Fire Rescue Victoria

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Author: FSSPR and DG Units
Sponsor: Dangerous Goods Unit
Authorised by: Director, Fire Safety

Battery Energy Storage Systems

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1 PURPOSE

The purpose of this guideline is to inform industry of key safety in design considerations that Fire Rescue Victoria (FRV) considers relevant in the design and installation of Battery Energy Storage Systems (BESS).

2 SCOPE

This guideline applies to BESS installations that are proposed to be installed within the FRV fire district. It encompasses provisions for designers and facility operators where lithium-ion (Li-ion) BESS technologies are used or proposed to be used, which inherently maintain the potential to initiate a thermal runaway event or fire. Importantly, this guideline may also be used where BESS installations propose to utilise alternative battery chemistries.

3 DEFINITIONS

The following definitions and abbreviations apply to this document:

Deterministic Analysis – Evaluates a specific scenario (e.g., worst-case fire) using fixed inputs to compare outcomes (e.g., heat release, toxic gas) against safety criteria.

Fire Safety Study (FSS) – Systematic analysis to identify and mitigate fire hazards. It ensures fire prevention, detection, and protection measures are adequate for the specific hazard. *FRV Guideline 54 – Fire Safety Study* [1] provides further detailed guidance.

FRV Fire District – Has the same meaning as Section 4 of the *Fire Rescue Victoria Act 1958* (Vic.).

Habitable Structure – Structures that include residential dwellings, commercial and industrial buildings, public buildings, and the like, which remain legally habitable.

NSW HIPAP 2 Guidelines [2] – NSW Government, Department of Planning, Hazardous Industry Planning Advisory Paper No. 2, Fire Safety Study Guidelines, January 2011.

NSW HIPAP 6 Guidelines [3] – NSW Government, Department of Planning, Hazardous Industry Planning Advisory Paper No.6, Hazard Analysis, January 2011.

Preliminary Hazard Analysis – A systematic process used in the preliminary stages of project development to identify and evaluate potential hazards that could impact the safety and functionality of a system, process, or activity.

Protected Place – A facility where individuals are employed, whether within or beyond property boundaries. This includes, but not limited to offices, warehouses, manufacturing or processing areas, detached amenity blocks, schools, childcare centres, hospitals, event centres or the like, including ancillary outdoor areas.

Qualitative Risk Assessment – A risk evaluation method that uses descriptive analysis and expert judgment to identify hazards, assess potential impacts, and determine risk levels without numerical calculations, e.g., HAZID. Refer to ISO 31000: Risk Management [4].

Quantitative Risk Assessment (QRA) – A data-driven method that uses statistical analysis, probability calculations, and modelling to measure risk levels with numerical precision.

Semi-Quantitative Risk Assessment – A risk assessment approach that combines qualitative judgment with numerical scoring or consequence modelling to provide a more structured risk evaluation. e.g., thermal radiation, explosion overpressure, toxic dispersion modelling by using industry recognized software packages. Refer to the SFPE Handbook of Fire Protection Engineering.

4 BACKGROUND

FRV recognises that BESS offer significant advantages in renewable energy integration and grid stabilisation by storing surplus energy and releasing it when demand peaks. As this technology continues to grow across the energy sector, it also presents unique fire safety and risk management challenges.

Commercial and industrial scale BESS installations, as well as utility scale BESS installations, particularly those utilising lithium-ion battery technology, have been associated with several incidents globally, resulting in substantial fire, explosion, and toxic exposure hazards.

Such incidents have highlighted the potential for harm to responding firefighters and surrounding communities, particularly in densely populated urban and residential areas. In response to these risks, FRV and fire agencies internationally have classified utility scale BESS and commercial and industrial scale BESS as posing significant electrical, chemical, and fire hazards. Consequently, rigorous fire safety measures and comprehensive risk management strategies are essential throughout the design, installation, and operational life of these assets.

There have been several incidents within Australia involving BESS. These have been attributed to a range of factors, including manufacturing defects, battery damage, and improper installation, resulting in thermal runaway and fires.

The knowledge gained through the evaluation of fire incidents involving Li-ion BESS technologies aided the development of this fire safety guideline.

5 TYPES OF BESS

For the purposes of this guideline, the following categories will be used to identify the BESS installation settings.

5.1 Neighbourhood/Community

A neighbourhood battery, or a community battery, which has an energy storage capacity of 200 kWh to 2 MWh.

