Great North Road Solar and Biodiversity Park

Environmental Statement

Volume 4 – Technical Appendices

Technical Appendix A5.4 – Outline Fire Safety Management Plan

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Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, APFP Regulation 5(2)(a)

Contents

A5.4.1 INTRODUCTION

A5.4.1.1 DESCRIPTION

1 The proposed Great North Road (GNR) Solar and Biodiversity Park (the "Development") includes a Battery Energy Storage System (BESS) with an indicative maximum power output of 440 MW. The BESS will be within Work Area no. 5a: BESS. The Applicant has taken extensive measures to ensure a comprehensive fire safety strategy forms part of the Environmental Statement (ES).

2 This Outline Fire Safety Management Plan (FSMP) has been developed in collaboration with Blanboz Smart Renewables. This FSMP has been prepared by using the same approach adopted successfully at the consented Staythorpe BESS project (Planning Reference 22/01840/FULM) as well as the most recent fire safety guidance and best practice available at the time of preparing it. That approach was agreed after extensive consultation with Nottinghamshire Fire & Rescue Service (NFRS), and after accounting for concerns raised by the public in relation to fire safety. It was developed in coordination with industry leading experts including a Senior Advisor to the National Fire Chiefs Council (NFCC), the expert advisor to NFRS and a former Head of Safety for another large Fire and Rescue Service.

3 This Outline FSMP has been prepared based on the Draft Outline FSMP that was submitted for consultation as part of the Preliminary Environmental Information Report in January 2025. No responses were received that made specific comments on the content of the Draft Outline FSMP, and consequently no changes were made between the Draft Outline FSMP and this Outline FSMP.

4 The Outline FSMP has been reviewed and updated in accordance with the NFCC 2025 Guidance, following discussions with NFRS in March ~~2025~~2026.

5 Following grant of the DCO, once a preferred make and model of battery has been identified, this Outline FSMP will be refined further, in consultation with relevant bodies, into a final FSMP which will be submitted for the approval of Newark and Sherwood District Council (NSDC).

6 The aim of this report is for the Applicant to adopt the recommended measures set out in this document. Where this occurs, the risk of a fire occurring should be significantly reduced throughout the design, procurement, construction and operational phases of the project. Proactive measures will also be set out in this document aiming to deter the spread of fire should it occur on-site.

7 During the construction phase, the Applicant will liaise with NFRS to ensure that the site complies with legislation, and that NFRS are familiar with the facility. The Applicant will have continual liaison with NFRS throughout the operational life of the facility, to ensure the preparation of a clear and detailed response strategy as part of a comprehensive emergency response plan (ERP) in the case of a thermal event.

8 There are no applicable comprehensive IEC / BS EN standards that provide the same level of guidance, and as such, NFPA 855 is considered the standard for BESS facilities for mitigating hazards associated with energy

storage systems. The recommendations list and insurers guidance heavily reference UL 9540, UL 9540A, UL 1973, NFPA 68, NFPA 69 and IEC 62933-5-2 for the procurement and testing of BESS components, and NFPA 855 to cover the development of the BESS facility.

A5.4.1.2 BACKGROUND

9 The BESS is part of the Development, which forms part of the DCO Application.

10 It is expected that the BESS, as part of the Development, will be delivered via a BESS Supply Agreement with a BESS Original Equipment Manufacturer (OEM) and Balance of Plant (BoP) contractor. This Supply Agreement will significantly influence the technical specifications that underpin the BESS at the Development. The technical specifications will comply with all mitigations listed within this FSMP.

11 The BESS facility will consist of energy storage cells, modules, racks, cable and connectors, Battery Management System (BMS), DC isolators, AC breakers, and Housings, Power Conversion Systems (PCS / inverters and step-up transformer(s)), containerised housings, cables, connectors, smoke and fire detection systems, and fire suppression systems.

12 The BESS is planned to consist of multiple outdoor enclosures, housing battery modules placed in series to form a rack, racks placed beside each other in parallel, heating/cooling system, fire detection and prevention system (linked together to a central fire control panel), and a Battery Management System (BMS) to ensure the safe management of each single rack/string (and to isolate each rack/enclosure by opening DC contactors). The Energy Management System (EMS) forms the second layer of protection, ensuring all rack/enclosure level BMSs are operating within the safe limits, and allows the Operations and Maintenance (O&M) team to remotely operate and monitor the system through the site wide Supervisory Control and Data Acquisition (SCADA) system.

13 The battery cells have a design life of 25 years, and the DCO specifies an operational phase of 40 years. Equipment will be replaced as required to meet the 25 year design life requirement. Where components are replaced due to failure, or end of life, these will be replaced with equivalent components and certification. Any Lithium-Ion batteries replaced due to failure, augmentation or end of life, shall maintain or exceed the same level of certification that the batteries were previously procured with. The Applicant will appoint an O&M Contractor to conduct periodic maintenance activities on all aspects of the BESS facility.

A5.4.1.3 OBJECTIVES

14 The objectives of the recommendations in this FSMP are to:

- Assist the Applicant to fulfil their responsibilities to provide appropriate and effective fire safety management in their premises;
- Support the design fire strategy;
- Assist managers responsible for fire safety in the premises in discharging their duties effectively; and

- Provide a documentary record of the fire safety arrangements in the premises to assist in demonstrating compliance with the requirements of The Regulatory Reform (Fire Safety) Order 2005 (see section A5.4.1.5).

A5.4.1.4 APPROACH

15 The FSMP recommendations cover the following key areas:

- Organisation – overview of the planned organisation including roles and responsibilities;
- Fire Safety Arrangements – fire safety arrangements for the site, including:
  - Risk Assessment - comprehensive risk assessment covering the most critical failure modes experienced by the BESS from its initial transportation to site and storage, to issues seen on other similar sized BESS facilities. The risk assessment includes prevention measures and mitigations that must be implemented throughout the design, construction and operation of the project;
  - Recommendations List - the recommendations list contains technical guidance from independent insurers, GNR BESS will demonstrate compliance with these insurance requirements, considering NFPA 855 and the NFCC Guidance (2025) to enhance the design of the facility, mitigating fire risk as far as reasonably possible. The goal is to prevent any event from occurring, and secondarily introduce mitigations to prevent the spread of any such event;
- Monitoring – evacuation drills, checks, maintenance and testing, record keeping; and
- Audit and Review – review schedule, audit trail requirements and response to changes.

A5.4.1.5 REFERENCE DOCUMENTS

- BS 9999: 2017 Code of practice for fire safety in the design, management and use of buildings;
- UL 1973 – Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications.
- UL 9540 – Energy Storage System (ESS) Requirements;
- UL 9540A – Battery Energy Storage System (ESS) Test Method;
- NFPA 68 – Standard on Explosion Protection by Deflagration Venting; NFPA 69 – Standard on Explosion Prevention Systems;
- NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems;
- IEC 62619 –Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications;
- National Fire Chiefs Council (NFCC) Grid scale energy storage system planning - Guidance for fire and rescue services. Version 2, December 2025;
- Allianz Global Corporate and Speciality, Allianz Risk Consulting, Tech Talk 26 – Battery Energy Storage Systems (BESS) Using Li-Ion Reference 26/19/02;

- FM Global, Property Loss Prevention Datasheets, 5-33 Lithium-Ion Battery Energy Storage Systems, Interim Revision April 2025;
- BS5839-1:2017 - Fire detection and fire alarm systems for buildings – Part 1: Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises;
- BS EN IEC 62933-5-1 Electrical energy storage (EES) systems - Part 5-1: Safety considerations for grid-integrated EES systems - General specification.
- BS EN IEC 62933-5-2 Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical based systems.
- The Building Regulations 2010, Approved Document B (Fire Safety) - Volume 2;
- European Association for Storage of Energy (EASE), Battery Energy Storage System (BESS) Safety Best Practices Guideline, March 2025; and
- The Regulatory Reform (Fire Safety) Order 2005.

