assessment (FRA) adopts the CFA Risk Management Plan (RMP) methodology and has been prepared for AE BESS 3 Pty Ltd, to assess how the proposed development of a Battery Energy Storage System (BESS) at 221 Grahamvale Road and 305 Verney Road, Grahamvale VIC 3631 can respond to the bushfire risk and the applicable regulations and guidelines that relate to renewable energy developments and bushfire.

The proposal responds to the Fire Rescue Victoria (FRV) publication *Battery Energy Storage Systems Guideline No. 55* (GL-55) (FRV, 2025) and uses the Model and Additional Requirements outlined in the *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* by the Country Fire Authority (CFA, 2023)[1] ('the CFA Guidelines') as a methodology. GL-55 and the CFA Guidelines require that the risks associated with the development and operation of the Grahamvale BESS, including risk to and from bushfire, are appropriately assessed.

The Grahamvale BESS development area ('the site') comprises two parcels between Grahamvale Road (to the east) and Verney Road (to the west) at 221 Grahamvale Road and 305 Verney Road, Grahamvale. The two parts are not contiguous and neither fronts the main roads, but access roads provide through access to all parts of the site (see Map 1).

The site is not in a designated Bushfire Prone Area (BPA), nor is it covered by the higher hazard Bushfire Management Overlay (BMO). The site is in the Shepparton Fire Rescue Victora (FRV) response area, which is the responsible fire authority for referral and consultation as part of a planning application.

The proposal is to establish a utility-scale BESS facility with an estimated aggregate capacity of 1,920 MWh. The primary function of the Grahamvale BESS is to capture and store energy from the existing electricity grid during off-peak energy use times and feed it back into the grid during times of peak energy use. The anticipated operational lifespan of the facility is approximately 30 to 50 years.

This report assesses the risk, including the bushfire hazard, and identifies how the proposed development of the BESS can appropriately mitigate the bushfire risk and comply with the applicable regulations and guidelines. It has been prepared in accordance with guidance for the assessment of, and response to, bushfire risk, provided in:

- *Design Guidelines and Model Requirements: Renewable Energy Facilities v4.4* (CFA, 2023).
- *Battery Energy Storage Systems Guideline No. 55* (FRV, 2025).
- AS 3959:2018 *Construction of buildings in bushfire prone areas* (Standards Australia, 2020).
- Clause 13.02-1S *Bushfire Planning* (Clause 13.02-1S Shepparton Planning Scheme).

[1] Version 4 of The Guidelines (2023) has had multiple minor amendments since being published, the most current is version 4.4, which was issued in June 2025, however the update has not changed the publishing date in the document.

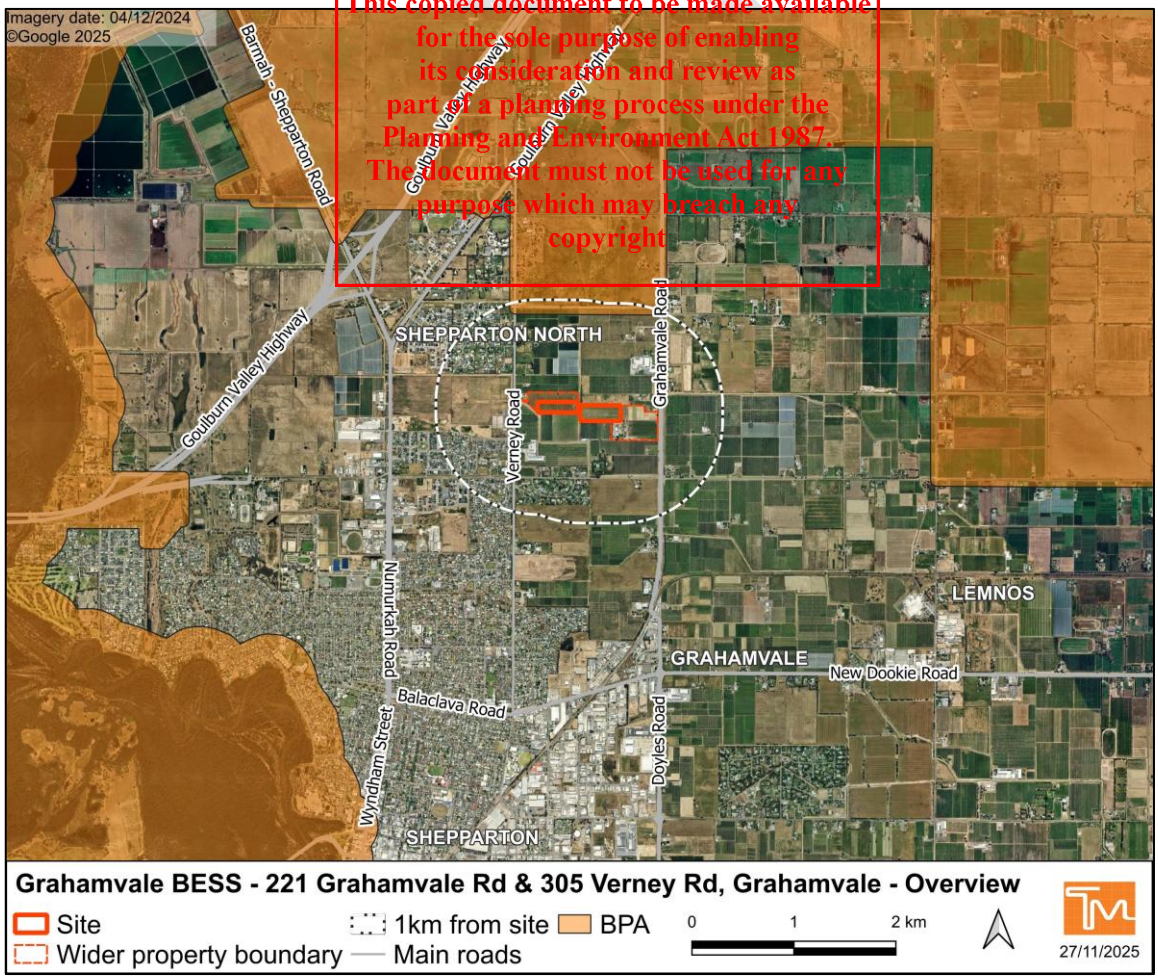
This document is structured around the CFA Guidelines as a methodology to respond to the requirements in the FRV GL-55 for a Fire Risk Assessment.

The operational matters for fire safety at the Grahamvale BESS will be documented in the final Fire Management Plan (FMP) (the current version accompanying this RMP is a draft for consultation). Further documentation to be prepared by others as part of the design and development phase include:

- Bushfire Attack Level assessment (BAL report – possibly to be prepared by Terramatrix).
- Emergency Response Plan (ERP).
- Emergency Information Book (EIB).

2 Site and proposal overview

Addresses:	221 Grahamvale Road, Grahamvale VIC 3631 (part of) 305 Verney Road, Grahamvale VIC 3631 (part of)
Lot and Plan Number	Lot 2 PS314077 Lot 2 LP219260
BESS development area:	Approx. 10 ha
BESS footprint:	Approx. 4 ha
Local Government Area:	Greater Shepparton City
Zone	Farming Zone – Schedule 1 (FZ1)
Overlay	Specific Contributions Overlay – PS map ref. SCO3 Schedule (SCO3)
Directory reference	VicRoads 673 U1
Site assessment date	16/07/2024
Assessed by	Angus Barbary



Map 1 – Overview of the site and surrounds.

The site is in FRV FS75 district and the nearest fire station is located 5 km away in Shepparton. The nearest CFA-operated fire stations are located at Shepparton East 8 km to the south-east, Mooroopna 8 km to the south-west and Tallygaroopna 11 km to the north.

The Grahamvale BESS will include a battery array, a substation that connects the facility to the wider power grid, electrical equipment and supporting infrastructure.

The site will also include temporary laydown and batch plant, storage areas, 6 m high acoustic walls (concrete) running the full perimeter of the site and also internally (see Map 4), fencing, roads, drainage, spill containment, earthing, and supporting buildings including switchgear, control, operations and maintenance building/s. The BESS development area has access to reticulated water for supply to a hydrant system. Two 144,000 L static water supply tanks are proposed.

At the time of submission of this Draft FRA (RMP) and the accompanying Draft FMP, the final arrangement and manufacturer of the battery array has not been confirmed, but the final decision to be confirmed as soon as possible.

Infrastructure details:

Manufacturer	Model/type	Details	Fire Suppression System
TBC	TBC	Approx. TBC BESS modules. Individual Capacity: TBC MWh. Aggregate Capacity: TBC MWh.	To be provided once OEM is determined

Item	Details
Battery Chemistry	LFP (lithium iron phosphate ($LiFePO^4$)).
Cooling and ventilation	To be provided once OEM is determined TBC
Water and ember protection	All systems feature an IP55 rating, protecting against water ingress and ember penetration.
Fire and explosion	To be provided once OEM is determined TBC

Standards complied with
AS/NZS 5139: General Installation and Safety Requirements for BESS.
IEC 61439: Low-voltage switchgear and control gear assemblies.
IEC 62619: Safety of Secondary Lithium Batteries.
IEC 62933-5-2: Safety Requirements for Grid-Integrated Electrochemical Energy Storage Systems.
IEC 62477-1: Safety of Power Electronic Converter Systems.
IEC 61000-6-2/4: Electromagnetic Compatibility (EMC).
IEEE 693: Seismic Design Level.
NFPA 69: Standard on Explosion Prevention.
NFPA 855: Standard for the Installation of Stationary Energy Storage Systems.

UL 1973: Batteries for Use in Stationary, Vehicle Auxiliary Power, and Light Electric Rail Applications. UL 9540A: Energy Storage Systems and Equipment Testing. UN 38.3: UN Transportation Testing for Lithium Batteries.

Further details

Item	Details
AC power	480 MW.
Power conversion system (PCS)	Inverter rating: To be provided once OEM is determined TBC Number of PCS modules: 140
Battery cell overall mass	TBC (subject to final design and product chosen).

Fire protection related infrastructure and preparedness

Item	Details
Fire water tanks	Two 144,000 L static water supply tanks are proposed.
Acoustic walls	6 m high concrete walls on all site boundaries and between rows of BESS modules.
Fire break	Minimum 15 m of non-vegetated (gravel/road) separation between infrastructure and site boundary. 7 m wide perimeter road within fire break providing full access to boundary and between rows.