These batteries are connected to a segment of the electricity distribution network and operate with a nominal voltage not exceeding 66,000 volts.

A neighbourhood battery is usually installed alongside public buildings and infrastructure.

5.2 Commercial and Industrial

A commercial or industrial installation, otherwise referred to as medium-scale BESS, has an energy storage capacity of 200 kWh to 5 MWh.

These systems can be installed in either indoor or outdoor environments.

5.3 Utility

Utility scale BESS typically has an energy storage capacity above 5 MWh, which are typically located adjacent to grid power supply infrastructure.

6 FIRE RESCUE VICTORIA'S ROLE

State and local government agencies that maintain a statutory role under relevant planning and environmental protection legislation may require designers, developers, land users or owners of property to obtain FRV's consent or approval, in connection with an application for a planning permit to install a BESS.

Additionally, these stakeholders may voluntarily seek to obtain FRV's written advice when developing a Fire Safety Study for proposed installations.

All submissions requesting FRV's written advice must include the completed Application Form and will incur fees and charges as set out in Regulation 21 of the Fire Rescue Victoria (General) Regulations 2020 [5]. This requirement applies when FRV has provided consent, approval, or written advice, as it allows FRV to assess the property and tailor its response strategy in the event of an incident.

7 RISK ASSESSMENT

FRV may expect qualitative, semi-quantitative and quantitative risk assessments based on the scale of the BESS facility. These types of risk assessments support the creation of a case-specific, hazard-based design approach to ensure that the fire safety system is adequately equipped to address potential fires at the site, effectively minimising the risk of fire propagation and incident escalation. The risk assessment, e.g. fire safety study, must be based on the specific BESS and associated equipment proposed for the development.

Qualitative risk assessments that identify potential hazards and estimate their impact may suffice for neighbourhood and community BESS installations.

However, commercial & industrial and utility installations demand semi-qualitative or quantitative risk assessments, which use statistical data and modelling (e.g., thermal radiation and toxic dispersion) to precisely evaluate risks.

Note: Appendix A contains a summary of the risk assessment processes and types of documents that are expected to be prepared by industry when consulting with FRV.

7.1 Fire Risk Assessment

A Fire Risk Assessment (FRA) is a qualitative, semi-quantitative and/or quantitative risk assessment methodology that is used to identify fire hazards, evaluate the likelihood of fire events, and assess their potential consequences. It should follow the principles of ISO 31000, which provides a structured approach to risk management, including hazard identification, risk analysis, and risk evaluation.

The FRA helps determine whether existing or proposed fire safety controls are adequate or if additional measures or assessment are required to reduce risk to acceptable levels.

7.2 Preliminary Hazard Analysis (PHA)

If a proposed utility scale BESS is to be situated within an urban area, or in close proximity to protected places, or is to be surrounded by existing facilities, it has the potential to pose a hazard to the surrounding areas. In these cases, FRV expects that a Preliminary Hazard

Analysis (PHA) is prepared to assess the off-site impact or risk to people, property, and the environment at the proposed location.

At a minimum, the PHA should address—

- BESS hazards (e.g., fire, toxic gas exposure, explosion)
- Electrical hazards
- Electromagnetic radiation from high-voltage sources
- Natural hazards (e.g., earth tremors, adverse weather, bushfires).
- Hazards associated with the storage and handling of dangerous goods (if applicable).

For a new development, the PHA should be conducted at the earliest stage of the project, which is typically useful for land-use planning purposes.

It is important to note that a PHA may be based on limited information, as complete data on the design and precise safeguards may not be initially available. The outcome of the PHA may influence the selection of technology or the site for development, and its results will be an input at later stages of project development.

The PHA should be developed using a well-recognised methodology, such as the NSW HIPAP 6 Guidelines. It is expected that a PHA study includes adequate modelling and quantitative analysis to justify risk acceptability.

7.3 Fire Safety Study

The Fire Safety Study (FSS) must meet the operational requirements of FRV to achieve an adequate level of on-site fire and life safety independence. Given the variety of battery chemistries, the FSS should be tailored to the specific types of batteries intended for use at the facility.

FRV Guideline *GL-54 Fire Safety Study* provides guidance on the preparation and expectations of a FSS and includes references to the NSW HIPAP 2 Guidelines.

FRV does not expect that a FSS is prepared for a proposed neighbourhood battery installation.

FRV expects that an FSS is prepared for an indoor commercial and industrial scale BESS facility. The FSS that is compiled for this specific indoor setting must also demonstrate that the ventilation system is adequate for managing the flammable, corrosive, and toxic vapours and gases produced during a thermal runaway event.