A5.4.2 ORGANISATIONS

A5.4.2.1 ROLES AND RESPONSIBILITIES

16 Table A5.4.1 sets out the recommended fire safety roles and responsibilities relevant to the management structure.

Table A5.4.1 – Roles & Responsibilities

Role	Summary of Responsibilities
Board / Directors	• Must ensure all relevant statutory fire safety provisions and requirements are always implemented and complied with in full; • Ensure that the fire safety policies/codes of practice that complement this management plan are in place, properly implemented and reviewed; • Ensure that qualified people are appointed to oversee and implement fire safety arrangements, and ensure that they are competent and appropriately trained to undertake their duties; • Ensure that arrangements are in place for the completion of Fire Risk Assessments and fire risk assessment reviews, including, where appropriate, technical surveys in respect of fire protection; • Ensure that fire, security, and health and safety arrangements at the premises are adequate and complementary; • Ensure that the plant has adequate insurance coverage.
Fire Safety Manager	• Ensure that Fire Risk Assessments and reviews are carried out when required;

Role	Summary of Responsibilities
	• Ensure that fire safety systems and equipment are appropriately located and properly maintained; • Ensure that a robust and effective Emergency Response Plan is in place to safely evacuate all persons, whether employees, visitors etc. This emergency plan must take into account people with mobility, sensory and learning impairments, including those with temporary impairments; • Arrange for the Emergency Response Plan to be issued to employees, visitors etc. to inform them what to do in the event of a fire, particularly safe evacuation; • Ensure that staff are appropriately trained in fire safety procedures to reflect the requirements of the Fire Risk Assessment; • Ensure that a copy of the current Fire Risk Assessment for the premises is readily accessible, and its provisions complied with; • Ensure that Fire Risk Assessments are reviewed at appropriate intervals; • Ensure that effective arrangements are in place for contacting the emergency services; • Ensure that the Fire and Rescue Service are aware of any significant hazards associated with the premises e.g., ethanol and any other dangerous substances; and • Liaise with NFRS to include post-incident meetings to discuss response, lessons learned and improvements to procedures.
BESS Specialist Consultant	• Ensure that all relevant applicable standards and regulations are implemented in the selected BESS technology; • Provide technology reviews from a BESS fire safety engineering angle; • Support Board/Directors, Fire Safety Manager among others with BESS engineering knowledge and intelligence to optimise solutions to reduce fire and explosion risks.
Competent / Designated Persons	• Assist and support with the preparation and review (at least annually) of Fire Risk Assessments; • Ensure compliance with the outcomes of the Fire Risk Assessment and that the necessary control measures are implemented; • Prepare and review the Fire Emergency Plan and ensure it is issued to all staff;

Role	Summary of Responsibilities
	• Ensure information on fire safety arrangements is available to staff; • Ensure all staff, visitors etc. are inducted on the contents of the Fire Emergency Plan; • Arrange and review fire drills at a suitable frequency; • Specify the arrangements for assisting visitors, disabled people or those with temporary physical impairments to safely evacuate the premises. Where appropriate, a PEEP must be developed; • Ensure Fire Alarms are tested in accordance with the testing and maintenance schedule; • Monitor that all fire safety equipment and systems are appropriately and regularly maintained; • Ensure the Fire Safety Logbook is kept up to date; • Ensure that Fire Action Notices and fire signage are appropriate and kept up to date; • Ensure all escape routes are kept clear of obstruction and that access to fire extinguishers and fire alarms is not impeded; • Ensure that all relevant fire prevention procedures are put into effect; • Ensure that fire safety inspections of the premises are carried out; • Ensure local fire related safety policies including no-smoking; and • Liaise with NFRS to include post-incident meetings to discuss response, lessons learned and improvements to procedures.
Employees	• Ensure familiarity with the Fire Emergency Plan for the premises and co–operate by participating in fire evacuation/drill procedures and by observing practical fire safety arrangements; • Fully conversant with site strategy and steps to be taken during any events related to fire; • Know, and co-operate with, the fire safety manager(s) for the premises; • Report to a relevant manager any concerns about fire safety; • Are familiar with all escape routes; • Take care to not wedge fire doors open, nor block or obstruct them; • Are aware of the action to be taken on discovering a fire, hearing a fire alarm, for raising the alarm (including

Role	Summary of Responsibilities
	the location of fire alarm call points) and for calling the Fire and Rescue Service; • Promptly evacuate the premises, in accordance with the Emergency response plan, to a place of safety without putting themselves and others at risk, and do NOT attempt to extinguish a fire unless they have been specifically trained; and • Comply with the No Smoking policy in place.

17 Arrangements should be put in place to ensure deputies are nominated to perform essential functions in the absence of the primary designated person.

A5.4.2.2 COMPETENCE

18 All those who have designated roles and responsibilities in respect of the fire safety management plan shall be competent. Competence will be achieved through knowledge, training and experience.

A5.4.2.3 AUTHORITY

19 Any person with a designated role and/or responsibility would be given the necessary authority to make decisions and take actions commensurate with their role / responsibilities.

A5.4.2.4 COMMUNICATION

20 Methods of communication are to be put in place to ensure effective sharing and exchange of fire safety information.

21 The essential areas for communication are set out in Table A5.4.2.

Table A5.4.2 – Communication

Subject	Method / Procedure
Dissemination of information about fire hazards	• Safety briefings and meetings. • Exchange of documents.
Fire prevention arrangements	• Included within staff training and refresher meetings. • Communicated with NFRS via email.
Emergency fire response procedure	• Included with staff training and refresher meetings. • Communicated with NFRS via email. • Local copy available within Information Box at main and emergency entrances to site. • Local copy available within welfare facility on-site (construction and operation).

Subject	Method / Procedure
	• Readily accessible to Operations and Maintenance (O&M) control room.
Reporting system for concerns or deficiencies in fire safety matters	E.g., verbal, submit hard-copy form, e-form via app.
Liaison with local Fire & Rescue Service	• Familiarity visits. • Communication via email and phone. • Emergency Response Plan (ERP) within Information Box. • Post-incident meeting to discuss response, lessons learned and improvements to procedures.
Informing relevant parties on the stakeholder management plan	Communication via phone, email and meetings.

A5.4.2.5 PROJECT DEVELOPMENT CYCLE GUIDANCE

22 Communication between the relevant parties during the construction phase is critical to ensure fire safety on site.

23 Table A5.4.3 sets out the key aspects of the expected co-ordination between the Applicant, the BESS OEM, BoP contractor and any other personnel on-site.

Table A5.4.3 – Project Development Cycle Communication Requirements

Subject	Key Summary	Notes
Significant Fire Hazards	The Applicant will be responsible for ensuring the correct information flow between the relevant parties regarding significant fire hazards, their locations, quantities and any key precautions to be taken.	Precautions covered within Section 3.
Communications	Agree process for communicating: • Warning of fire; • Other fire-related alerts; • Changes in fire hazards; • Reports of fire concerns affecting the other party's area; and • Interface between operator's control room and NFRS.	Other alerts may include investigating potential concerns (e.g., smell of smoke). Meetings (routine or ad-hoc) may be arranged.

Emergency Response	Agreements on: • Designated escape routes; • Shared escape routes; • Assembly points; • Meeting fire crews attending; • Step by step guide for evaluating any potential BESS facility fires; and • Post-incident de-brief / remediation.	ERP to be agreed with NFRS prior to construction commencing.
First Aid	Provide information on first aid provisions on site, nearest hospitals and emergency contact details.	

A5.4.3 FIRE SAFETY ARRANGEMENTS

A5.4.3.1 FIRE SAFETY DESIGN

24 The chosen BoP contractor retains control of the fire safety design until handover to GNR BESS. The BoP contractor will be responsible for integrating the site-wide fire protection and suppression strategy.

25 The Project's technical specifications shall require compliance with the editions of the safety standards referenced in this FSMP at the time of writing.