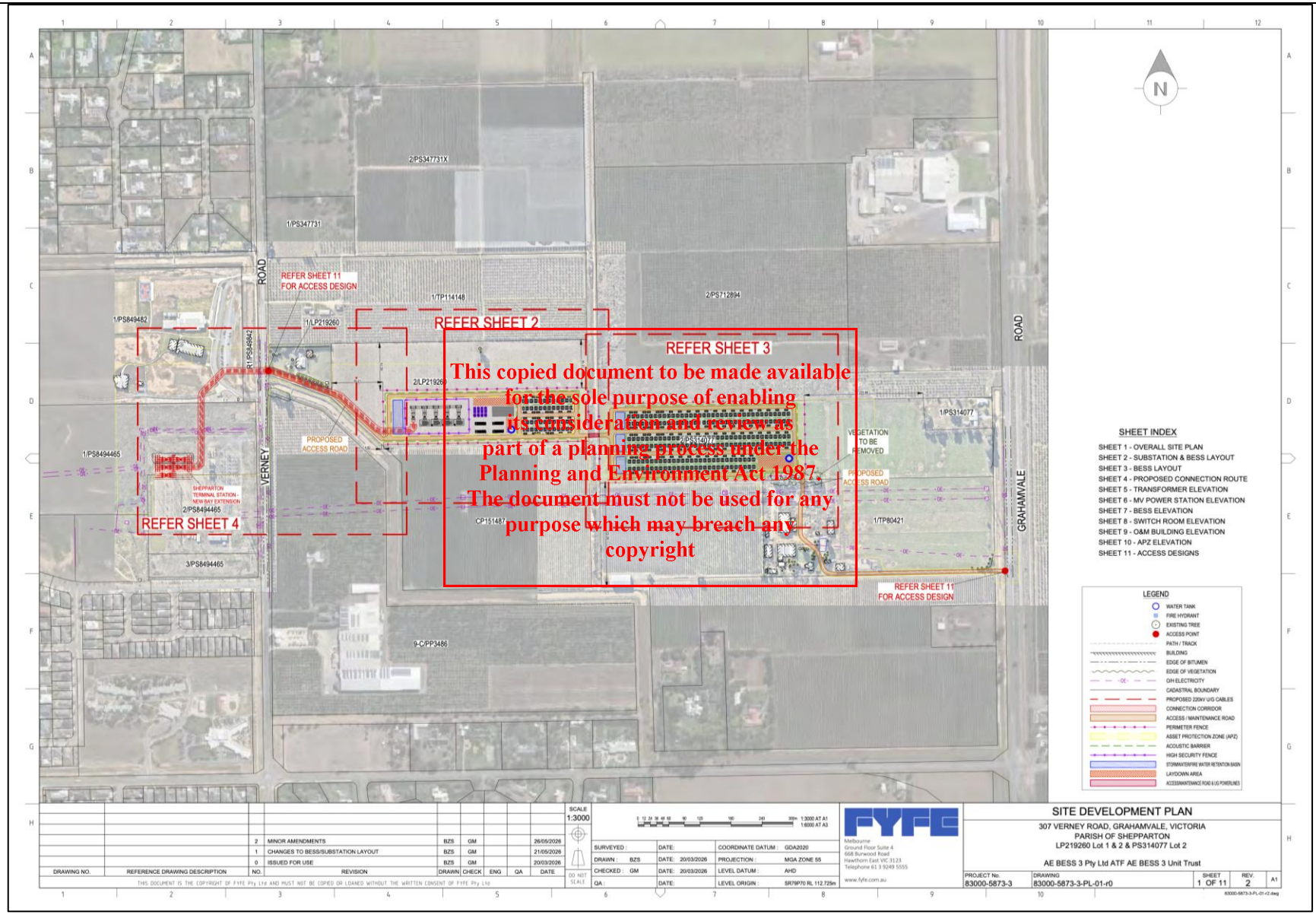


Figure 1 – Site Development Plan Rev 2 (Fyfe, 2026).

3 Regulatory framework

This section identifies the applicable regulations and guidelines that relate to bushfire and the BESS.

3.1 Clause 13.02-1S Bushfire planning

Clause 13.02-1S has the objective '*To strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life*' (Clause 13.02-1S Shepparton Planning Scheme). The policy must be applied to all planning and decision making under the Planning and Environment Act 1987, relating to land which is:

- Within a designated BPA.
- Subject to a BMO.
- Proposed to be used or developed in a way that may create a bushfire hazard.

Development should not be approved 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 CFA Guidelines require the Clause 13.02-1S bushfire hazard identification and assessment strategies to be applied (see Section 4).

The Grahamvale BESS can appropriately prioritise the protection of human life and meet the objectives of Clause 13.02-1S, by assessing the risk and developing and implementing a FMP (see accompanying document).

3.2 CFA Design Guidelines for Renewable Energy facilities

The *Design Guidelines and Model Requirements Renewable Energy Facilities* (CFA, 2023) call for consultation with CFA (in the case of Grahamvale BESS, this will be FRV) and provide guidance on designing, constructing and operating new renewable energy facilities, including a BESS. Correspondence between Avenis Energy and CFA established that the responsible fire agency is FRV. While the site is within an FRV response area, the CFA Guidelines are still considered appropriate, as they provide a useful structured response to assessing bushfire risks associated with a BESS facility early in the planning development process, particularly by requiring that any proposal prepares a Risk Management Plan (RMP) and Fire Management Plan (FMP).

The Guidelines provide standard measures and processes in relation to fire safety, risk and emergency management. Measures include those to be applied in the development of all renewable energy installations, shown in this report as pink tables:

Model Requirements – all facilities

and others specific to battery (BESS) installations, shown in this report as light orange tables:

Model or Additional Requirements – BESS specific

Of relevance to the proposed Grahamvale BESS are:

- Consideration of applicable Australian standards.
- Meeting the requirements of the planning approvals process.
- Risk management planning.
- Facility location and design.
- Construction, commissioning, and operational procedures.
- Emergency management planning.
- Incorporating CFA input re dangerous goods for battery storage facilities.
- Occupational Health and Safety requirements.
- Provision of information to, and consultation with FRV on the above-mentioned points.

This FRA (RMP) forms part of the engagement process with FRV and is structured around the Guidelines, as is the accompanying FMP. FRV also point to the Guidelines in GL-55 (FRV, 2025) regarding the standards for emergency vehicle access, as detailed in the FMP.

Model Requirements – all facilities

A Risk Management Plan must be developed for all renewable energy facilities. Modifications to Model Requirements must be in consultation with CFA.

The Risk Management Plan must:

a) Describe the infrastructure (natural and built), landscape, nature of operations and occupancy of the facility.

b) Describe the risks and hazards at the facility to and from the renewable energy infrastructure (including battery energy storage systems).

c) Specify and justify, in accordance with Section 4.2 of this guideline:

- *The **location** of the facility in the landscape and the proposed infrastructure on-site.*
- ***Emergency vehicle access** to and within the facility that:*
  - *Includes site access points of a number suitable to the size and hazards of the facility (a minimum of two).*
  - *Provides access to renewable energy infrastructure, substations and fire service infrastructure.*
- ***Firefighting water supply** for the facility.*
- *A **fire break width** of 10m or greater, based on radiant heat flux (output) as an ignition source:*
  - *Around the perimeter of the facility.*
  - *Between any landscape buffer/vegetation screening and infrastructure.*
- *The **separation distance**, based on radiant heat flux (output) as an ignition source, between:*
  - *Adjacent renewable energy infrastructure (e.g., between adjacent battery*

containers/enclosures).

- *Battery containers/enclosures and related battery infrastructure, buildings/structures, and vegetation.*

- ***All other controls*** *for the management of on- and off-site hazards and risks at the facility (including all proposed battery energy storage system safety and protective systems).*

d) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.

e) Form the basis for the design of the facility.

3.3 FRV Battery Energy Storage Systems Guideline No. 55

Battery Energy Storage Systems Guideline No. 55 (GL-55) applies to BESS installations within the FRV fire district and has the aim of providing fire safety guidance for the design and installation of BESS facilities.

GL-55 divides types of BESS facilities into categories based on the proposed energy storage capacity in MWh. The Grahamvale BESS is considered a 'utility' scale BESS, as it has a storage capacity of more than 5 MWh. GL-55 includes provisions on risk assessment, design considerations for BESS facilities, and commissioning determined by the storage capacity regarding the documentation and consultation required to satisfy FRV, as shown in Table 1 below.

Table 1 – Summary of required documentation and consultation to satisfy FRV for utility scale BESS facilities (FRV, 2025).

Energy storage capacity	> 5 MWh.
Type/position	State/National utility/grid scale – before electrical meter (outdoor).
Consultation with FRV	Expected.
Pre-planning permit (concept design phase)	> 200 m from habitable structure.
	• *Fire Risk Assessment.*
Pre-construction (design development phase)	• *Consequence modelling.* • *Bushfire Attack Level (BAL) Assessment.*
Pre-operation (commissioning phase)	• *Emergency Response Plan (ERP).* • *Emergency Information Book (EIB).*

The Grahamvale BESS facility infrastructure will be more than 200 m from the nearest existing habitable structure, as shown in Map 3, and consequently, as per Appendix A to GL-55, a *Preliminary Hazard Analysis* and/or a *Fire Safety Study* is not required.

The need for a *Fire Risk Assessment* is addressed in this draft FRA (RMP) and the accompanying draft FMP. Where relevant, the applicable provisions of GL-55 are referenced throughout both documents

to demonstrate how the applicable provisions are met, while retaining the structure of a response to the CFA Guidelines.

Further documentation required during the design and development phase (post-permit) include an ERP and EIB, which will then be prepared by the site operators or other consulting bodies.

3.4 Relevant standards

FRV GL-55 identifies the following standards to be utilised for the design and operation of the BESS:

- AS/NZS 4681: The storage and handling of Class 9 (miscellaneous) dangerous goods and articles.
- AS 3959: Construction of buildings in bushfire prone areas.
- AS/IEC 62619: Secondary cells and batteries containing alkaline or other non-acid electrolyte – Safety requirements for secondary lithium cells and batteries, for use in industrial applications.
- AS/NZS 5139: Electrical installations – Safety of battery systems for use with power conversion equipment.
- IEC 62897: ED1 Stationary Energy Storage Systems with Lithium Batteries – Safety Requirements.
- NFPA 855: Standard for the Installation of Stationary Energy Storage Systems.
- UL 9540: Energy Storage System Requirements.
- UL9540A: Battery Energy Storage System (ESS) Test Method.
- FM Global Property Loss Prevention Data Sheet 5-33: Electrical Energy Storage Systems.
- FM Global Property Loss Prevention Data Sheet 5-32: Data Centers and Related Facilities (FRV, 2025).

Additionally, the CFA Guidelines state *'In the absence of a specific Australian Standard for large-scale battery energy storage system facilities, the current versions of the following should be used in the design and operation of battery energy storage systems, except where varied by this guideline*', and provides the following list of applicable standards:

- NFPA 855: Standard for the Installation of Stationary Energy Storage Systems.
- UL 9540: Energy Storage System Requirements.
- UL 9540A: Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.
- FM Global Property Loss Prevention Data Sheet 5-33 Electrical Energy Storage Systems.

Additionally, this FRA (RMP) follows *AS ISO 31000:2018 Risk Management – Guidelines* from the Australian Institute for Disaster Resilience *National Emergency Risk Assessment Guidelines* (AIDR, 2020) ('NERAG'), which is the structured approach to risk evaluation recommended in both the CFA Guidelines and in GL-55.

4 Bushfire hazard assessment

The bushfire risk to, and that may arise from, the BESS has been assessed in accordance with:

- The hazard identification and assessment strategies at Clause 13.02-1S, primarily to 20 km, 1 km, and 400 m.
- The AS 3959:2018 site assessment methodology to 100 m.

4.1 Landscape assessment

4.1.1 Location description

The BESS is in the City of Greater Shepparton local government area, 2.5 km north of the existing industrial areas in Grahamvale and 5 km north-east of the Shepparton central business district. The site is in a landscape that can be described as the interface between urban residential areas to the south and west and agricultural and horticultural land, comprising fruit orchards and vineyards. The wider agricultural land used for grazing and cropping (800 m to the north at the closest point), is generally indicated by the BPA coverage shown on Map 2.

Within 20 km the landscape is dominated by agricultural land except for corridors riparian Woodland (primarily river red gum) along the Goulburn River and Broken River, as indicated by BMO covered areas on Map 2. The main area of bushland is within the Lower Goulburn National Park and the connected Shepparton Regional Park, which are 3.5 km south-west of the site at the closest point. The bushland corridor is up to 2 km wide and could cause spotting and minor ember attack at the site and/or spot fires in agricultural land closer to the site. The relatively low fuel loads in the areas not designated as BPA would impede the spread of fire near the site. The site is neither remote nor isolated and is not directly exposed to forest or steep or rugged terrain that would constitute a greater bushfire hazard.