Where a utility scale BESS facility or a commercial and industrial scale BESS installation is proposed, it is imperative that a FSS is prepared.

7.4 Hazards to firefighters and other emergency responders

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.

7.5 Specific risk mitigation measures for Neighborhood/Community battery installations

FRV recommends implementing the following measures for neighbourhood/community BESS.

a. Security Measures: Install fences, bollards, and cameras to protect against any unauthorized access and potential mechanical impact.

b. Water Protection: Ensure proper water ingress protection, including safeguards against flood water.

c. Remote Monitoring: Implement remote monitoring systems to detect faults and temperature increases outside the manufacturer's specified operating parameters, and to notify emergency services immediately.

d. Fire Water Runoff Management: Establish measures to manage fire water runoff effectively.

e. Combustible Material Clearance: Maintain a clear area around the batteries, free from combustible materials such as fallen leaves, branches, and debris.

f. Regular Maintenance: Conduct regular inspections, testing, and servicing as required by legislation and the manufacturer.

g. Post-Event Inspections: Perform periodic inspections following significant weather events and reports of damage.

h. Marking and Painting: Battery units or modules should not be painted or covered with any other external materials without manufacture approval. This may obstruct heat transfer and the ventilation system.

8 DESIGN CONSIDERATIONS FOR BESS FACILITIES

8.1 Technical reference documents

Unless otherwise specified by this guideline, the current version of the following standards should be utilised for the design and operation of 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.

8.2 Location considerations for Neighborhood/Community BESS

Site selection is critical for the safe installation of a neighbourhood/community BESS. Where a neighbourhood / community BESS is proposed, FRV recommends that its planned on-site location be—

a. Situated within low-risk locations, i.e., low-density population levels, low vehicular traffic movement and areas that are not subject to flooding or rainwater inundation;
b. Situated outside of areas that are defined by the Victorian Planning Provisions as being subject to a Bushfire Management Overlay or Land Subject to Inundation Overlay;
c. Situated outside of the potential drop zone of natural vegetation and away from overhead power lines;
d. Installed on a suitable load bearing, non-combustible surface, such as a reinforced concrete slab;
e. The subject of a deterministic analysis, which is informed by suitable qualitative or quantitative methods that consider the impact of heat, explosion and toxicity, where neighbourhood/community BESS are proposed to be within 10 metres of a habitable structure or inside a building or protected place;
f. Situated within accessible locations that permit firefighters to use an on-site fire hydrant installation or a street hydrant installation, to combat a fire at or near the proposed location of the neighbourhood / community battery, as well as protecting adjoining exposures.

8.3 Separation of equipment on site

The Fire Safety Study (FSS) must outline strategies to prevent fire spread between equipment, supported by fire testing or engineering evaluation, with appropriate consideration given to the following matters.

- A deterministic analysis should consider credible fire scenarios and determine adequate control measures to demonstrate that a fire will not propagate from the initiating module or unit, i.e. mitigation of escalation. During the design phase, the deterministic analysis should be represented within a fire engineering evaluation. Prior to or during the project's commissioning phase, it may be necessary to undertake bespoke fire testing to validate the operation of the control measures.
- Where controlled burn out is proposed for the site, separation distances between equipment are required to be quantitatively validated to mitigate potential for fire spread between equipment onsite.
- The calculated total heat release rate and time to total burn out for a BESS unit fire event are also to be provided in this analysis.
- Separation distances between equipment and other exposures, e.g., allotment boundary, buildings, storage of hazardous materials, access tracks for emergency services and so on are be substantiated.
- Transformer fires inducing thermal runaway exposure to neighbouring BESS units should be considered. It is noted that the separation distances referred to in AS 2067-2018 [10] do not consider this issue. The spatial separation requirements of AS 2067-2018 or any deviation from this standard, must be validated by consequence modelling.

8.4 Ventilation

BESS units, cabinets, or containers should be equipped with adequate ventilation in accordance with the manufacturer’s requirements. Designers should also have regard to the specific ventilation requirements and smoke control measures that are contained within NFPA 68 [6], NFPA 69 [7] and AS 1668.1-2015 [8] and AS 1668.2-2012 [9], when situated within buildings.

The FSS for any facility proposing to contain a BESS must demonstrate through a deterministic analysis that is informed by suitable qualitative or quantitative methods that the ventilation system is adequate for managing the flammable, corrosive, and toxic vapours and gases produced during a thermal runaway event.