A5.4.3.2 RISK ASSESSMENT

26 The risk matrix in Table A5.4.4 has been developed to consider the probability and impact of any identified failure modes, and the prevention / mitigation measures that could be included throughout the different phases of the project.

Table A5.4.4 – Risk Assessment Matrix

			Probability				
		Severity Description	**1 (Remote)**	**2 (Unlikely)**	**3 (Possible)**	**4 (Probable)**	**5 (Almost Certain)**
Severity (S)	5 – Catastrophic	Risk of death, explosion, complete loss of facility, catastrophic environmental damage	HIGH	CRITICAL	CRITICAL	CRITICAL	CRITICAL
	4 – Major	Life changing injury, extensive damage to facility, significant environmental damage	HIGH	HIGH	CRITICAL	CRITICAL	CRITICAL
	3 – Moderate	Significant non-life changing injury, significant damage to facility, minor environmental damage	MEDIUM	MEDIUM	HIGH	HIGH	CRITICAL
	2 – Minor	Minor injury, minor damage to facility,	LOW	LOW	MEDIUM	HIGH	HIGH
	1 – Inconvenience	No risk of injury, no damage to facility and no environmental damage	LOW	LOW	LOW	MEDIUM	MEDIUM

Table A5.4.5 – Site Risk Assessment Matrix

No.	***Component***	***Hazard***	***Cause of Hazard***	***Consequence***	***Initial Risk Assessment***			***Prevention / Mitigation Strategy***	***Residual Risk Assessment***			***Further comments***
					S	**P**	**Risk**		**S**	**P**	**Risk**	
1	Battery	Battery fire	Transportation	• Personnel Injury. • Physical damage to Battery. • Toxic chemicals leak. • Explosion.	3	3	High	Lithium batteries are required to pass Section 38.3 of the UN Manual of Tests and Criteria (UN Transportation Testing). The provision of a UN 38.3 or UN transportation testing report is required for transportation. UN 38.3 requires several tests to prove the battery design is safe for transportation including thermal, vibration, shock, short circuit, and impact testing. The chosen technology will require testing evidence to UN 38.3 to prove the design is safe for transportation.	3	1	Medium	UN 38.3 testing will be conducted on the design to reduce the probability of this occurring.
2	Natural Hazard	Water damage	Flooding	• Water damage to BESS equipment / submerged site	4	1	Critical	A Flood Risk Assessment (FRA) has been completed for the Development, which identified no flood risk for Work Area no. 5a, including the BESS.	4	1	Medium	No effect is expected from flooding on the BESS.
3	Battery	Thermal hazard	Battery Cell / Module Over / Under Temperature	• Injuries to personnel (burns, smoke, and	3	3	High	BESS containers are generally cooled by a Heating Ventilation and Air Conditioning (HVAC) unit or are liquid cooled using a heat exchanger, expansion vessel, pump and associated small bore pipe work to infer heat transfer from the battery cells.	3	1	Medium	The Applicant shall procure field proven equipment.

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
				chemical inhalation). • Damage to battery cell and BESS container.				The battery cells will have a target temperature which is pre- programmed by the BESS Original Equipment Manufacturer (OEM) in the Battery Management System (BMS) which communicates with the Industrial Personal Computer or package controller within the control panel. This then drives the cooling system to act to maintain an optimum ambient temperature to maintain the pre-programmed operating environment. Where the cooling system develops a fault, alarms will immediately be sent via the BESS SCADA system to the operations control room. The BESS container will automatically be prevented from charging / discharging, to allow the operators time to rectify the fault. Continuous preventative maintenance as advised by the BESS OEM. Regular maintenance of the BESS will be conducted in accordance with the BESS OEM's recommendations.				
4	Battery	Thermal hazard	Fire Detection System Failure	• Injuries to personnel (burns, smoke, and chemical inhalation). • Damage to battery cell and surrounding BESS infrastructure.	4	3	Critical	The BESS OEMs under consideration predominantly supply their solution with a minimum of 1 x smoke detector and 1 x heat / gas detector, these designs will have several sensors of each for back- up and these will not be connected on the same line to provide redundancy. Alternative suppliers will utilise the BMS and associated proven algorithms rather than physical detection devices, to detect if an event is occurring. In the rare event of a complete fire detection system failure, the initial communications loss or any continuous rise in temperature or electrical fault would be detected by the BMS and error messages communicated to the SCADA for operator rectification. Maintenance of the fire detection system is critical to ensure operation, at regular intervals as dictated by the BESS OEM, the operator will conduct checks on the full detection system.	2	3	Medium	The severity is reduced due to the unit having several protections, starting from initial procurement of proven, certified components to BESS equipment that has been tested for propagation.

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
5	Battery	Thermal hazard	Fire Suppression System Failure	• Injuries to personnel (burns, smoke, and chemical inhalation). • Damage to battery cell and surrounding BESS infrastructure.	4	3	Critical	Where the fire suppression system fails to activate when required, the emergency response plan for the site should be followed. Upon the initial activation of the fire detection system, the SCADA system will notify the operators to enable the emergency response plan and contact NFRS for assistance. The battery modules and enclosure selected during the tender process should be all proven to the UL9540A – Battery Energy Storage System (ESS) Test Method. UL9540A standard subjects the battery modules and enclosure to large scale fire testing, batteries are forced into failure, held for a period of time, and then proven to not propagate extensively outside the limits of the test, nor have an excessive concentration of flammable gas.	3	2	Medium	Please note that BESS OEMs determine the fire suppression system for the BESS container. The operator has selected LFP batteries as their battery selection. The operator has also optimised the layout of the site using NFPA 855 – Standard for Installation of Stationary Energy Storage Systems, this further reduces the chance of the event propagating from container to container by enforcing clearance distances from potential exposure, with exceptions for equipment that have completed UL9540A testing and are approved by NFRS / NSDC.
6	Battery	Thermal hazard	Battery Cell / Module Failure – Thermal Runaway	• Injuries to personnel (burns, smoke, and chemical inhalation). • Damage to battery cell and surrounding BESS infrastructure.	5	3	Critical	The Applicant will procure equipment in accordance with UL 9540, IEC 62619, certification, and UL9540A/CSA TS-800 testing, to prove that the fire will not spread to adjacent modules / units / systems as the testing shows. The philosophy is ~~then~~ to use the water within the fire tanks if deemed necessary and appropriate by NFRS to cool adjacent enclosures / cabinets to add a secondary layer of prevention and allow the ~~effected~~affected item to consume itself. Section 2.5.3.3 (Early Intervention Thermal Runaway Prevention) of FM Global 5-33 (2024) sets out that the battery protection system together with the BMS will be capable of automatic early detection and electrical isolation of a thermal runaway event via constant monitoring of the cells' temperature or by off-gas detectors capable of identifying the volatile organic compounds that commonly precede thermal runaway.	3	1	Medium	The BoP contractor and BESS OEM shall provide a detailed methodology of the purpose of the fire detection and suppression system, with particular emphasis on the disconnection of the BESS, interlocking of the container and HVAC systems.
7	Battery	Explosion Hazard	Battery Cell/ Module Failure – Thermal Runaway.	• Damage to battery components and surrounding	5	2	Critical	NFPA 855 (2026) Section 9.7.6.7.3 states that: • All ESSs shall be provided with a reliable explosion control and prevention system designed, installed, operated, maintained, and tested in accordance with NFPA 69.	5	1	High	The selected BESS unit will be equipped with an explosion prevention system, compliant with NFPA 69, and a deflagration venting system, compliant with NFPA 68. This