Safer areas that would provide refuge in the event of a bushfire are available in the urban areas of Shepparton to the south. Grahamvale Road and Verney Road provide access to these low threat urban areas.

Fire history

The region has a history of bushfire, with numerous small but locally significant fires and several larger fires in recent decades. Many relatively small bushfires have occurred in Lower Goulburn National Park and Shepparton Regional Park. A large grassfire occurred 15 km north of the site near Drumanure and smaller grassfires have occurred within 20 km, one of which was not in a designated BPA, 2 km west of the site. There is no history of bushfire impacting the site in the publicly available spatial data (see Map 2).

Landscape risk

To assist in assessing landscape risk, four 'broader landscape types', representing different landscape risk levels, are described in the technical guide *Planning Applications Bushfire Management Overlay* (DELWP, 2017). These are intended to streamline decision-making, and support more consistent decisions based on the landscape risk.

The broader landscape types are based on descriptive characteristics associated with the surrounding landscape (see Table 2). The four types range from low risk landscapes where there is little hazardous vegetation beyond 150 m of the site and extreme bushfire behaviour is not credible, to extreme risk landscapes with limited or no evacuation options and where fire behaviour could exceed BMO presumptions.

The site is in a low risk landscape, potentially exposed to grassfire through agricultural land to the north or west and low levels of potential ember attack from bushland multiple kilometres to the west. Access to lower threat areas is readily available. The immediately surrounding landscape accords with Broader Landscape Type 1 or 2.

Table 2 - Landscape risk typologies (from DELWP, 2017).

Broader Landscape Type 1	Broader Landscape Type 2	Broader Landscape Type 3	Broader Landscape Type 4
• *There is little vegetation beyond 150 metres of the site (except grasslands and low-threat vegetation).* • *Extreme bushfire behaviour is not possible.* • *The type and extent of vegetation is unlikely to result in neighbourhood- scale destruction of property.* • *Immediate access is available to a place that provides shelter from bushfire.*	• *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.*	• *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 approach from more than one aspect.* • *The site is located in an area that is not managed in a minimum fuel condition.* • *Access to an appropriate place that provides shelter from bushfire is not certain.*	• *The broader landscape presents an extreme risk.* • *Fires have hours or days to grow and develop before impacting.* • *Evacuation options are limited or not available.*
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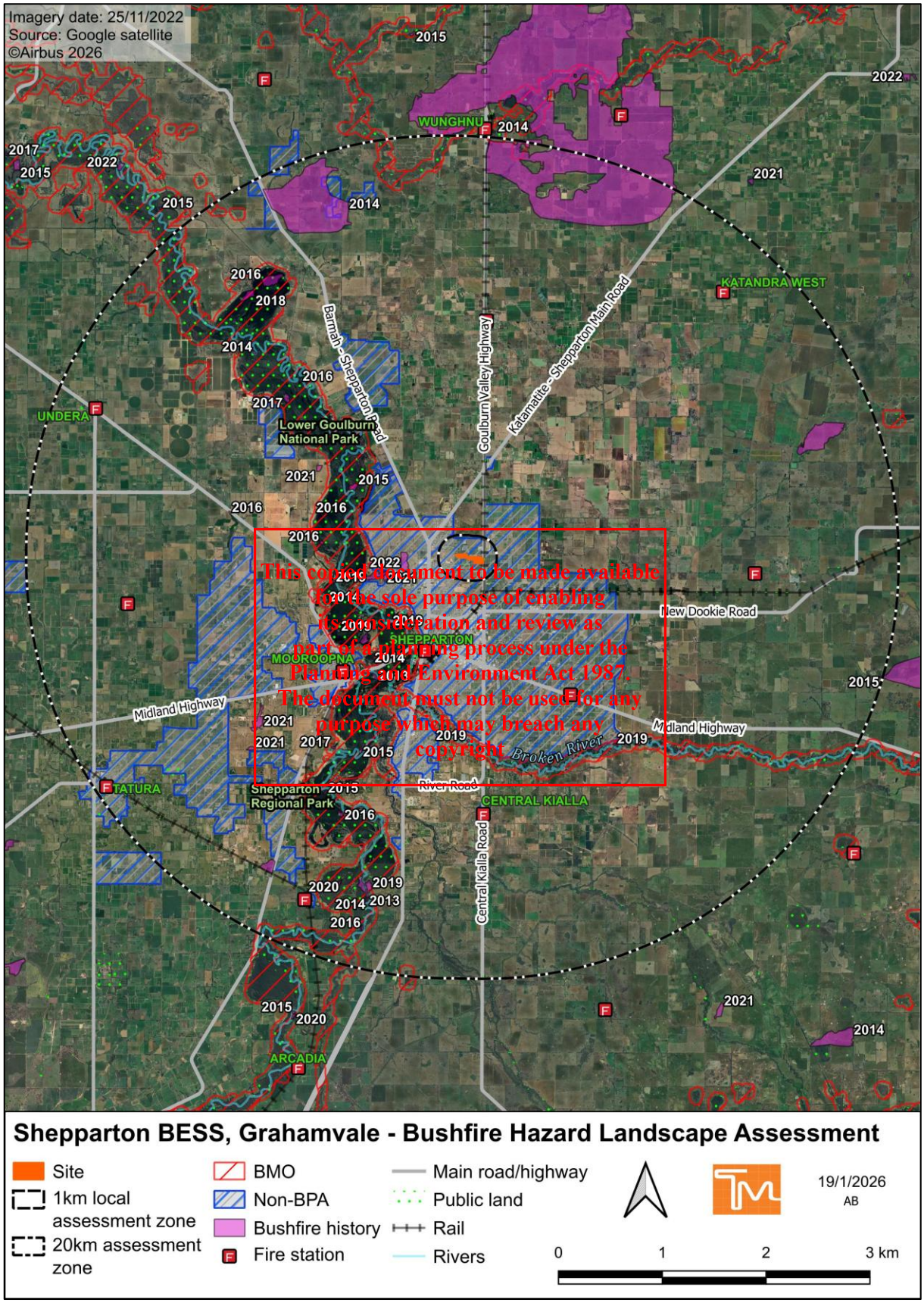


Map 2 – Bushfire hazard landscape assessment.

4.1.2 Local landscape risk

Within the 1 km local assessment zone, the land is predominantly horticultural with some cropland and/or vacant land with patches of potential Grassland hazard. Low threat urban areas are located 400 m to the north-west and south-west.

While most of the land within 1 km is not in a designated BPA, it is still possible for a grassfire to develop and approach the site from the north, west or (with a shorter approach) from the south. Although the property immediately to the north of 221 Grahamvale Road comprises Grassland (see Map 4), a fire in this landscape is unlikely to achieve AS 3959:2018 design fire parameters.

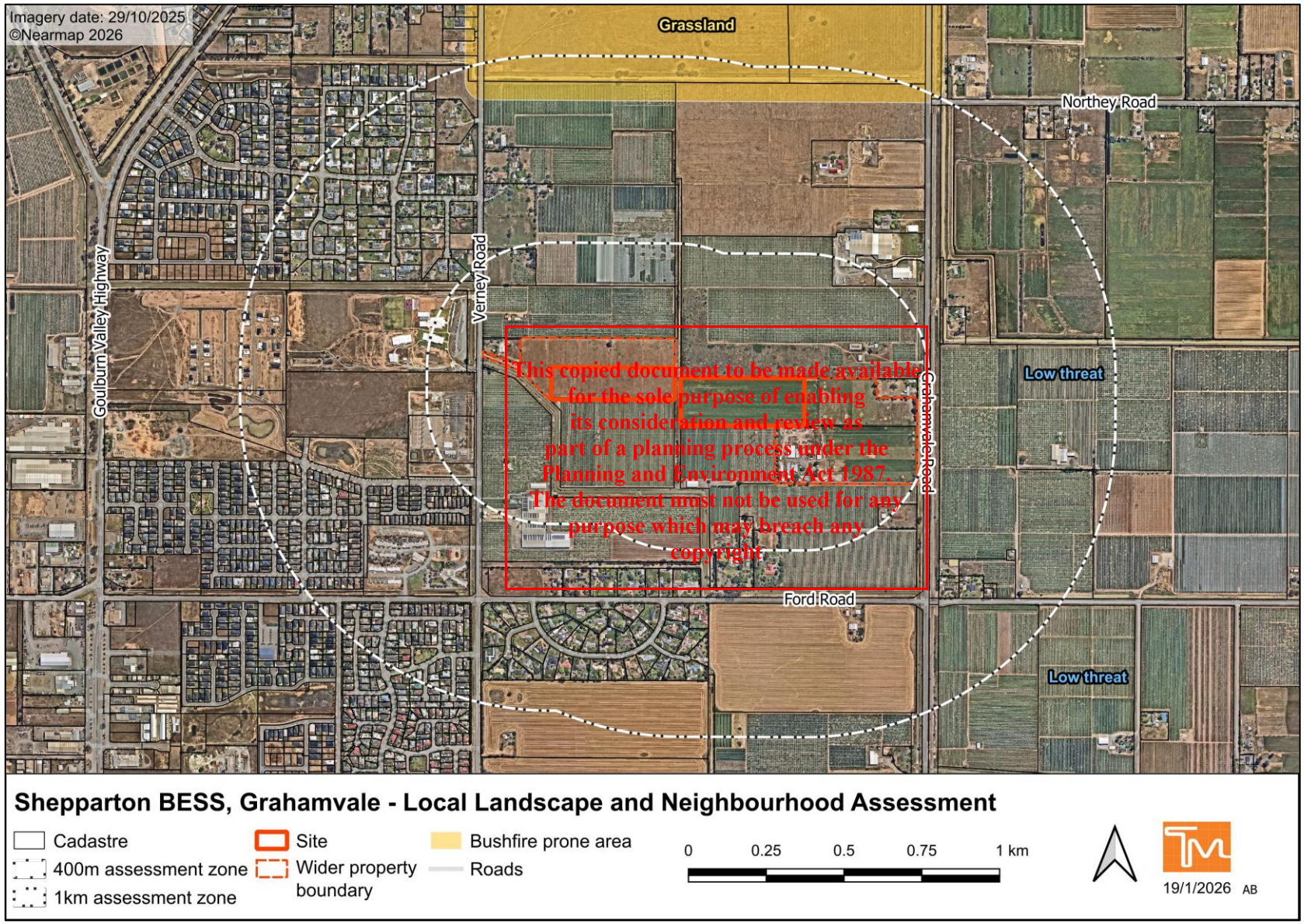
4.1.3 Neighbourhood risk

Within 400 m, the neighbourhood scale bushfire risk to the site is largely consistent with that for 1 km. Verney Road and Grahamvale Road could somewhat moderate the spread of a grassfire from the east and west, as they comprise a 20 m and 50 m wide low threat or non-vegetated fire break, which is also an access line for active fire suppression. Again, the horticultural land use of surrounding properties acts to reduce exposure to bushfire.

4.1.4 Credible bushfire scenarios

The most likely bushfire scenarios for a large landscape fire in Victoria are an approach from those directions typically associated with the direction of the wind on extreme fire danger days, i.e. from the north, north-west, west or south-west (Long, 2006). This principle provides a basis for identifying potential bushfire/grassfire runs that could occur in the landscape.