It is expected that the deterministic analysis will address how the accumulation of flammable and toxic vapours or gases will be managed via adopted engineering controls, such as detection and mitigation systems.

A scenario that considers thermal runaway, which is generated by a flammable atmosphere, requires a consequence assessment to evaluate the impact of an ignition leading to deflagration or explosion on surrounding racks or units, supporting infrastructure, and other nearby elements or structures.

8.5 Access

FRV recommends site access is provided around the full perimeter of the installation with the provision of a least two points of access throughout the facility. The number of access points must be informed through a risk management process, developed in consultation with FRV.

The Country Fire Authority’s *Design guidelines and model requirements for Renewable Energy Facilities* v4 publication [10], provides detailed guidance on access considerations.

Ensuring access for firefighting purposes is a critical design consideration that ensures that an incident involving a BESS can be managed safely and efficiently.

Firefighting vehicles must have unhindered access to the site containing the BESS. Wide, stable access roads that physically support large firefighting vehicles and permit other firefighting vehicles to pass them, are essential attributes of an emergency vehicular access road.

Clear, unobstructed pedestrian access routes must be provided to allow firefighters to reach all critical areas of the facility, particularly in emergency scenarios.

Appropriate hardstand areas must be incorporated to serve as staging locations for firefighting vehicles, in accordance with Section 3.3 of AS 2419.1-2021 [11]. The design should include multiple staging areas to account for varying wind directions and potential obstructions, thereby reducing firefighters' exposure to toxic gases and fumes during an incident.

8.6 Firefighting water

At a minimum, FRV requires the installation of a hydrant system that complies with the requirements of AS 2419.1:2021. BESS installations are classified as special hazard areas and must be assessed in accordance with Appendix E of the standard.

External fire hydrants must be strategically located and remain easily accessible to responding firefighters. The facility should have appropriate water supplies that are compatible with the fire suppression and exposure protection requirements for the identified fire scenario of the BESS facility, as determined in the FSS.

The location of any external hydrant shall be situated outside of a 3 kW/m^2 radiant heat contour.

Consideration must also be given to the containment of firefighting water which will vary from site to site.

8.7 Indoor installations

Indoor BESS installations, require more stringent ventilation and access controls to manage risks such as thermal runaway incidents and release of toxic gases.

Outdoor installations, while having more natural ventilation, may require different access considerations due to potential exposure to the elements and surrounding infrastructure.

In either situation, designers must ensure that a safe atmosphere is achieved, which supports the safe conduct of fire brigade intervention activities.

8.8 Signage and other visual indicators

FRV recommends that neighbourhood/community battery installations be provided with prominent visual indicator markings or signage within external settings that are visible to approaching firefighters.

It is strongly preferred to use warning notices, as referenced by AS/NZS 4777.1-2016 [12], which identify potential electrical and high-voltage hazards.

Emergency contact details of the neighbourhood battery's owner and specialist electrical response arrangements or personnel should be displayed in a prominent location that is visible to approaching firefighters and adjacent to the battery.

FRV recommends that the posted emergency contact sign meet the following requirements.

a. The sign must utilise both fade and weather-resistant material.
b. The use of text that is no less than 50 mm in height, in a colour contrasting with the background.
c. The sign should be affixed to a pedestal or metal pole and be situated no closer than 3 m of the battery and within 1200 mm to 1800 mm of the surface level.

d. Where the property is provided with a fire indicator panel of fire control centre, the emergency contact sign should be situated or duplicated at these locations.

8.9 Commercial and industrial, and utility scale BESS facilities

Signage should be installed at strategic locations based on a thorough site assessment. This includes all facility entrances, the main control room, and electrical and chemical hazards.

A red visual alarm device (VAD) that conforms with AS ISO 7240.3-2021 [13], should be affixed to the wall, at or near the entrance to an occupiable physical enclosure that contains the BESS.

The activation of the VAD should be initiated by the installed detection system, battery management system (BMS) or any other automatic or manual protection measure that may be in place.

9 COMMISSIONING

FRV's Dangerous Goods Unit must be notified no less than 30 days before the commissioning of the BESS. Notifications should be made in writing and sent to dangerousgoods@frv.vic.gov.au.

9.1 Emergency Information Book

BESS facilities present unique hazards for firefighters during an emergency response. Providing accurate and current information about potential risks and hazards to emergency responders is crucial for effective intervention, minimising response delays, and ensuring the safety of responders.