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
			Thermal effects chain reaction from cells within the battery module.	BESS infrastructure. • Release of toxic gases – pollution. • Injury to site personnel (burns, smoke and chemical inhalation. • Release of flammable gasses.				• A partial volume deflagration evaluation shall be conducted in accordance with NFPA 68. ~~Alternatively, these explosion prevention and deflagration venting features may be omitted if the BESS unit is deemed sufficiently safe from fire propagation, as demonstrated by adequate testing and by proving that the BESS design does not allow flammable gas concentrations inside the container to exceed 25% of the LFL.~~				will form part of a comprehensive safety strategy that takes into account all potential scenarios in the event of an emergency. Additionally, compliance with NFPA 855 (2026 Edition) will be required, including the requirement of large-scale fire testing (by an approved testing laboratory) in addition to UL 9540A testing, and following the requirements of CSA TS-800 testing procedure. The final separation distances of the outdoor containers will be in accordance with the manufacturer specifications and NFCC 2025 guidance. Smoke and fire detection of the BESS containers shall comply with NFPA 72, and all Critical Safety Systems in the BESS shall be tested and verified for proper operation, among other safety features detailed throughout this document.
8	Battery	Explosion hazard	Ventilation System Failure Battery Cell/ Module Failure – Thermal Runaway.	• Injuries to personnel (blast pressure effects and burns). • Damage to batteries and surrounding BESS infrastructure.	5	3	Critical	Section 2.5.5 (Air Circulation/Mechanical Ventilation) of FM Global 5-33 (2025) and the NFCC guidance (2025) set out the following measures: To prevent explosions caused by off-gassing, particularly hydrogen accumulation, due to inadequate air circulation in the battery containers, hydrogen detectors will be installed to alarm at 10% Lower Explosive Limit (LEL) in the battery containers. A forced circulation/ventilation system will be provided to vent off-gases to safe levels and activate emergency exhaust ventilation at a maximum of 25% LEL to rapidly exhaust air directly outdoors. The system's design will incorporate non-combustible ductwork, carefully routed to prevent water ingress and explosive gas leakage to other areas of the container and will include alarm notifications to a constantly attended location. This system will be integrated into the site's emergency response	2	3	Medium	

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
								plan (ERP) and will have a clear marking of the ventilation system's disconnect switch to ensure emergency responders do not inadvertently disconnect the power supply during an incident.				
9	Battery	Thermal hazard	Battery Cell / Module Over / Under Voltage	• Irreversible Battery damage. • Efficiency reduction. • Thermal Runaway.	3	2	Medium	Batteries will be continuously monitored by the Battery Management Module (BMS). Where the BMS detects a cell in under voltage, Under Voltage Protection (UVP), an alarm would be sent to the SCADA to inform the operator and the BMS should take corrective action to increase the cell voltage. Where the battery cell is detected to have an overvoltage, Over Voltage Protection (OVP) will be activated. The BMS will force shut the battery rack contactors, bringing the rack offline and isolated from the remainder of the unit. Further investigation will be required, but it is likely that the battery module will be replaced by the battery supplier.	2	1	Low	
10	All BESS equipment	Electrical hazard	Communications Failure		2	2	Low	Where a rare communications failure occurs within the BESS containers, the system will lock in, and all DC contactors will close to isolate the effected BESS enclosure. The auxiliary power will be maintained to provide power to the monitoring systems of the BESS. For a site-wide power outage, there is a UPS which is used to power only the critical auxiliary circuits until the auxiliary power can be returned. The UPS will undergo continuous maintenance as part of the O&M regime.	1	2	Low	The communications logic from each BESS OEM will vary, the communications logic is usually CANbus between each rack and the system BMS, then MODbus RS484 or TCP/IP to the EMS and onwards to the SCADA. The SCADA then provides access to the operators through a local or remote HMI within the operations control room, then finally on to the integration with the grid where applicable.
11	Battery	Thermal hazard	HVAC / Liquid Cooling System Failure	• Injuries to personnel (burns, smoke, and chemical inhalation). • Electrical and fire damage to battery cell.	3	2	Medium	Entering standby mode allows the effected BESS enclosure to prevent any unintended temperature increases due to charging / discharging. The temperature will gradually increase / decrease to the local ambient temperature over time. The operators will be alerted through the SCADA and can immediately proceed with corrective action using the on-site spares contingent.	2	1	Low	The HVAC system is normally powered from the auxiliary circuit for the site, which is fed from the main grid voltage via a step-down transformer. Where the system fails through mechanical, electrical or software means, the operators will be notified via the EMS / SCADA system that an error has occurred. The effected BESS enclosure will automatically enter standby mode by

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
								Maintenance of the HVAC system is critical to ensure reliable operation. At regular intervals as dictated by the BESS OEM, the operator will conduct preventative maintenance including filter clean-ups, filter replacements, refrigerant checks / re-charge or coolant checks / top-ups and related activities to ensure reliable operation of the cooling system.				not importing / exporting from the batteries.
12	All BESS equipment	Electronical Failure and Thermal Hazard	Energy Management System Failure	• Electrical and fire damage to battery cell and other site equipment.	2	1	Low	Where a very unlikely error occurs with the EMS and too much power is imported from the grid or too much power is exported from the BESS, there are multiple lines of protection. The transformers on each BESS block are likely to be protected via Voltage Transformer monitoring and potentially Current Transformer monitoring, that will trip the site or BESS block off as required. The PCS also has voltage protection and will trip when outside of the expected voltage range.	1	1	Low	The EMS is used to control all of the devices and interfaces on site, it provides a bridge from the BESS to the customer, market and utility interfaces. The EMS dispatches each of the energy storage systems and controls the communications to influence the charging / discharging of the batteries.
13	Transformer / Power Conversion System	Thermal and Environmental hazard	Transformer / Power Conversion System Failure	• Fire spreading to surrounding BESS containers and/or surrounding environment.	4	2	High	The transformers and PCS will be positioned according to the manufacturer's guidance and following BS EN standards. The transformer will be bunded to prevent the potential leakage of cooling fluid to the environment.	3	1	Medium	
14	Transformer / Power Conversion System BESS	Electrical hazard	Arcing or short circuit	• Electrocution resulting in injury or fatality • Ignition to start fire	5	2	Critical	The BESS OEM and BoP Contractor shall provide arc flash protection, proven through relevant studies. The relevant contractors will conduct arc flash / fault level studies for the HV switchgear according to IEEE 1584 or equivalent and provide arc-flash PPE requirements for relevant equipment on site. All equipment on site will be subject to an intensive maintenance regime in accordance with the relevant BESS OEM, and BoP Contractor.	5	1	High	

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
15	All BESS equipment	Electrical hazard	Failure to follow maintenance regime	• Reduced BESS lifetime. • Battery efficiency and capacity decrease.	1	2	Low	The BESS OEM provides a minimum recommended operation and maintenance regime that must be followed throughout the lifetime of the facility. The BESS O&M contractor and BESS OEM are both incentivised to fully implement the maintenance regime, as the financial performance from both parties may be significantly impacted from premature degradation, unexpected downtime or loss of systems. The operator should carry out periodic inspections and site meetings to ensure that the O&M provider is adhering to the recommended guidance.	1	1	Low	
16	All BESS equipment	Environmental hazard	Failure to follow vegetation management / debris management	• Injuries to personnel • Damage to BESS infrastructure.	1	2	Low	The operator will sign an agreement with an O&M provider to ensure that the BESS site is well maintained. The operator will delegate the site maintenance including vegetation management to the O&M provider. The O&M provider shall ensure that there is no over-hanging vegetation across the site boundaries, all BESS containers including transformer / PCS must be completely free of over-hanging tree branches and be sited a minimum of 3m from the closest vegetation in accordance with NFPA 855, unless UL9540A test reports are submitted to relax this restriction with approval from NFRS / the LPA.	1	1	Low	
17	All BESS Equipment	Thermal hazard	Emergency services unable to respond effectively due to lack of knowledge of battery chemistry, system size and procedure.	• Unwarranted damage to BESS equipment and surrounding infrastructure. • Financial cost to replace and repair damage. • Injury to first responders/ SFRS.	4	3	Critical	A pre-incident and emergency response plan (ERP) will be developed in collaboration with the local fire rescue service to ensure effective response and safety in the event of a fire or explosion. The ERP will address key considerations, including hazard identification, safe access, water supply, firefighting infrastructure, vegetation management, and prevention of fire ignition and spread. Site personnel and the local fire rescue service will receive training on emergency plan priorities and actions to follow in the event of an incident, with regular updates and reviews to ensure the plan remains effective.	2	2	Low	Owners and developers directly benefit from developing an effective emergency plan as it can mitigate the overall scope of property damage and increases the likelihood of the facility maintaining continuity of operations.