The site could be approached by a large grassfire burning toward it from any of the higher bushfire threat directions, although immediate approach of fire from any direction would be moderated by roads and low threat agricultural and horticultural land around the site. If the bushland in Lower Goulburn National Park and Shepparton Regional Park, 3 to 4 km to the west, was involved in bushfire the potential for minor ember attack to the site exists, but the Grassland of the broader landscape has limited potential to generate significant ember attack.



Map 3 - Local landscape and neighbourhood assessment.

4.2 Site assessment

4.2.1 Classified vegetation

Vegetation within a 100 m assessment zone around the BESS has been classified in accordance with the AS 3959:2018 methodology. Classified vegetation is vegetation that is deemed hazardous from a bushfire perspective and, unless excludable, is sorted into one of the vegetation classes at Section 2.2.3 of AS 3959:2018. The applicable classes for this site are described below.

The classification is based on the current and anticipated likely future long-term state of the vegetation.

4.2.2 Grassland

Vegetation on the adjacent properties to the north of 221 Grahamvale Road matches the AS 3959:2018 classification of Grassland, which is defined as all forms of vegetation (except Tussock Moorlands) including situations with shrubs and trees, if overstorey foliage cover is less than 10%. Includes pasture and cropland (Standards Australia, 2020).

Grassland vegetation is considered hazardous and therefore classifiable when it is not managed in a minimal fuel condition. Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (e.g. short-cropped grass, to a nominal height of 100 mm) (Standards Australia, 2020). Grassland areas are assumed to be unmanaged and classifiable unless there is 'reasonable assurance' that they will be managed in perpetuity, in a low threat state, no more than 100 mm high.

4.2.3 Excluded vegetation and non-vegetated areas

Areas of low threat vegetation and non-vegetated areas can be excluded from classification in accordance with Section 2.2.3.2 of AS 3959:2018, if they meet one or more of the following criteria:

(a) *'Vegetation of any type that is more than 100 m from the site.*
(b) *Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.*
(c) *Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other, or of other areas of vegetation being classified vegetation.*
(d) *Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.*
(e) *Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.*
(f) *Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and*

other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks' (Standards Australia, 2020).

The low-threat areas excluded from classification include the orchards and vines on horticultural properties that comprise the majority of the site assessment zone. Non-vegetated areas within the 100 m site assessment zone include roads, irrigation canals and structures (see Map 4).

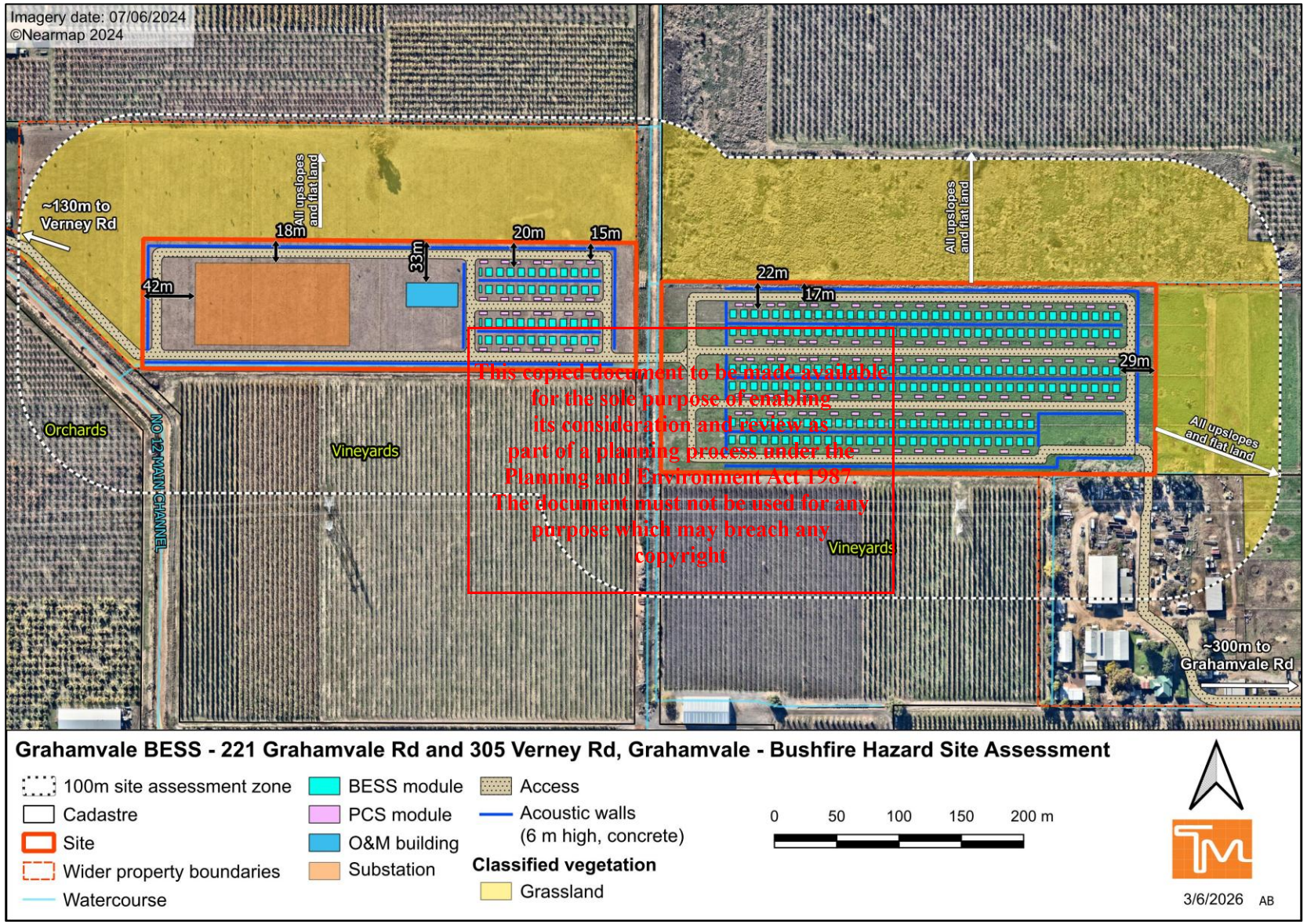
4.2.4 Topography

AS 3959 requires that the 'effective slope' be identified to determine the BAL and applicable vegetation setback distances. This is the slope of the land under the classified vegetation[2] that will most significantly influence the bushfire attack on a building. Two broad types apply:

- Flat and/or Upslope - land that is flat or on which a bushfire will be burning downhill in relation to the development. Fires burning downhill (i.e. on an upslope) will generally be moving more slowly with a reduced intensity.
- Downslope - land under the classified vegetation on which a bushfire will be burning uphill in relation to the development. As the rate of spread of a bushfire burning on a downslope (i.e. burning uphill towards a development) is significantly influenced by increases in slope, downslopes are grouped into five classes in 5˚ increments from 0˚ up to 20˚.

The land is flat or slightly undulating and is in the 'All upslopes and flat land' slope class of AS 3959:2018 (see Map 4).

[2] The slope of the land between the classified vegetation and the building is called the site slope, which in the Method 1 procedure of AS 3959 is assumed to be the same as the effective slope.



Map 4 – Bushfire hazard site assessment.

4.3 Fire weather

The Victorian planning and building systems use the Forest Fire Danger Index (FFDI) and the Grassland Fire Danger Index (GFDI) to represent the level of bushfire threat based on weather (and fuel) conditions. An FFDI 100/GFDI 130 (approximately equivalent to the Catastrophic fire danger rating under the Australian Fire Danger Rating System) is applied in non-alpine areas of Victoria by the building system to establish building setback distances from classified vegetation in accordance with AS 3959:2018. The potential fire behaviour and impact under different Fire Danger Ratings (FDRs) is summarised in Table 3.

Table 3 - Fire Danger Ratings (Source: RFS, 2023).

Grassland Fire Behaviour Index	Fire Danger Rating (FDR)	Description of conditions	
		Indicative fire behaviour	Potential for impact
100+	Catastrophic	Extremely rapid fire growth and increasing likelihood of large final fire area/size. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times.	Extremely high likelihood of agricultural/ pasture/crop/stock losses together with loss of rural assets such as homesteads, fencing machinery and buildings. Very limited visibility due to smoke and dust. Very high risk to the community related to inappropriate pre-considered plans, inadequate sheltering. Extremely strong winds are likely to impact infrastructure (e.g., power lines) and fall trees increasing the likelihood of obstructed roads and power outages.
50-99	Extreme	Extremely rapid fire growth and increasing likelihood of large final fire area/size. Possibility for fire behaviour to become erratic and plume driven. Strong convective column formation. Wind speed and direction likely to be erratic at times.	Increasingly high likelihood of agricultural/ pasture/crop/stock losses together with loss of rural assets such as homesteads, fencing machinery and buildings. Limited visibility due to smoke and dust. High risk to the community related to inappropriate pre-considered plans, inadequate sheltering. Strong winds are likely to impact infrastructure (e.g., power lines) and fall trees increasing the likelihood of obstructed roads and power outages.
24-49	High	Wind driven, rapidly spreading fires with potential for development into large fire area/size and with the potential for short distance spotting and long flame lengths.	High likelihood of agricultural/ pasture/crop/stock losses together with loss of rural assets such as homesteads, fencing machinery and buildings.
12-23	Moderate	Typically wind driven and rapidly spreading fires with the potential to gain size quickly.	Possible agricultural/ pasture/crop/stock losses together with loss of rural assets such as homesteads, fencing machinery and buildings.
6-11	No rating	Fires easily sustained. Typically wind driven fires that can spread quickly.	Community losses are unlikely however unattended or poorly prepared houses and infrastructure may be at risk.
0-5		Fire difficult to ignite and sustain. Fires generally unlikely to spread and likely to self-extinguish.	Community losses are unlikely.

Note that the benchmark of an FFDI 100 represents a 'one size fits all' model of extreme fire weather conditions for the state, but which has been exceeded during some significant fire events, including in Victoria on 'Black Saturday' 2009. Therefore, it is important to note that this is not necessarily the *worst-case* conditions for any location, including the Grahamvale BESS site.

In southern Australia, since the 1950s there has been an increase in the length of the fire weather season and an increase in extreme fire weather. It is projected that there will be further increase in the number of dangerous fire weather days and a longer fire season for southern and eastern Australia (CSIRO/BOM, 2024). There is a 'high confidence' that climate change will result in a harsher fire weather climate for the Murray Basin sub-cluster that the study area is in, with 'high' confidence that there will be increased potential evapotranspiration (curing) in all seasons as warming progresses (CSIRO/BMO, 2025).

Currently the CFA and DTP have no published policy on FFDI/GFDI recurrence intervals. There is, therefore, no compelling rationale for applying a different FFDI/GFDI from the 'default' FFDI 100/GFDI 130 threshold currently used throughout non-Alpine areas of Victoria in the planning and building system.

4.4 Low risk environment attributes

The CFA Guidelines recommend that '*Renewable energy facilities are to be located in low-risk environments wherever possible, to reduce the risk of external fire impacting the facility and its consequences*' (CFA 2023). The Guidelines provide a list of indicators of a lower risk environment:

- Grassland.
- No continuous other vegetation types within 1- 20 km of the project site.
- 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.

The landscape around the Grahamvale BESS site is largely consistent with these indicators, although there is a large area of continuous bushland, comprising Woodland under the AS 3959:2018 schema, to the west along the Goulburn River. This vegetation is not close to the site although it could potentially generate ember attack that would affect the site. Consequently, the site location does not fully meet the list of indicators of a *low* risk environment, however it is a *lower* risk environment.