For a utility scale BESS, and a commercial and industrial scale BESS within an indoor setting, an Emergency Information Book (EIB) shall be prepared and situated within the site's Emergency Information Container (EIC).

For guidance on how to prepare an EIB, please refer to FRV's Emergency Information Book publication [14].

For non-utility scale BESS installations, an EIB may not be necessary if they form part of a building or property fire protection infrastructure.

9.2 Emergency Response Plan

FRV expects that an Emergency Response Plan (ERP) is prepared for every utility scale, and commercial and industrial scale BESS that is proposed to be installed within an indoor setting. An ERP is not expected for a neighbourhood battery installation. Similarly, an ERP is not expected for a commercial and industrial scale BESS that is situated within an outdoor setting.

The ERP is a key component of an EIB. The ERP must be developed with consideration of the specific hazards posed by the site and should meet the operational requirements of FRV. Recommendations from the FSS should be incorporated into the ERP.

In addition to standard content, the ERP should also address the following additional issues.

a. Procedures for alerting the owner/operator to abnormal operations, faults, or hazards in the BESS.
b. Procedures for notifying fire services of an incident. FRV preference is for an automatic notification. That is, upon detection of a fire in the BESS or on the site via an automatic detection system, notification to the fire services should be immediate.
c. Communication strategies with the remote operator representative during an incident.

d. Arrangements for the attendance of an emergency liaison officer (ELO) on-site during any incident.

e. Clear procedures for communicating critical battery status and operational information to emergency services. This includes details on the activation of deflagration panels and other essential safety measures.

9.3 Open Yard Storage of BESS

Most BESS projects involve the import of containerized units from international manufacturers, which are then temporarily stored in open areas such as ports, depots, wharfs, or project staging areas before installation.

FRV recommends the following measures to reduce fire risks and support firefighting efforts.

a. Cluster Segregation: BESS units should be grouped into clusters, with each not exceeding 50 meters in length.

b. Separation Distances: Maintain at least 6m from fire hazards. e.g., buildings, boundaries and 1m within clusters for access panels, doors, or vents.

c. Stacking Restrictions: For utility scale BESS and commercial and industrial scale BESS, racks and/or containers should not be stacked.

d. Firefighting Access: Provide perimeter access for fire brigade vehicles in line with firefighting guidelines.

e. Operational Firefighting Equipment: Fire hydrants and suppression systems should be functional before delivery and storage.

f. Fire Protection Measures: If firefighting equipment is not available, ensure alternative fire protection is available, especially in bushfire-prone areas.

g. State of Charge (SOC) Limits: Each battery module should adhere to SOC limits set by manufacturers (usually 30%), the International Maritime Dangerous Goods Code, or UN Transport Regulations.

h. Battery Management System (BMS): BMS should be active and monitored per manufacturer guidelines.

i. Communication Strategy: Implement a system to monitor BMS status and notify of any abnormal conditions.

j. Emergency Plan: Prepare an emergency response plan, considering potential hazards and regulatory requirements.

10 REFERENCES

[1] *Fire Rescue Victoria 2024, Fire Safety Guideline GL-54 Fire Safety Study*, FRV, East Melbourne, Victoria.

[2] NSW Department of Planning, *Hazardous Industry Planning Advisory Paper 2: Fire Safety Study Guidelines* (January 2011).

[3] NSW Department of Planning, *Hazardous Industry Planning Advisory Paper 6: Hazard Analysis* (January 2011).

[4] International Organization for Standardization, *ISO 31000:2018 – Risk Management – Guidelines*.

[5] Fire Rescue Victoria (General) Regulations 2020 (Vic), S.R. No. 68/2020.

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[7] National Fire Protection Association. (2024). NFPA 69: *Standard on explosion prevention systems* (NFPA 69-2024). Quincy, MA: NFPA.

[8] Standards Australia. (2015). AS 1668.1:2015 – *The use of ventilation and air conditioning in buildings – Part 1: Fire and smoke control in buildings.* Sydney, NSW: Standards Australia.

[9] Standards Australia (2024). AS 1668:2-2024 – *The use of ventilation and airconditioning in buildings – Part 2: Mechanical ventilation in buildings.* Sydney, NSW: Standards Australia.

[10] Country Fire Authority. (June 2025). *Design guidelines and model requirements: Renewable energy facilities* (Version 4.4). State of Victoria (Country Fire Authority Specialist Risk and Fire Safety Unit).