No.	Component	Hazard	Cause of Hazard	Consequence	Initial Risk Assessment			Prevention / Mitigation Strategy	Residual Risk Assessment			Further comments
					S	P	Risk		S	P	Risk	
18	Batteries / Oil-filled Transformers	Chemical spill hazard	Inadequate containment and detection measures, equipment failure, or human error	• Environmental pollution, • Short circuit / Electrical fire • Damage to BESS infrastructure	4	3	Critical	Containment measures such as bunds for transformers and spill trays for liquid-cooling systems shall be installed, including leak detection sensors for the battery containers. A spill response plan will be developed and added to the ERP.	2	2	Low	
19	All BESS Equipment	Thermal hazard	Inadequate fire stop (F-stop) mechanism	• Uncontrolled fire/explosion • Damage to BESS infrastructure	4	3	Critical	The F-Stop mechanism shall be designed to maintain the operational functionality of the BMS and firefighting or explosion prevention systems of the BESS while disconnecting non-critical components during fire or explosion scenarios. These capabilities shall be tested and validated across multiple fault conditions. Functional safety assessments (FMEA/HARA) will be conducted to ensure F-Stop reliability. Compliance with relevant standards (UL 9540/IEC 61508) will determine the need for redundancy, which will be implemented to eliminate single points of failure and enhance emergency reliability.	3	2	Medium	

A5.4.3.3 FIRE PROTECTION MEASURES

27 Passive and active fire protection measures should be maintained in good order to ensure their effectiveness. Active fire protection measures have been introduced throughout the site design, covering fire detection and suppression especially on the BESS containers as these are flagged as the highest risk assets. Passive fire protection has been included by following NFPA 855 guidance for the site layout design and firefighting equipment on site.

28 They will be subjected to checks, tests and maintenance as detailed in Appendix D.

29 Passive fire precautions as regards the physical conditions in the premises are designed to facilitate containment of fire by design, construction and layout, effective communication and safe evacuation. Active fire precautions within the fire safety management system detect and engage in the event of a fire, including fire alarm systems, emergency lighting systems, firefighting equipment and fire shutters / curtains.

30 Passive and active fire protection measures will be maintained in good working order in accordance with manufacturer's instructions and British Standard guidance where applicable. They will be subjected to checks, tests and maintenance as detailed in Appendix D.

A5.4.3.4 RECOMMENDATIONS LIST AND COMPLIANCE

31 Tables A5.4.6, A5.4.7 and A5.4.8 cover key loss prevention recommendations for the design, operation, protection, inspection, maintenance, and testing of BESS systems that utilise Lithium-Ion batteries. The Applicant has demonstrated compliance with the key measures outlined below, that aim to significantly reduce the potential and mitigate the impact of BESS related incidents. The guidance provided by these technical publications is used to ensure developers produce the most resilient site possible. Additional study will be required as the project proceeds throughout the development lifecycle. The following technical publications have been referenced to draft the recommendations list below:

- National Fire Chiefs Council (NFCC) Grid scale energy storage system planning - Guidance for fire and rescue services. Version 2, December 2025;
- FM Global, Property Loss Prevention Datasheets, 5-33 Lithium-Ion Battery Energy Storage Systems, Interim Revision April 2025.
- European Association for Storage of Energy (EASE), Battery Energy Storage System (BESS) Safety Best Practices Guideline, March 2025;
- Allianz Global Corporate and Speciality, Allianz Risk Consulting, Tech Talk 26 – Battery Energy Storage Systems (BESS) Using Li-Ion Reference 26/19/20.

Table A5.4.6 – NFCC Guidance Recommendations

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
2	<u>Principles</u> This guidance has been developed with the safety of the public and emergency responders in mind. It is intended to help reduce the risk to as low as reasonably practicable (ALARP). At the same time, it recognises that ultimate responsibility for the safe design and running of these facilities rests with the developer and operator. These guidelines provide a basis for assessing planning proposals and, as such, cannot cover every eventuality or type of design. In developing these guidelines, the hazards and risks from lithium variant batteries identified in NFCC Operational Guidance (Utilities and fuel: Rechargeable batteries) have been considered. The following principles, adapted with minor amendments from guidance on renewable energy facilities produced by the Australian state of Victoria (County Fire Authority), form the basis of this guidance. They should be considered by fire and rescue services when liaising with operators: 1. Effective identification and management of hazards and risks specific to the siting, infrastructure, layout, and operations at the facility. 2. Siting of renewable energy infrastructure to eliminate or reduce hazards to emergency responders. 3. Safe access for emergency responders in and around the facility, including to renewable energy and firefighting infrastructure. 4. Provision of adequate water supply and firefighting infrastructure to allow safe and effective emergency response. This could include the provision of water to allow for defensive firefighting to protect surrounding infrastructure. 5. Siting and management of vegetation to avoid increased wildfire risk. 6. Prevention of fire ignition on-site that could spread to BESS and associated infrastructure (for example, inverters, switchgear, and transformers). 7. Prevention of fire spread between site infrastructure (for example, solar panel banks, wind turbines, battery containers/enclosures, transformers, inverters, and switchgear). 8. Prevention of external fire impacting and igniting site infrastructure. 9. Provision of accurate and current information for emergency responders during emergencies. 10. Effective emergency planning and management, specific to the site, infrastructure, and operations.	All the safety principles considered in this guidance are addressed below in this compliance table, highlighting the safety features of the Project and aiming to significantly reduce the potential and mitigate the impact of BESS-related incidents. Section A5.4.3.2 (Risk Assessment) of this FSMP features a risk matrix considering the probability and impact of any identified failure modes, and the prevention/mitigation measures that could be included throughout the different phases of the project, taking from the recommendations listed in this guidance.	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier).
4	<u>Planning approval process</u> As BESS are classed as infrastructure projects, they progress via a planning application route for approval. They are not dealt with via Building Regulations (as amended) consultations, unless there are ancillary buildings on site which may be covered. As such, the fire and rescue service are not a statutory consultee in planning applications for BESS sites. BESS sites are not categorised as Nationally Significant Infrastructure Projects (NSIP) for the purpose of planning.	Nottinghamshire Fire & Rescue Service (NFRS) has been engaged with the Applicant since the early stages of planning and developing the GNR BESS Project, and this engagement will continue throughout the site development and operational phase. Moreover, this oFSMP has been prepared by using the same approach adopted successfully at the consented Staythorpe BESS project (Planning Reference 22/01840/FULM). That approach was agreed after extensive consultation with NFRS, including accounting for concerns raised by the public in	Compliant