Overall, the Grahamvale BESS has a lower landscape scale bushfire risk than is common in rural Victoria, as indicated by the absence of BPA designation, and is considered to be low risk. Similarly, the local, neighbourhood and site bushfire risk is low largely due to the irrigated horticultural land use of the surrounding properties.

5 Risk identification and assessment

The risk assessment process applied follows *AS ISO 31000:2018 Risk Management – Guidelines* from the Australian Institute for Disaster Resilience *National Emergency Risk Assessment Guidelines* (AIDR, 2020) ('NERAG').

This process identifies the risks to and from the Grahamvale BESS during the construction, commissioning and operational phases, evaluates and analyses the risk and identifies appropriate treatments, including the application of the CFA Guidelines. Likelihood and consequence of an event are considered and assessed against a risk matrix to provide a risk rating. The way in which the Grahamvale BESS complies with the FRV GL-55 requirements and the CFA Guidelines is documented in the accompanying FMP.

Risks are identified and assessed here in accordance with the AIDR *National Emergency Risk Assessment Guidelines* (AIDR, 2020) methodology. Possible events associated with the development of the Grahamvale BESS have been considered; this report is considered to comprise an *initial risk assessment* as per NERAG. Consequently, these identified risks are subject to review and input from stakeholders following submission of this report.

5.1 Risk identification

Risk identification is the identification of the sources of risk (such as bushfire or electrical fire hazard), possible emergency events and their potential consequences for the safety of the BESS, its staff and the wider community. Matters relating to Occupational Health and Safety (OHS) (other than where specified by the CFA Guidelines), operational and system risks that are not unique to a BESS are not considered here.

5.1.1 Sources of risk

For each risk description, sources of risk were identified through consideration of factors affecting hazard, exposure and vulnerability, in the context of the BESS operating during the declared Fire Danger Period for the City of Greater Shepparton.

Risks to and arising from the BESS are informed by the bushfire risk assessment of Section 4, a review of fire events involving BESS infrastructure, and the CFA Guidelines.

5.1.2 Risk descriptions

The identified risks are articulated as risk descriptions for the purpose of the subsequent risk analysis. A risk description is a structured statement linking the source of risk to a consequence. Four key risk descriptions have been generated for the Grahamvale BESS. These are:

1. There is potential that during the declared Fire Danger Period a large, established bushfire impacts the Grahamvale BESS and causes injury or loss of life to people on site, financial loss through damage to site infrastructure and/or disruption to operation of the BESS.

2. There is potential that during the declared Fire Danger Period an accidental or deliberate ignition on site will result in a bushfire that will spread and cause injury or loss of life to people on site, financial loss through damage to site infrastructure and/or neighbouring properties, and/or disruption to operation of the BESS.

3. There is potential that an accidental or deliberate ignition on site will result in a fire in BESS infrastructure that causes injury or loss of life to people on site, financial loss through damage to site infrastructure, and/or disruption to operation of the BESS and neighbouring properties.

4. There is potential that an accident or mechanical failure will result in the release of electrolyte or other harmful substance with potential to cause injury or loss of life to people on or near the site, financial loss through damage to site infrastructure and/or damage or disruption to neighbouring properties, and/or disruption to operation of the BESS.

5.1.3 Existing risk controls

As a new facility there are no existing controls in place specific to the Grahamvale BESS.

FRV provides emergency response to the site as part of their wider service to the community.

5.2 Risk analysis

The NERAG methodology involves consideration of possible consequences, the likelihood that those consequences occur and any existing controls that modify the risk.

5.2.1 Risk criteria

Risk criteria assist in deciding which risks need to be treated. Risk criteria comprise:

- Impact category.
- Consequence level.
- Likelihood level.
- Risk level.
- Confidence level.

Impact category

The risk assessment uses three impact categories:

- People – deaths and injuries as a direct result of the emergency.
- Infrastructure/assets – cost of asset and service loss as a result of the emergency.

- Environment – damage to biodiversity and/or air and water quality as a result of the emergency.

This FRA (RMP) only addresses the criteria of consequences affecting people, infrastructure/assets and the environment. Associated consequences such as 'downstream' economic, public administration or social setting consequences are assumed to be addressed by the controls applied to avoid the primary consequences.

Consequence level

The consequence of a hazardous event at the Grahamvale BESS facility is the scale and nature of its impact on people, infrastructure, and the environment, assuming the event occurs.

People

- Potential for injury or fatality from fire, explosion, toxic smoke, or electrical hazards.
- Health effects on workers, emergency responders, and nearby residents from exposure to heat, hazardous gases or particulates.
- Disruption to community wellbeing through evacuation, restricted access, or anxiety related to high-profile incidents.

Infrastructure/assets

- Damage or destruction of the BESS units, control systems, and associated electrical equipment.
- Disruption of electricity supply, grid stability, or loss of critical services reliant on the facility.
- Flow-on damage to nearby assets such as substations, transmission lines, or neighbouring land uses if fire spreads.
- Long repair/replacement lead times for specialised components.

Environment

- Localised contamination of soil and water from electrolyte leakage or firewater runoff.
- Emission of toxic gases and particulates into the atmosphere.
- Potential ignition of surrounding vegetation in bushfire-prone areas, contributing to broader landscape fire impacts.
- Medium- to long-term ecological effects where contamination enters waterways or sensitive habitats.

Table 4 – Consequence scale.

Likelihood	General description
Insignificant	Little or no measurable impact on people, property, environment, or services. Localised inconvenience only, with normal response arrangements easily coping. No lasting disruption; recovery is immediate or near-immediate.
Minor	Limited impacts that may require a coordinated response but are readily manageable. Small numbers of people affected, with minor injuries or short-term discomfort possible. Localised property damage or minor environmental harm.

	Services may be briefly disrupted but quickly restored.
Moderate	Noticeable impacts across the community or sector. Injuries requiring medical treatment, possible hospitalisations, but few fatalities. Damage to property or infrastructure requiring repair or replacement at moderate cost. Local economy and essential services experience disruption for days to weeks. Environmental damage evident but contained and reversible with recovery effort.
Major	Significant impacts requiring multi-agency coordination and substantial resources. Multiple serious injuries and/or fatalities possible. Extensive property damage or destruction of critical infrastructure. Services and community functions disrupted for weeks to months. Long-term or widespread environmental damage.
Catastrophic	Widespread, severe, and long-lasting impacts. High numbers of fatalities and/or severe injuries. Destruction of major infrastructure and critical services, with recovery taking years. Community dislocation, long-term economic loss, and possible permanent change to environment or settlement patterns. National significance; may require extraordinary emergency powers or resources.

Likelihood level

A consideration of the likelihood of an event is required, reflecting the probability of the emergency event and the identified consequences occurring as a result. NERAG provides a recurrence interval of likelihood level and applies the subjective terms listed in the left hand column of Table 5. NERAG links these subjective terms to annual exceedance probability (AEP) or average recurrence intervals (ARI) where data is available. For example, Almost Certain might correspond to an AEP of >10%, while Extremely Rare might align with <0.001% AEP, but in this descriptive format, the focus is on the qualitative nature of these terms.

Table 5 – Likelihood scale.

Likelihood	General description
Almost Certain	The event is expected to occur in most circumstances. High level of recorded incidents or strong evidence of frequent recurrence. Could occur multiple times within a typical planning cycle or project life.
Likely	The event will probably occur in many circumstances. Has occurred several times in the past and is expected to happen again. Reasonable expectation of occurrence during the life of the asset/project.
Unlikely	The event could occur at some time, but it is not expected in most circumstances. May have happened occasionally in similar settings but not regularly. Considered a low-probability event within the planning timeframe.
Rare	The event may occur only in exceptional circumstances. Recorded events are uncommon, and conditions would need to align unfavourably. Considered highly unlikely during the life of the asset/project, though possible.
Very Rare	The event is technically possible but has little precedent. May be expected to occur only a few times in many decades or centuries. Not generally anticipated in the foreseeable future.
Extremely Rare	The event is conceivable in theory but has not been observed in practice. Would require highly unusual or unprecedented circumstances.

	Considered beyond reasonable planning assumptions but not impossible.

Risk level

The risk matrix is a tabular framework that plots likelihood against consequence to produce a risk rating. The risks identified above have been assessed for likelihood and consequence and summarised at Table 7.

Table 6 - Risk level matrix.

Likelihood	Consequence level				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost Certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	Extreme	Extreme
Unlikely	Low	Low	Medium	High	Extreme
Rare	Very Low	Low	Medium	High	High
Very Rare	Very Low	Very Low	Low	Medium	High
Extremely Rare	Very Low	Very Low	Low	Medium	High

5.2.2 Summary of risk analysis

This section summarises the results of the risk analysis and the subsequent risk ratings for the BESS. The analysis included consideration of the context, potential fire scenarios and the level of controls already in place. A summary of the analysis for each of the risk descriptions is provided below.

This risk assessment is adapted from the NERAG methodology. This risk assessment is intended to be iterative and informed by inputs from the proponents, stakeholders and the referral fire authority. The risks associated with the BESS are often interrelated, with a hazard (e.g. electrical failure) having a number of resultant risks (i.e. hazards to operators, damage within the site, ignition of fire, potential spread beyond the site boundary with a consequent wider impact etc.). This assessment aims to assess the core risks to and from the BESS, however there is by default some repetition and crossover between identified risks.

5.2.3 Risk description #1

There is potential that during the declared Fire Danger Period a large, established bushfire impacts the Grahamvale BESS and causes injury or loss of life to people on site, financial loss through damage to site infrastructure and/or disruption to operation of the BESS.

The site of the Grahamvale BESS and surrounds has a lower bushfire risk than much of rural Victoria that is in the BPA. There is limited potential for a fire to approach the site due to the irrigated horticultural land use of the surrounding properties.

Potential effects of bushfire impact from the broader landscape are addressed by the measures adopted from the FRV GL-55 requirements and the CFA Guidelines as documented in the accompanying FMP.

Hazard	External bushfire
Consequence category	People (within site) Infrastructure/assets (within site)
Consequence	**Minor** As identified above, the radiant heat and ember attack effects on the site will be limited and will be further reduced by virtue of the design characteristics of the facility, including the battery array which will be constructed to UL9540 and UL9540A. The limited radiant heat flux and ember attack arising from the limited nearby bushfire hazard means that impact on the site facilities is adequately addressed by the separation from the hazard and management actions as detailed in the accompanying FMP, including the provision of a 10 m fire break inside the site boundary.
Likelihood	**Unlikely** A fire approaching the site is unlikely, and the bushfire hazard assessment process has identified that the Grahamvale BESS has lower landscape scale bushfire risk than is common to rural Victoria as indicated by the lack of BPA designation and is considered to be low risk. Similarly, the local, neighbourhood and site bushfire risk is low. Consequently, bushfire behaviour close to the site will be well within AS 3959:2018 parameters. Based on the site assessment documented at Section 4.2, the distance between site facilities and the limited area of bushfire hazard (Grassland - 17 m to the north and 29 m to the east (see Map 4)) and applying Table 2 to AS 3959:2018 values, site infrastructure will be exposed to radiant heat flux values of slightly more that than 12,500 kW/m^2 , but the presence of the proposed 6 m high concrete acoustic walls will act to minimise exposure to radiant heat. Although grassland burns intensely, dwell time is limited, ember generation is limited and the hazard is easily reduced through vegetation management. The absence of Woodland or Forest in the immediate surrounds means that ember attack on the BESS would be minimal. As a result, impacts within the site arising from a bushfire are unlikely.
Risk level	**Low**
Treatment	The treatments applied in response to this FRA (RMP) comprise the management actions as detailed in the accompanying FMP. In relation to addressing the potential for impact from bushfire in the surrounding environment, these include the provision of a firebreak along the site boundary, the 6 m high concrete acoustic walls, the management of vegetation within the site in a low threat state, the provision of a water supply (2 x 144,000 L and hydrants) for fire fighting and appropriate emergency management arrangements.