[11] Standards Australia (2021). AS 2419:1-2021 – *Fire hydrant installations Part 1: System design, installation and commissioning.* Sydney, NSW: Standards Australia.

[12] Standards Australia & Standards New Zealand. (2016). AS/NZS 4777.1:2016 – *Grid connection of energy systems via inverters – Part 1: Installation requirements.* Sydney, NSW: Standards Australia.

[13] Standards Australia. (2021). AS ISO 7240.3:2021 – *Fire detection and alarm systems – Audible alarm devices.* Sydney, NSW: Standards Australia.

[14] Fire Rescue Victoria. (2021). *Emergency Information Book.* State of Victoria (Fire Rescue Victoria). https://www.frv.vic.gov.au/sites/default/files/2021-04/EIB%20Information.pdf

[15] Fire and Rescue NSW, *Technical Information – Large-scale external lithium-ion battery energy storage systems – Fire safety study considerations*, Version 01, State of New South Wales, Jul. 2023.

[16] Energy Safe Victoria. (2023). *Safety standards for high voltage and complex electrical installations*. State of Victoria.

[17] Safe Work Australia. (2012). Emergency plans fact sheet. https://www.safeworkaustralia.gov.au/doc/emergency-plans-fact-sheet

[18] FM Global, *Property Loss Prevention Data Sheet 5-33: Electrical Energy Storage Systems,* Factory Mutual Insurance Company, 2020.

[19] FM Global 2022, *Property Loss Prevention Data Sheet 5-32: Data Centres and Related Facilities,* Factory Mutual Insurance Company, 2022.

[20] Standards Australia. (2023). AS IEC 62619:2023 – *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications.* Sydney, NSW: Standards Australia.

[21] Standards Australia. (2000). AS 4681-2000 – *The selection of cables for fire safety systems.* Sydney, NSW: Standards Australia.

[22] Fire and Rescue NSW. (2024). *Position statement summary: Open yard storage of battery energy storage systems (BESS)* (Version 01 – December 2024). State of New South Wales.

Appendix A: Required documentation and consultation to satisfy FRV

	Utility BESS		Commercial & Industrial BESS[Ψ]		Neighbourhood / Community BESS	
Energy Storage Capacity	**> 5 MWh**		**< 5 MWh**		**200 kWh – 2 MWh**	
Type/position	**State/National utility/grid scale – before electrical meter (outdoor)**		**Local business/industry after electrical meter (Indoor/outdoor)**		**Local council or community utility/grid scale – before electrical meter (outdoor)**	
Consultation with FRV (FRV Position)	Expected		Expected		Not Expected	
Pre-Planning Permit (Conceptual Design Phase)	≤ 200 m of habitable structure	> 200 m of habitable structure	Indoor	Outdoor	< 2 MWh	Criteria 1: > 2 MWh or Criteria 2: < 2 MWh and < 10 m of habitable structure
	▪ Fire Risk Assessment ▪ Preliminary Hazard Analysis (PHA)*	▪ Fire Risk Assessment	▪ Fire Risk Assessment	▪ Fire Risk Assessment	▪ Fire Risk Assessment	▪ Fire Risk Assessment
Pre-Construction (Design Development Phase)	▪ Fire Safety Study (FSS) ▪ Bushfire Attack Level (BAL)[Ω] assessment – refer to AS 3959	▪ Consequence modelling ▪ Bushfire Attack Level (BAL)[Ω] assessment – refer to AS 3959	▪ Consequence modelling (all except Data Centres) ▪ Fire Safety Study (FSS) (for Data Centres only) ▪ Bushfire Attack Level (BAL)[Ω] assessment – refer to AS 3959	▪ Consequence modelling (if within 70 m of habitable structure) ▪ Bushfire Attack Level (BAL)[Ω] assessment – refer to AS 3959	▪ Bushfire Attack Level (BAL)[Ω] assessment – refer to AS 3959	▪ Consequence modelling ▪ Bushfire Attack Level (BAL)[Ω] assessment – refer to AS 3959
Pre-Operation (Commissioning Phase)	▪ Emergency Response Plan (ERP) ▪ Emergency Information Book (EIB)		▪ Emergency Response Plan (ERP) ▪ Emergency Information Book (EIB)	▪ Emergency Information (Contact and basic battery info)	▪ Emergency Information (Contact and basic battery info)	

Ψ including Data Center with lithium-ion or similar batteries
*Subject to condition, please refer to the guidelines for details
Ω As applicable