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	The UK government's planning practice guidance for renewable energy encourages both planners and developers to engage with the local fire and rescue service when planning new sites. As such, fire and rescue services should be part of early conversations regarding BESS proposals. This should continue throughout the development and into the operational phase. Whilst fire and rescue services are not a statutory consultee for planning, they do have a statutory responsibility under the Fire and Rescue Services Act. This includes obtaining information to assist with the extinguishing of fires, and the protection of life and property in their area. Fire and rescue services in devolved administrations should consult their relevant equivalent legislation. In addition, through engaging at the pre-planning or planning stage, fire and rescue services may be able to give advice about the design and layout of the site to aid operational pre-planning. It is expected that the number of BESS developments across the UK will increase significantly. Fire and rescue services may also seek to ensure they are aware of planned and operational projects in their area. The Department for Energy Security and Net Zero (DESNZ) maintain a database of Renewable Energy Schemes for this purpose.	relation to fire safety. NFRS will be consulted on the FSMP under Requirement 7 of the DCO.	
5	Information requirements Grid-scale BESS should form part of fire and rescue service planning in accordance with arrangements required under Section 7(2)(d) of the Fire and Rescue Services Act. Incidents involving BESS will require a hazardous materials response. Site specific risk information (SSRI) should therefore be gathered with the support of suitably trained fire and rescue service hazardous materials advisors (HMA), and made available to operational fire crews.	Site-specific risk information (SSRI) and the sharing of fire safety information are outlined in Section A5.4.2.4 (Communication) of this FSMP. This includes developing a comprehensive emergency response plan (ERP) in collaboration with NFRS, incorporating a clear and detailed response strategy during construction and operation.	Compliant
6	System design, construction, testing and decommissioning BESS can come in a wide variety of designs, from large shipping containers to multiple smaller enclosures. BESS can either be accessed by an internal access route (Figures 1 and 2) or from the outside (Figure 3). Fire and rescue services should seek to obtain as much information as possible at the earliest opportunity to enable an initial appraisal of the BESS. It is the responsibility of the applicant / developer / designer / manufacturer to provide this information to the fire and rescue service. Additionally, they must provide the fire and rescue service with appropriate evidence to support any claims made on performance, and cite appropriate standards for installation. Fire and rescue services should recognise that the development timeline of some projects may span several years. Consequently, initial information may be provided at the outline stage, with more detailed information following as the project progresses. This information should be made available to operational risk teams within fire and rescue services for inclusion in SSRI records. The fire and rescue service may wish to clarify the following areas with the site developer at the pre application/engagement phase:	The Applicant has selected LFP batteries for their battery selection. The Applicant has also optimised the layout of the site using NFPA 855 – Standard for Installation of Stationary Energy Storage Systems (2026 Edition), including UL9540A testing up to the installation level. This reduces the chance of the event propagating from container to container by enforcing clearance distances from potential exposure. The final separation distances of the outdoor containers will consider manufacturer specification as well as the NFCC guidance. Smoke and fire detection of the BESS containers shall comply with NFPA 855 and NFPA 72, and all Critical Safety Systems in the BESS shall be tested and verified for proper operation, among other safety features detailed throughout this document. The selected BESS unit will be equipped with an explosion prevention system, compliant with NFPA 69, and a deflagration venting system, compliant with NFPA 68. This will form part of a comprehensive safety strategy that considers all potential scenarios in the event of an emergency. The BESS enclosures shall meet UL 9540 standards. The site will feature two access points, and the Applicant will develop the ERP before energisation of the site; the ERP will be created in	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	1. Thermal events and events leading to deflagration: • How will the proposed BESS perform in a thermal event / deflagration, and what proactive or reactive systems are proposed to mitigate this? • How will the thermal event be contained to the BESS cabinet of origin without the radiant heat affecting other cabinets? • How has the performance of the BESS in a thermal runaway event influenced site design? • Has the proposed equipment undergone any full-scale fire testing or has it been certified by a reputable body such as Underwriters Laboratory (UL 9540A)? 2. Site plans: • What are the assumptions about active firefighting within the emergency response plan, and what measures are in place to reduce the scale of an incident? • Are the incident assumptions realistic? What is the role of the fire and rescue service at an incident? Are they realistic? What is the expectation of the fire and rescue service in terms of the fire strategy at a thermal event? • What is the provision for firefighting access to, around, and within the site? 3. Water supply and suppression systems: • What is the type, purpose, and effect of any fire suppression system installed? • What is the purpose of the water supply provision on site? Is it intended for boundary cooling / defensive firefighting or active suppression? • How will water run-off be managed? 4. BESS design: • What is the size, quantity, and capacity of each BESS unit? • Is the BESS design appropriate for the weather at the proposed location in terms of preventing water ingress and impact of temperature range on cooling systems? • Does the applicant / developer have relevant competence and experience in the field of BESS design and deployment on the scale of the proposed development? If not, do they have access to specialist advisors to support? • What are the arrangements for ongoing monitoring of the BESS? • What is the response time for onsite technical assistance in the event of an incident? 5. Detection and monitoring: • How will the BESS and associated equipment be monitored, and what is the process for alerting the fire and rescue service? • How will the fire and rescue service align their approach to handling calls to BESS sites to their unwanted fire signals position? 6. Environmental receptors (please refer to sections 17 and 18 of this guidance for details).	consultation with the NFRS. The plan will address key considerations, including hazard identification, safe access, and firefighting infrastructure, and will be reviewed and updated regularly to ensure effectiveness. The Applicant has included water tanks that meet the minimum requirements of NFRS, NFPA 855 and ARC. The water supply will provide 1,900 litres per minutes (LPM) for at least 2 hours, The Applicant has made provision for two tanks, each containing 228 m^3 of firefighting water. The Applicant's firefighting strategy will include cooling nearby BESS enclosures using the available water supply on site if deemed necessary and appropriate by the NFRS. The Applicant will incorporate instructions from the BESS manufacturer for safety procedures on-site, including any suppression strategy. Decommissioning strategies will be considered and required from the BESS Supplier.	