Treatment efficacy	In the identified low bushfire risk landscape, the risk of an external fire causing site impacts can be adequately mitigated through the application of the FRV GL-55 requirements and the Model Requirements and BESS specific Additional Requirements of the CFA Guidelines.
Residual risk	**Rare/ Minor – Low**

5.2.4 Risk description #2

There is potential that during the declared Fire Danger Period an accidental or deliberate ignition on site will result in a bushfire that will spread and cause injury or loss of life to people on site, financial loss through damage to site infrastructure and/or neighbouring properties, and/or disruption to operation of the BESS.

A fire arising from an ignition within the Grahamvale BESS (from any source) could spread to the broader landscape. Potential ignition sources include a fire in the BESS and associated infrastructure (see Risk Description # 3), incidents involving above ground conductors, vehicle movements and hot works. It is noted, however, that the presence of the proposed 6 m high concrete acoustic walls makes the spread of fire beyond the site boundaries unlikely.

Under a Catastrophic fire danger rating, and with reference to the bushfire risk assessment at Section 4, a fire arising from the BESS could:

- Impact the adjacent horticultural properties with the potential for loss of crops and associated infrastructure.
- Affect the operation of Verney Road and Grahamvale Road.
- Burn toward nearby urban areas (through a predominately low threat landscape where it is unlikely to achieve a steady state forward rate of spread and intensity) and impact nearby infrastructure and urban areas (such as immediately to the south).
- Burn through the predominately low threat landscape under the influence of a wind from those directions typically associated with the direction of the wind on extreme fire danger days, i.e. from the north, north-west, west or south-west, and affecting Verney Road and Grahamvale Road, surrounding properties, the broader landscape and the environment.

The Australian Fire Danger Rating System (AFDRS) identifies that under Catastrophic conditions (FBI 100+) the potential for impact is:

> *'Extremely high likelihood of agricultural/pasture/crop/stock loss together with losses of rural assets such as homesteads, fencing, machinery and buildings. Very limited visibility due to smoke and dust. Very high risk to the community related to inappropriate pre- considered plans, inadequate sheltering. Extremely strong winds are very likely to impact infrastructure (e.g. power lines) and fall trees resulting in a high likelihood of obstructed roads and power outages'* (AFAC, 2022).

Under a GFDI of 130 (the pre-2022 'Code Red' level), a fire burning from the BESS toward nearby urban areas (through low threat vegetation and patches of Grassland and on an average slope in the

'All upslopes and flat land' AS 3959:2018 slope class) would potentially achieve a Forward Rate of Spread (FROS) that could cause destruction and, although unlikely, potentially loss of life. Under these conditions, a fire could potentially reach nearby urban areas.

Hazard	BESS ignition
Consequence category	People (beyond site) Infrastructure/assets (beyond site)
Consequence	**Major** A bushfire arising from these circumstances, particularly under weather conditions associated with days of elevated fire danger could burn through the mixed low threat and Grassland landscape and impact nearby urban areas with the potential for harm to people, property and community infrastructure. There is also potential for dense toxic smoke, heat and debris can cause acute respiratory harm, burns or traumatic injuries; reduced road visibility can cause traffic collisions and closure of Verney Road and Grahamvale Road and contamination of soil or waterways.
Likelihood	**Rare** While single-cell failure is uncommon, the facility scale raises the chance that some failure will occur during the asset life. The absence of hazardous vegetation outside of the site reduces the likelihood of impacts.
Risk level	**High**
Treatment	Design and engineering and compliance with relevant standards, thermal monitoring and detection, mitigation and suppression through fire response and suppression systems, module separation, separation from external vegetation (including the provision of a 10 m fire break inside the site boundary and the 6 m high concrete acoustic walls), commissioning and operations procedures, preventative maintenance and safety procedures, emergency response and coordination including management actions as detailed in the accompanying FMP.
Treatment efficacy	Implementing the measures of the FRV GL-55 requirements and the Model Requirements and BESS specific Additional Requirements of the CFA Guidelines cannot eliminate risk entirely but can reduce the likelihood to acceptable residual level of Extremely Rare. Under Catastrophic FDR conditions the potential consequence of a fire remains Major as measures within the Grahamvale BESS can only act to reduce likelihood, not consequence once a fire has spread outside of the facility.
Residual risk	**Extremely Rare/Major – Medium**

5.2.5 Risk description #3

There is potential that an accidental or deliberate ignition on site will result in a fire in BESS infrastructure that causes injury or loss of life to people on site, financial loss through damage to site infrastructure, and/or disruption to operation of the BESS and neighbouring properties.

Fires in BESSs often involve a thermal runaway in batteries, leading to toxic smoke, rapid fire spread, possible explosions, and fires that are difficult to extinguish. Key risk factors include design or

manufacturing defects, physical or electrical abuse, and integration issues, which can cause cells to fail and spread the fire to adjacent units.

The *Battery Energy Storage Systems Guidance Report* prepared for the Australian Energy Council Limited (GHD, 2024) identifies thermal runaway events as a risk associated with the operation of BESS facilities and provides the following broad categories of causes:

- Electrical abuse (e.g. overcharging / discharging).
- Thermal abuse (e.g. overtemperature).
- Mechanical abuse (e.g. external impact).
- Existing, latent defect (e.g. electrolyte leaks, faulty components) (GHD, 2024).

The report provides a non-exhaustive overview of grid-scale BESS incidents from around the world, including the July 2021 Victorian Big Battery fire. It is noted that energy storage battery fires are decreasing as a percentage of deployments as regulation and design improves (Cleanpower, 2023). However, thermal runaway events, along with the potential for electrical faults in other BESS infrastructure, are identified as a risk.

A scenario for a BESS fire event may involve a thermal runaway/ignition inside the BESS (module, rack, container or plant equipment) resulting in uncontrolled fire, heat, smoke and/or projectiles that cause physical damage to adjacent infrastructure within the site (solar arrays, inverters, transformers, terminal station infrastructure, control buildings, underground cables) and/or spread of fire to those assets. It is noted, however, that the presence of the proposed 6 m high concrete acoustic walls makes the spread of fire within the site beyond the immediate areas of the ignition unlikely.

Possible causes could include:

- Cell/module failure leading to thermal runaway (manufacturing defect, internal short).
- Overcharge/overdischarge or BMS failure (control or communications fault).
- Lightning strike or electrical fault in inverter / transformer causing ignition.
- Physical damage (vehicle strike, falling object) or unauthorised access/vandalism.
- Poor commissioning / maintenance, human error, or unsuitable equipment for ambient conditions.

Such an event could impact the site itself and potentially spread offsite if the fire or smoke plume extends beyond site fencing (via smoke drift, flying debris, or fire spread to adjacent vegetation/buildings). Firefighting runoff or contaminated debris also moves off-site, affecting neighbours, public assets and the environment.

The BESS construction and commissioning phases may involve works and development with an elevated likelihood of ignitions, such as electrical faults arising from manufacture or design faults that may be revealed during commissioning, at a time when fire protection systems may not be activated.

The July 2021 Victorian Big Battery fire occurred during the commissioning phase, although it is considered to have 'failed safely' with no resultant casualties or bushfire ignition despite spreading to an adjacent battery pack. The lessons learnt during this incident have informed the current CFA Guidelines.

The subsequent operational phase of the BESS involves the ongoing use of the facility for its intended purpose for the anticipated life of the development. This involves ongoing application of all systems including fire monitoring and protection systems, battery and electrical safety systems and site access control.

Electrical hazards may cause injury to people and/or damage to infrastructure without resulting in a fire. Electrical hazards, potential for intense fire and toxic smoke can make fire fighting particularly hazardous.

The application of a Fire Management Plan, as accompanying this report, is intended to address the risks associated with ongoing operation of the site.

Hazard	BESS ignition
Consequence category	People within site. Infrastructure/assets within site.
Likelihood	**Likely** Large, grid-scale lithium-ion BESS facilities operate with many cells/containers and complex power electronics. While individual cell failures are uncommon, the installed energy (MWh) and number of modules increase the probability that a failure or fault will occur sometime during the life of the plant. Industry experience and guidance (AFAC, CFA, industry reports) show that, without robust design and controls, the probability of at least one significant battery incident over decades is non-negligible. Proximity of multiple energy assets on the same site (substation equipment) raises potential for propagation or collateral damage.
Consequence	**Moderate** Consequences to people (workers/contractors/visitors), site infrastructure (solar arrays, inverters, substation equipment, communications, access and operations buildings), and the environment (pollutant release, soil/vegetation impacts, firefighting runoff) are possible. BESS fire can generate extreme heat and toxic smoke and can damage adjacent transformers, inverter stations, solar arrays and communications; repair/replacement cost and prolonged outage risk to the site (and possibly to grid connection) can be very high. Fire fighting runoff with battery electrolytes and particulates can contaminate soil/water; smoke plume may affect nearby communities. However, consequence would likely be moderate localised event with limited exposure of people.
Risk level	**High**
Treatment	Design and engineering and compliance with relevant standards, thermal monitoring and detection, mitigation and suppression through fire response and suppression systems, module separation, separation from infrastructure, commissioning and operations procedures, preventative maintenance and safety procedures, emergency response and coordination including management actions as detailed in the accompanying FMP.

Treatment efficacy	Implementing the measures of the FRV GL-55 requirements and the Model Requirements and BESS specific Additional Requirements of the CFA Guidelines cannot eliminate risk entirely but can reduce the risk to an acceptable residual level.
Residual risk	**Unlikely/Minor – Low**

Hazard	Electrical hazards
Consequence category	People (within site) Infrastructure/assets
Likelihood	**Likely** A grid-scale BESS contains many high-voltage (HV) and low-voltage (LV) electrical systems (battery strings, DC combiner systems, inverters, LV/HV switchgear, transformers, AC protection), increasing the number of locations where an electrical fault could occur. Common operational electrical-hazard triggers include insulation failure, cable/connector degradation, water ingress, human error during interventions, protection relay or control failures, and switching/commissioning errors. Routine operations, maintenance and periodic interventions (e.g. module replacements, commissioning, or contractor activities) create repeated opportunities for exposure. Past industry experience shows that the probability of some electrical incident (shock, arc flash, HV fault) occurring over a large facility's life is possible. Given these factors, it is likely that there will be electrical failures causing a risk to people and infrastructure (and possibly leading to other risks identified here).
Consequence	**Moderate** Electrical incidents can produce immediate, severe outcomes: fatal or life-changing electric shock; arc-flash burns and blast injuries; ignition of surrounding combustible materials leading to fire; damage to inverters/transformers and secondary system failures causing cascade outages. Consequences extend beyond personal injury: damage to critical site infrastructure (loss of export capability, damage to grid connection equipment), long outages while equipment is repaired/replaced, and potential environmental impacts if fires or spillages occur. For the Grahamvale BESS scale (large MWh capacity), the energy available magnifies the potential severity compared with smaller installations. However, consequence would likely be moderate localised event with limited exposure of people.
Risk level	**High**
Treatment	Treatments include compliance with relevant standards (AS/NZS 3000, AS/NZS 4836, AS/NZS 5139 where applicable) and best practice HV/LV design, segmentation and selective coordination of protection (fault limiting, zone protection, fast isolation hardware, DC string fuses/isolators), adequate earthing/grounding design and equipotential bonding for containerised and outdoor equipment. Use of arc-flash-rated enclosures / remote racking / motorised isolators to keep personnel clear of potential arc-flash. Physical separation and barriers between HV plant and general access areas; weatherproofing and IP-rated components to prevent ingress. Other measures involve detection, monitoring and automated responses (i.e. trip/isolations), procedures and permits, PPE, labels, maintenance, inspection and asset management, emergency preparedness and response.

Treatment efficacy	With full implementation of the design, monitoring and procedural controls, good protection and automation plus strict lockout/tagout and maintenance procedures can substantially reduce incident frequency. Engineering controls (arc-flash rated equipment, remote racking, fast isolation) and PPE greatly reduce the severity of personal injury and limit equipment damage. Early fault detection and automatic isolation reduce cascade effects and together with the application of the measures of the FRV GL-55 requirements and the Model Requirements and BESS specific Additional Requirements of the CFA Guidelines can reduce the risk to an acceptable residual level.
Residual risk	**Unlikely/Minor - Low**

Hazard	Noxious emissions.
Consequence category	People (within and beyond site)
Likelihood	**Likely** A BESS can release noxious emissions primarily in the event of thermal runaway, fire, or chemical spill. These emissions include: • Toxic gases from lithium-ion battery decomposition (e.g. hydrogen fluoride, carbon monoxide, volatile organic compounds). • Smoke, particulates, and electrolyte aerosols. Emissions can occur rapidly during thermal runaway or fire and may be carried off-site by wind. Routine operations carry minimal risk if batteries remain healthy, but during fault conditions, releases are credible. Fire suppression actions, especially with water, can mobilise contaminants and create additional airborne hazards.
Consequence	**Major** Noxious emissions can affect: • Health of staff and responders - acute respiratory irritation, chemical burns, or toxic exposure; potential fatalities in extreme cases. • Off-site receptors - nearby residents, road users (such as on Verney Road and Grahamvale Road), or sensitive environments may be affected by smoke or airborne chemicals. • Environmental contamination - deposition of particulates or chemical aerosols can affect soil, waterways, and vegetation. The severity is significant due to the rapidity of release, toxicity of battery decomposition products, and potential for wide dispersal under prevailing wind conditions.
Risk level	**Extreme**
Treatment	Design and engineering controls include: • Fire-rated, ventilated battery enclosures to contain gases and prevent off-site spread. • Gas management systems or venting designed to minimise toxic release. • Segregation of high-risk areas from personnel access and sensitive receptors. Additionally, detection and monitoring, PPE and emergency equipment, emergency planning and maintenance and assurance controls can be applied.
Treatment efficacy	Treatment can significantly reduce the likelihood of an incident with engineered containment, monitoring, and strict operational controls. Consequence can be reduced

	with rapid detection, remote isolation, protective PPE, and controlled response and can reduce the risk to acceptable residual level.
Residual risk	**Unlikely/Minor - Low**

5.2.6 Risk description #4

There is potential that an accident or mechanical failure will result in the release of electrolyte or other harmful substance with potential to cause injury or loss of life to people on or near the site, financial loss through damage to site infrastructure and/or damage or disruption to neighbouring properties, and/or disruption to operation of the BESS.

The Grahamvale BESS, like all grid-scale lithium-ion battery systems, will involve the storage and management of hazardous materials, including electrolytes, flammable components, and associated ancillary chemicals (coolants, cleaning agents etc.). The identified risk highlights that an accident or mechanical failure could result in the release of these materials, either suddenly (through rupture, thermal runaway, or fire) or gradually (through leakage or degradation of containment systems).

There is potential for an event to impact the health and safety of people, damage to site infrastructure, impact on neighbouring properties and operations and disruption to the operation of the BESS.

Hazard	Hazardous material (Dangerous Goods)
Consequence category	People (within and beyond site)
Consequence	**Major** Release, ignition, or reaction of dangerous goods can result in: • Fire/explosion - thermal runaway of batteries or reaction of stored chemicals can cause intense fires, smoke, toxic fumes, or explosion, endangering personnel and site infrastructure. • Environmental contamination - spilled electrolytes or chemicals can contaminate soil, stormwater, or nearby waterways. • Off-site impacts - depending on the severity, smoke plumes or fire may extend beyond the site, potentially affecting nearby roads (Verney Road and Grahamvale Road), residents, or sensitive ecosystems.
Likelihood	**Rare** The Grahamvale BESS facility contains dangerous goods, primarily in the form of lithium-ion battery cells and modules, which include flammable electrolytes, reactive metals (e.g., lithium) and oxidisers. Ancillary chemicals may include coolants, cleaning agents, and maintenance chemicals classified as dangerous goods. Storage and handling of these materials is continuous over the life of the facility, and there are credible pathways for spills, leaks, or fire if containment or handling procedures fail. Human intervention (maintenance, module replacement, commissioning, or accidental damage) increases exposure opportunities. Industry incident reports demonstrate that dangerous goods at

	large-scale BESS facilities can ignite or release hazardous substances without strict controls. It is noted that the Grahamvale BESS will not store additional battery cells or battery modules as spares on site, all battery cells and modules will be in service. Stored material will be separate from the BESS array.
Risk level	**High**
Treatment	Treatments include design and engineering controls, detection and monitoring, handling and operational procedures, emergency preparedness, maintenance and inspection.
Treatment efficacy	Effective design, monitoring, training, and emergency preparedness, proper containment and handling drastically can reduce the likelihood of accidental release or ignition. Fire-rated enclosures, suppression systems, and emergency response can effectively limit the severity of incidents and off-site impacts and can reduce the risk to acceptable residual level.
Residual risk	**Unlikely/Minor – Low**

5.2.7 All risks

BESS, including their supporting infrastructure, pose electrical hazards to onsite personnel, firefighters, and other supporting emergency responders. These hazards may include, but are not limited to the following:

- Fires and explosions in power converters;
- Fires and explosions in high-voltage transformers, with potential for escalation;
- Electrical fires in substations (e.g., arcing);
- Direct contact with electricity; and
- Electromagnetic radiation generated by BESS, high-voltage power lines, and grid infrastructure.

Any type of risk assessment that is undertaken for a proposed BESS facility, must consider these hazards.

In situations where there is a significant risk to firefighter safety within an operational fire ground setting, FRV's incident controller may rationalise aspects of the responding firefighting activities and focus on protecting adjoining exposures and the environment.

During incidents involving BESS, firefighters and other emergency responders may be exposed to the following challenges.

- The state of charge of an affected unit may be indeterminable.
- High voltages may persist even at low states of charge.
- Energy may be stranded within an affected unit.
- Isolation of the input to or output from an affected unit may be impossible, especially if isolation controls (automated or manual) are compromised by radiant heat exposure.
- The ingress protection (IP) rating of the affected and surrounding units may degrade due to exposure to radiant heat.
- Possibility of secondary incidents, reignition of a thermal runaway, etc.

Hazard	Danger to staff and firefighters during emergency response
Consequence category	People (within site)
Consequence	**Major** Potential consequences for personnel include: • Severe burns, respiratory injuries, or electrocution. • Physical trauma from explosions, arc-flash, or projectiles. • Toxic smoke inhalation leading to acute or chronic health effects. • Multiple responders affected simultaneously in a high-energy event, leading to injury clusters. Consequences extend to operational delays, prolonged site shutdown. Given the energy stored in a large-scale BESS and the properties of lithium-ion batteries, a serious incident could result in major injuries or fatalities if mitigation measures are absent or inadequate. FRV GL-55 Guidelines specify that: *'BESS, including their supporting infrastructure, pose electrical hazards to onsite personnel, firefighters, and other supporting emergency responders. These hazards may include, but are not limited to the following:* • *Fires and explosions in power converters;* • *Fires and explosions in high-voltage transformers, with potential for escalation;* • *Electrical fires in substations (e.g., arcing);* • *Direct contact with electricity; and* • *Electromagnetic radiation generated by BESS, high-voltage power lines, and grid infrastructure.* *Any type of risk assessment that is undertaken for a proposed BESS facility, must consider these hazards.* *In situations where there is a significant risk to firefighter safety within an operational fire ground setting, FRV's incident controller may rationalise aspects of the responding firefighting activities and focus on protecting adjoining exposures and the environment.* *During incidents involving BESS, firefighters and other emergency responders may be exposed to the following challenges:* • *The state of charge of an affected unit may be indeterminable.* • *High voltages may persist even at low states of charge.* • *Energy may be stranded within an affected unit.* • *Isolation of the input to or output from an affected unit may be impossible, especially if isolation controls (automated or manual) are compromised by radiant heat exposure.* • *The ingress protection (IP) rating of the affected and surrounding units may degrade due to exposure to radiant heat.*

	• *Possibility of secondary incidents, reignition of a thermal runaway, etc'*. (FRV, 2025).
Likelihood	**Likely** Emergency response to a BESS incident (fire, thermal runaway, chemical release, or electrical fault) inherently exposes staff and firefighters to multiple hazards, including: • High-energy electrical equipment (HV/LV). • Flammable or reactive battery chemicals and associated smoke/toxins. • Heat, fire, and potential explosion or projectile hazards from failing battery modules. • Unstable or collapsing structures within containerised battery racks. Personnel may be required to enter areas with limited visibility, high heat, or toxic gases during firefighting or rescue operations. Historical incidents and guidance (CFA, AFAC, FRNSW, Australian BESS Safety Studies) indicate that even trained emergency responders face significant risk if procedures or protective equipment are inadequate. Likelihood is considered 'Likely' because the hazard exposure occurs every time an emergency response is required, and BESS incidents are uncommon but credible.
Risk level	**Extreme**
Treatment	Treatments include design and engineering controls, including: • Safe access zones and exclusion areas around high-risk battery modules. • Fire-rated containerisation to limit thermal propagation and prevent secondary hazards. • Automatic shutdown/isolation of HV/LV systems to reduce electrical exposure during emergencies. Additionally, detection and early warning, training and operational procedures, PPE And protective equipment, emergency coordination and maintenance and assurance can reduce the risk to acceptable residual level.
Treatment efficacy	With fully implemented engineering, detection, and procedural controls, combined with well-trained emergency teams the likelihood of an incident can be significantly reduced. PPE, remote intervention, and controlled access reduce the severity of potential injuries can reduce the risk to acceptable residual level.
Residual risk	Unlikely/Minor - Low

5.2.8 Risk summary

The risks identified above, and other subsidiary or associated risks, are summarised as broad categories here. Matters relating to Occupational Health and Safety (OHS), operational and system risks that are not unique to a BESS are not addressed here.

Table 7 –Risk summary.

Hazard	Risk
1). External bushfire	There is potential that during the declared Fire Danger Period a large, established bushfire impacts the Grahamvale BESS and causes injury or loss of life to people on site, financial loss through damage to site infrastructure and/or disruption to operation of the BESS.

2). BESS ignition	There is potential that during the declared Fire Danger Period an accidental or deliberate ignition on site will result in a bushfire that will spread and cause injury or loss of life to people on site, financial loss through damage to site infrastructure and/or neighbouring properties, and/or disruption to operation of the BESS.
3). BESS ignition - Electrical hazards and Noxious emissions	There is potential that an accidental or deliberate ignition on site will result in a fire in BESS infrastructure that causes injury or loss of life to people on site, financial loss through damage to site infrastructure, and/or disruption to operation of the BESS and neighbouring properties.
4). Hazardous material (Dangerous Goods)	There is potential that an accident or mechanical failure will result in the release of electrolyte or other harmful substance with potential to cause injury or loss of life to people on or near the site, financial loss through damage to site infrastructure and/or damage or disruption to neighbouring properties, and/or disruption to operation of the BESS.
All risks - Danger to staff and firefighters during emergency response	

This summary informs the FMP provided as an accompanying document.