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	Responses to these questions will assist in creating an emergency response plan. This information is based on similar guidance published by the Environment Agency (Fire Prevention Plans: Environmental Permits guidance). This details what should be included in a fire prevention plan, the fire prevention measures that should be put in place, a plan template, and examples of alternative measures. Equivalent guidance should be sought in devolved administrations.		
7	Battery chemistry Battery chemistry is a highly specialised area of materials science. As such, NFCC is not an authoritative body on the subject matter and can only comment on the broad and generally accepted principles of battery chemistry. These form part of the 2024 report 'Health and Safety Guidance for Grid Scale Energy Storage Systems'', produced by Frazer-Nash Consultancy on behalf of DESNZ. The following text relating to battery chemistry principles, taken from this report, is reproduced here with the permission of DESNZ: There is a range of battery chemistries available which suit different use cases, have a different maturity and which present different risks and safety profiles that are at varying states of maturity. Lithium-ion batteries make up the majority of the current grid-scale BESS global market share, due to their ideal characteristics of high-energy density, high-energy efficiency and a long-life cycle. There are multiple variants of lithium-ion batteries, with lithium nickel manganese cobalt oxide (NMC) and lithium iron phosphate (LFP) the two main chemistries that dominate stationary lithium-ion energy storage projects. There are multiple trade-offs when selecting battery cell types, including power and energy density, availability, cost and safety. From a safety perspective, it is noted that LFP batteries typically have better thermal stability (lowering the probability of thermal runaway) than NMC batteries, but not removing it. 'Health and Safety Guidance for Grid Scale Energy Storage Systems' (2024), Frazer-Nash Consultancy. While characteristics of lithium-ion batteries can vary depending on their chemistry, the overall hazards they pose to personnel during a fire are broadly similar. Specifically, they may all involve toxic, flammable and/or explosive vapour clouds. They may also result in intense flaming combustion. In 2023, the Research Institute of Sweden (RI.SE) published the report 'Guidelines for the fire protection of battery energy storage systems'' (RI.SE report 2023:117). The report highlighted examples of cause scenarios and their associated possible consequences related to BESS. These are listed below, in no particular order: Cause scenarios: Manufacturing or installation errors	The Applicant has selected lithium iron phosphate (LFP) batteries for their battery selection for their thermal stability. The chosen BESS equipment will be compliant with IEC 62619, IEC 63056, UL 1973, UN 38.3, UL9540/IEC 62933-5-2, and tested as per UL 9540A. The BESS installation will be compliant with the requirements of NFPA 855 (2026 Edition) and the recommendations of this guidance. The technical specification will mandate advanced safety features, including early detection and prevention, active cooling systems, and fire-resistant materials, to prevent thermal runaway and ensure operational reliability. The BESS technical specifications will require: NFPA 68 and NFPA 69 compliance, with system design informed by the results of UL 9540A testing. Cybersecurity and mitigation of cyber-attacks in accordance with the latest version of relevant standards such as IEC 62443, IEC 62531, ISO 27000, ISO 27001, ISO 27002, ISO 27019, and NIS2. Adequate containment of wastewater and toxic spills. Protection systems, such as DC Ground Fault Protection, insulation monitoring, and overcurrent protection, to be monitored by the BMS.	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	Damage to battery cells due to environmental effects (for example, dust, humidity, salt water, and lightning strikes) Electrical faults such as overcharging or deep discharge, electrical arcs Ageing and lithium dendrite formation Mechanical impact (for example, collisions, and ice from wind turbines) External fire spreading to the BESS Over/under-temperatures Incidents caused by human factors during maintenance Vandalism, cyber attacks Possible consequences: High temperatures Fire Explosion Pressure buildup Release of toxic gases Projectiles Electrical hazards Corrosive gases Chemical spill		
8	Detection and monitoring An effective and appropriate method of early fault detection within the batteries should be in place, making it possible to immediately disconnect the affected battery/batteries remotely. This may be achieved through an effective battery management system (BMS). There are specific systems that detect the early components of electrolyte degradation and ‘off gassing’, which may be helpful as an early warning. However, these systems should not be relied on alone to predict or prevent a thermal event. Temperature detection via the BMS is also a critical first warning of thermal runaway. The risk management process should include detection systems to alert the operator of an event at the site. Appropriate automatic detection such as smoke, gas, or radiant heat detectors, as well as continuous combustible gas monitoring within BESS cabinets/enclosures should be provided in all BESS. Where systems are installed, gas detectors should alarm when flammable gas is detected, shut down the BESS, and initiate full exhaust ventilation. Sensor placement should ensure that gases are detected quickly enough for an effective response. Sensor placement should take into account the device’s response times and the type of gas being monitored (for example, hydrogen, carbon monoxide, or other volatile organic compounds). As an alternative to actively managing the release of flammable gas, deflagration panels could be used to deal with any over-pressurisation of the	The Project requires a BMS that can monitor and control cell temperature measurement and signalling, alarm generation in response to temperature anomalies and automatic shutdown protection systems in compliance with NFPA 855 (2026 Edition). The battery protection system, together with the BMS, will be capable of automatic early detection and electrical isolation of a thermal runaway event via constant monitoring of the cells’ temperature, gas/smoke and radiant heat detectors. The technical specification for the BESS units will state that to prevent explosions caused by off-gassing, particularly hydrogen accumulation, due to inadequate air circulation in the battery containers, hydrogen detectors shall be installed to alarm at 10% Lower Explosive Limit (LEL) in the battery containers. A forced circulation/ventilation system will be provided to vent off-gases to safe levels and activate emergency exhaust ventilation at a maximum of 25% LEL to rapidly exhaust air directly outdoors. This system will be integrated into the site's emergency response plan (ERP) and will have a clear marking of the ventilation system's disconnect switch to ensure emergency responders do not inadvertently disconnect the power supply during an incident. The technical specification for the BMS will state that the BMS shall transmit all of the required data to the SCADA, and finally to the operations control room and to a remote server. The BMS shall continuously monitor cell and rack conditions, including voltage, current, temperature, and SoC balance, triggering alarms via the SCADA for	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	BESS cabinet/enclosure. Any deflagration panels present should be conspicuously indicated. External audible and visual warnings should be clearly visible to operational crews, along with addressable identification, control, and indicating equipment. This equipment should be linked to: Battery management system (when a thermal runaway event is identified) Detection and suppression system activation This will help operational crews understand what the warning relates to, improving their decision-making and incident planning.	unwanted behaviours and activating protection systems or controlled shutdowns as needed. The BESS technical specification will require the implementation of a reliable F-Stop mechanism, designed to disconnect non-critical components during fire or explosion scenarios while maintaining the operational functionality of the BMS and firefighting or explosion prevention systems.	
9	Suppression systems Suppression systems will either use inert gas or aerosol suppression, or water-based suppression. The type of suppression system should be dictated by the battery technology used within the BESS, and not by site conditions or constraints. For example, gaseous suppression should not be used to compensate for the lack of availability and accessibility of water supplies at a particular site. It is becoming increasingly common for BESS to be designed and manufactured without any suppression system, and to be specifically designed so that a fire can be contained within the BESS cabinet/enclosure. Even in cases where no water-based suppression system is installed, local water sources will always be needed for exposure protection to limit cabinet-to-cabinet fire spread. The primary role of a fire suppression system in a BESS is to prevent a fire in the ancillary electrical equipment spreading to the battery modules. It may have a limited effect to protect the BESS from an external fire spreading to it. All claims of performance of suppression systems need to be supported with appropriate evidence for that specific use case. The suppression system, regardless of type, will have little effect on a thermal event within the battery cell. Their primary function is to help prevent cell to cell propagation, rather than fully extinguishing a fire in the cell. The suppression system may, however, offer the advantage of dealing with fires occurring elsewhere within the BESS cabinet that are unrelated to the lithium battery. A developer may propose that suppression systems are not required in the design. In such cases, the fire and rescue service should be satisfied that alternative controls are in place to prevent a fire or other thermal event in the BESS cabinet/enclosure of origin, from propagating to adjacent equipment. Inert gaseous and aerosol suppression system Gaseous suppression systems have limited cooling ability and cannot suppress thermal runaway, which will continue even without oxygen. Their use, however, has been effective in managing flaming combustion within enclosed spaces, which may make them more suitable for use in certain ancillary electrical systems. The design and selection of a gaseous suppression system should be specific to the use of the BESS in question and designed by a competent person.	The BESS OEM will determine the fire suppression system for the battery containers in accordance with NFPA 855 and local codes, aiming to prevent internal propagation. The fire suppression system will include automatic detection and alarm (audible and visible) systems and shall not be used as the primary mitigation; instead, priority shall be given to early detection, explosion prevention, ventilation and fire containment. The design of the suppression system shall prevent the formation of an explosive vapour cloud and limit contaminated water run-off. If no suppression system is present in the units, alternative measures will be implemented to prevent fire or thermal events from spreading to adjacent equipment. The BESS site will ensure adequate water availability for firefighting purposes, coordinating with local fire authorities to match resources with suppression needs. The Applicant will provide on-site water reserves, comprising two 228m^3 tanks, meeting the minimum requirements of NFRS, NFPA 855, and ARC. The water supply will deliver 1,900 LPM for at least 2 hours, enabling effective cooling of nearby BESS enclosures. This strategy complies with local water management and safety regulations, ensuring a robust firefighting capability. The BoP (or EPC) contractor will be responsible for integrating the site-wide fire protection and suppression strategy for non-battery fires.	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	Whilst a suppression system may extinguish the flaming combustion within a BESS, it could create a further complexity. In some cases, it can contribute to the formation of an explosive vapour cloud, as occurred in the McMicken incident in Surprise, Arizona in 2019. Water-based suppression system Water has a high cooling capability and therefore may be able to prevent further cell to cell propagation and thermal runaway within a BESS. However, it is also conductive and has in some cases caused additional damage and increased incident duration. Water-based systems could be installed in one of two ways: As a wet pipe system with a dedicated water supply As a dry pipe system with a standard instantaneous firefighting connection for the fire and rescue service to connect to from a distance. Where dry pipe or fire service inlets are provided for BESS cabinets/enclosures, they should be clearly marked with appropriate signage in a prominent position for the fire and rescue service to use. This signage should clearly indicate which cabinets/enclosures each inlet serves. For sites where a dry pipe system is installed, the following considerations apply: Fire and rescue service attendance is dependent on many factors. The developer and the relevant fire and rescue service should discuss attendance expectations early in the planning process, as response times and weight of attendance will vary between services. Fire and rescue service inlets need to be positioned where operational crews are safe from the effects of a BESS event. Poor placement may render the system unusable. An appropriately sized water supply must be provided in a location that allows quick access for the fire and rescue service. Any calculations to determine the required water supply for an appropriate suppression system should be completed by a competent person. They should take into account the appropriate risk and duration of any fire. Where water-based suppression systems are incorporated, their use should be accompanied by a plan to contain any contaminated fire water run-off.		
10	Explosion control (deflagration protection) Explosive vapours will be produced which – through the process of thermal runaway, and depending on the battery chemistry – may transition to flaming combustion, or remain as a vapour cloud that could lead to an explosion hazard that personnel need to be aware of. BESS containers should be fitted with explosion protection or deflagration venting appropriate to the hazard and battery technology deployed. Designs should be developed by competent persons, with design suitability able to be evidenced by utilising British Standards or equivalent National Fire Protection Association (NFPA) Standards, as follows: BS EN 16009:2011 Flameless Explosive Venting Devices BS EN 14373:2021 Explosion Suppression Systems	The Applicant will procure equipment compliant with NFPA 855, certified to UL 9540, and tested in accordance with UL 9540A up to the installation level (large-scale fire testing). Furthermore, the BESS technical specification will mandate compliance with NFPA 68 and NFPA 69 for deflagration venting and explosion prevention, respectively, with system design informed by the results of UL 9540A testing and other real-world testing. This will form part of a comprehensive safety strategy that considers all potential scenarios in the event of an emergency. The technical specification for the BESS units will require that hydrogen detectors shall be installed to alarm at 10% Lower Explosive Limit (LEL) in the battery containers. A forced circulation/ventilation system will be provided to vent off-gases to safe levels and activate emergency exhaust	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	BS EN 14797:2007 Explosion Venting Devices NFPA 68 Standard on Explosion Protection by Deflagration Venting NFPA 69 Standard on Explosion Prevention Systems Exhaust systems designed to prevent deflagration should keep the environment below 25% of the lower explosive limit (LEL). Flames and materials discharged during venting should be directed safely outside. Measures must be in place to ensure they do not cause fire spread beyond the affected unit, or pose additional risks to people near the originating BESS cabinet or enclosure. The likely path of any vented gases or materials should be identified in emergency response plans to reduce the risk to responders. The position of any venting should take account of the likelihood of weather-related ingress of water. The aim is to minimise the risk of water damage during the ordinary functioning of the BESS. Designs should also give consideration to leakage paths for explosive vapour via cable trunks and routes to other structures, which could result in a secondary remote vapour cloud explosion, as in the Dahongmen incident in Beijing in 2021. Explosion/deflagration strategies should be built into the emergency response plan to ensure that responders understand the strategies and how their actions may influence them. For example, personnel may open the door to a unit, which may negate the potential effect of deflagration vents due to an alternative path of least resistance having been created. Where emergency ventilation is used to mitigate an explosion hazard, the isolation/disconnect for the ventilation system should be clearly marked. Signage should warn personnel or operational crews not to disconnect the power supply to the ventilation system during an evolving incident (NFPA (2023) Standard for the Installation of Stationary Energy Storage Systems, paragraph G.1.4.3.3). The remaining unaffected cells need to continue to be maintained within their operating temperature. The chosen method of explosion control system should be supported by evidence from a competent person or an approved institution, such as Underwriters Laboratories (UL) or the NFPA. Site location The potential impact of an incident on the local environment should factor into the choice of BESS site and its associated safety measures. The developer should produce a plan that identifies all sensitive receptors within a 1km radius of the site. This plan should support discussions with planners and other stakeholders regarding site suitability and inform appropriate emergency planning. The Environment Agency's Fire Prevention Plans: Environmental Permits Guidance provides examples of sensitive receptors that may include: Schools, hospitals, nursing and care homes, residential areas, and workplaces	ventilation at a maximum of 25% LEL to rapidly exhaust air directly outdoors. The BESS facility layout design will comply with regulations and NFPA 855 regarding the final grouping and separation distances between battery enclosures, other equipment, buildings and other exposures. UL 9540A test reports from BESS OEMs will be submitted for NFRS sign-off before construction and insurer agreement. The Site's O&M provider will be responsible for vegetation management, ensuring a 3m clearance from vegetation to BESS containers. The Applicant will engage with the NFRS, independent technical advisors, OEMs, and EPC/O&M Contractors to create a comprehensive Hazard Mitigation Analysis (HMA) to be conducted following the latest editions of NFPA 855 or IEC 62933-5-2/1. The project-specific HMA shall consider the safety of the BESS throughout its entire lifecycle, addressing all identified hazards and meeting environmental impact requirements.	