5.3 Fire Safety Study

For a utility/grid scale outdoor BESS of more than 5 MWh more than 200 m from a habitable structure the FRV GL-55 Guidelines do not require a Fire Safety Study (FSS) (FRV, 2025).

5.4 Facility location and design

'Renewable energy facilities are to be located in low-risk environments wherever possible, to reduce the risk of external fire impacting the facility and its consequences' (CFA, 2023).

The location and design of the facility is considered in relation to the identified risks.

Additional Requirement – BESS specific
Wherever possible, battery energy storage systems must be sited in low-risk environments, such as where the BMO and LSIO do not apply. The Risk Management Plan must inform the siting for battery energy storage systems.

The bushfire hazard assessment in this FRA (RMP) has identified the landscape, local, neighbourhood and site bushfire risk to be low. As the landscape-scale risk is not entirely consistent with the CFA Guidelines indicators of a low risk environment, further assessment in accordance with the Model Requirements (see table immediately below) is appropriate.

Model Requirements – all facilities
Planning applications for all renewable energy facilities proposed in high risk environments must address the following:

- *a) An assessment against policy at **Clause 13.02-1S (Bushfire Planning)** where the facility is located in a Bushfire Prone Area (BPA):*
- *b) The impact of any ignitions arising from the infrastructure (solar panels, wind turbines, battery energy storage systems, electrical infrastructure) on nearby communities, infrastructure and assets.*
- *c) The impact of bushfire on the infrastructure (eg. ember attack, radiant heat impact, flame contact).*
- *d) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.*

a) Although the site is not in a designated BPA, it has been assessed against Clause 13.02-1S (see landscape risk assessment at Section 4.1 and Clause 13.02-1S response at Section 6).
b) The potential impact of ignitions arising from the BESS has been identified at Section 5, with the measures to mitigate this risk to be arrived at in consultation with FRV and documented in the accompanying FMP.
c) The potential impact of bushfire on the BESS has been identified at Section 5 and the measures to mitigate this risk to be arrived at in consultation with FRV and documented in the accompanying FMP.
d) The potential increase in risk to adjacent land has been identified at Section 5 and the measures to mitigate this risk to be arrived at in consultation with FRV and documented in the accompanying FMP.

5.5 FRV GL-55 and CFA Model requirements response

Other measures, to be documented as part of the FRV consultation process in the accompanying FMP, in accordance with the following sections of FRV GL-55, are:

- Section 8.3 Separation of equipment on site.
- Section 8.4 Ventilation.
- Section 8.5 Access.
- Section 8.6 Firefighting water.
- Section 8.9 Commercial and industrial, and utility scale BESS facilities.

Further measures include:

- Section 9 Commissioning (notification of FRV).
- Section 9.1 Provision of an Emergency Information Book.
- Section 9.2 Emergency Response Plan.
- Section 9.3 Open Yard Storage of BESS.

Additionally, Section 4.2 of the CFA Guidelines, regarding emergency vehicle access, fire fighting water supply, fire break width, separation distances and other controls are documented in more detail in the accompanying FMP for consideration during the consultation process.

No battery safety and protective systems will be omitted from the Grahamvale BESS and the proposal will comply with FRV requirements (noting that the Model Requirements and BESS specific Additional Requirements of the CFA Guidelines are adopted as a methodology during the consultation process).

6 Response to Clause 13.02 *Bushfire planning*

To support the planning application of the Grahamvale BESS, the strategies of Clause 13.02-1S are detailed in the following sub-sections, and a summary response to the relevant strategies is provided about how the development responds to the strategies.

6.1.1 Protection of human life strategies

Priority must be given to the protection of human life.

Prioritising the protection of human life over all other policy considerations

The facility is in a low bushfire risk location. The protection of human life can be prioritised by compliance with FRV requirements, initially through the application of the Model and Additional Requirements in the CFA Guidelines by means of this FRA (RMP), accompanying FMP as part of the consultation process to arrive at a bushfire safe solution.

Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.

As identified in Section 4.1, the site is in a low risk landscape and is not covered by the BMO and is not in the BPA. The location is largely consistent with the indicators listed in the Guidelines for a low-risk environment, and the risk can be adequately addressed by the measures detailed in the accompanying FMP.

The nearest *lower* risk locations are considered to be the urban-residential areas of Shepparton to the south-west that are also not in the BPA (see Map 2).

Reducing the vulnerability of communities to bushfire through consideration of bushfire risk in decision-making at all stages of the planning process

This FRA (RMP) provides the basis for incorporating bushfire risk into decision making associated with planning development in the facility. This FRA (RMP) has identified and assessed the risks to and from the Grahamvale BESS and provides a basis for decision makers to consider risk as part of the application process.

The proposal responds to the CFA Guidelines as a methodology for meeting the FRV GL-55 requirement for a Fire Risk Assessment and will apply the Model Requirements of the CFA Guidelines and the Additional Requirements for BESS facilities as part of the consultation process with FRV. This includes consideration of the bushfire risk during the planning, construction and operational phases of the facility as documented in this FRA (RMP).

It is considered that development of the facility can appropriately implement the strategies in the FRV GL-55 and CFA Guidelines and Clause 13.02-1S that aim to prioritise protection of human life.

6.1.2 Bushfire hazard identification and assessment strategies

The bushfire hazard must be identified and an appropriate risk assessment be undertaken.

Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard.

This report identifies the site hazard in accordance with the commonly accepted methodologies of AS 3959:2018.

The type and extent of (hazardous) vegetation within 100 m of the facility has been identified and classified into AS 3959:2018 vegetation groups. Classification was based on the anticipated long-term state of the vegetation, EVC mapping, aerial imagery, site assessment and published guidance on vegetation assessment for bushfire purposes.

GIS analysis of publicly available 10 m contour data for the area was undertaken and the effective slopes identified (see Map 4).

In relation to climatic conditions and fire weather, the AS 3959:2018 default FFDI 100/GFDI 130 benchmark used in the Victorian planning and building system, has been applied as discussed in Section 4.3.

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.

The extent of BPA coverage has been considered (see Section 4.1) and is shown in Map 2 (rather the inverse; non-BPA land is shown). This is based on the most recent BPA mapping for the area. The site is not in the BPA.

Applying the Bushfire Management Overlay in planning schemes to areas where the extent of vegetation can create an extreme bushfire hazard.

As identified in Section 4, no part of the site is covered by the BMO (see Map 3). This is considered appropriate and reflects recent statewide BMO mapping and the Shepparton Planning Scheme.

Considering and assessing the bushfire hazard on the basis of:

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

The hazard has been assessed and described at the required scales (see Section 4).

At the site scale, the assessment follows the AS 3959:2018 methodology applied in a BPA, of classifying vegetation and topography within 100 m of the facility (see Map 4).

At the landscape scale a 20 km, and 1 km and 400 m radius of the site has been applied (see Map 2 and Map 3) in accordance with Clause 13.02-1S and guidance about assessing risk for planning scheme amendments in the Planning Advisory Note 68 (DEWLP, 2018).

Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.

This FRA (RMP) and the accompanying FMP form the basis for consultation and engagement with FRV. Outcomes from this engagement will inform future updates of this FRA (RMP), the FMP and the overall facility design.

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.

The FRV and CFA Guidelines, Clause 13.02-1S, and the building regulations invoked by the BPA coverage, including the bushfire hazard landscape assessment, specify the general requirements and standards for assessing the risk. Along with *AS ISO 31000:2018 Risk Management – Guidelines* from the Australian Institute for Disaster Resilience *National Emergency Risk Assessment Guidelines* (AIDR, 2020) ('NERAG'), these have been used in this FRA (RMP) as appropriate and bushfire protection measures have been identified commensurate with the risk.

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.

If the FRV GI-55 Guidelines and the objectives and strategies of Clause 13.02-1S are complied with, as outlined in this FRA (RMP), then the risk can be deemed to be acceptably mitigated such that development can proceed.

6.1.3 Settlement planning strategies

Settlement planning must strengthen the resilience of settlements and communities and prioritise protection of human life. As development of the Grahamvale BESS is not settlement planning, these strategies are not applicable and no response is required.

6.1.4 Areas of high biodiversity conservation value

Ensure settlement growth and development approvals can implement bushfire protection measures without unacceptable biodiversity impacts by discouraging settlement growth and development in bushfire affected areas that are of high biodiversity conservation value

The site forms part of property previously used for agricultural and horticultural purposes. There are no apparent additional biodiversity impacts associated with the findings of this bushfire assessment.

6.1.5 Use and Development control in a Bushfire Prone Area

'In a bushfire prone area designated in accordance with regulations made under the Building Act 1993, bushfire risk should be considered when assessing planning applications for the following uses and development:

- ***Subdivisions of more than 10 lots.***
- ***Accommodation.***
- ***Child care centre.***
- ***Education centre.***
- ***Emergency services facility.***
- ***Hospital.***
- ***Indoor recreation facility.***
- ***Major sports and recreation facility.***
- ***Place of assembly.***
- ***Any application for development that will result in people congregating in large numbers'***

The proposed Grahamvale BESS does not meet any of the use and development categories and this control is not responded to here. It is noted that the bushfire risk is adequately mitigated to an acceptable level by the measures documented in this FRA (RMP).

7 Conclusion

Terramatrix was engaged by Beveridge Williams Pty Ltd on behalf of AE BESS 3 Pty Ltd to prepare a FRA (RMP) for the proposed Grahamvale BESS, that identifies and assesses the risk to the proposed development. The site is not in a designated BPA and there is no BMO coverage.

This report details how the bushfire hazard to the proposed Grahamvale BESS has been assessed at various scales, in accordance with Clause 13.02-1S in the Shepparton Planning Scheme, AS 3959:2018 methodology and additional guidance provided in *Planning Advisory Note 68 Bushfire State Planning Policy Amendment VC140* (DEWLP, 2018). This FRA (RMP) responds to the Fire Rescue Victoria publication *Battery Energy Storage Systems Guideline No. 55* (GL-55) (FRV, 2025) and uses the Model and Additional Requirements outlined in the *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* by the Country Fire Authority (CFA, 2023) as a methodology.

The landscape has been determined as being of a low bushfire risk. Bushfire behaviour can reasonably be expected to be well within AS 3959:2018 presumptions and design parameters. The type and extent of classified (hazardous) vegetation within 100 m of the facility has been identified and classified into AS 3959:2018 vegetation groups, based on the extant modelled EVC mapping, aerial imagery and site assessment. The classification is based on the current and likely future state of the vegetation and identifies that the hazard is limited areas of Grassland.

The topography on and around the site, within the 100 m assessment zone is flat or slightly undulating and the applicable AS 3959:2018 slope class under Grassland is 'All slopes and flat land'.

The identified landscape, local, neighbourhood and site scale bushfire risk is low and the development can appropriately prioritise the protection of human life and meet the objectives of Clause 13.02-1S by implementing the FRV GL-55 Guidelines.

The risk assessment process - subject to further input from stakeholders and consultation with FRV - has identified that the risks to and from the proposed BESS can be managed to an acceptable level through the implementation of the FRV GL-55 Guidelines and using the applicable Model and BESS specific Additional Requirements of the CFA Guidelines in the accompanying FMP as part of the consultation process.

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