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	Protected habitats, watercourses, groundwater, boreholes, wells, and springs supplying water for human consumption (Further habitat information can be found on the Department for Environment, Food and Rural Affairs (Defra) MAGiC map) Roads, railways, bus stations, pylons (on or immediately adjacent to the site only), utilities, and airports Any plans created should include a compass rose showing north and the prevailing wind direction. Whilst incidents involving BESS are relatively rare at the time of publication, they can result in extended disruption and may impact business continuity in the adjacent area. Since UK fire safety principles and design documents are based on the assumption that an incident or fire will occur (typically one fire at one time), applicants or developers should assess the potential impact of such an incident on the surrounding area. This should include consideration of business continuity, neighbourhood disruption, and wider impact. The assessment should be inextricably linked to the battery technology type, the expected incident response from the fire and rescue service (controlled burn or active firefighting), and the proximity of any significant transport infrastructure and public buildings. The assessment should recognise that any incident may last several hours. It should outline any disruption to the local and/or national economy. Where there are concerns that a potential toxic vapour cloud could affect nearby sensitive receptors, developers may also wish to commission an analysis of fire gas plume modelling under different scenarios. This helps to understand the impact on local communities from conditions such as prevailing wind. Such modelling, if undertaken, should be completed by a competent person. External factors also need to be considered, including proximity of other BESS sites and the risk to the site from surface water flooding or spread from wildfire.		
11	Access Site access Suitable facilities for safe access and egress to the site should be provided. Designs should be developed in close liaison with the local fire and rescue service, as specific requirements may apply due to variations in vehicles and equipment. Achieving adequate vehicular access for the fire and rescue service prevents personnel from having to enter the BESS site and drive through a vapour or gas cloud to reach the scene of operation. It is therefore preferable to have an alternative access point, taking account of the likely wind direction. If the provision of an alternative access point is not practicable, an alternative may be to provide a perimeter ‘loop’ type of vehicle access around the site. Whilst the BESS approval process is via the planning route, there is an absence of guidance regarding adequate access for the fire and rescue service. However, the principles contained within Approved Document B in support of B5 may assist in providing proportionate and adequate access and	The site features two access points and perimeter ‘loop’ roads around the BESS. The Applicant will develop an ERP before energisation of the site; the ERP will be created in consultation with the NFRS. The plan will address key considerations, including hazard identification, safe access, and firefighting infrastructure such as fire appliances and water outlets/connection requirements. The ERP will be reviewed and updated regularly to ensure effectiveness. The site layout features 4.5 m-wide roads, no dead-ends and sufficient separation between the equipment and internal roads to accommodate fire and rescue service vehicle access and manoeuvrability. The final site layout will be compliant with NFCC guidance on minimum turning circles, clearance height, and carrying capacity. Full compliance will be achieved upon completion of the final site layout design.	Partially Compliant (Full compliance upon issuance of final layout drawings and completion of ERP).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	facilities for the fire and rescue service. It should, however, be acknowledged that the guidance referenced below is intended for 'common building situations'. As BESS clearly do not fall into this category, the guidance is cited only as potential broad principles. Section 15 of Approved Document B Volume 2: Buildings other than dwellings sets out a number of tables relating to access routes and hard standing areas that consider the dimensions of fire service vehicles. Table 15.2 of Approved Document B, reproduced in Table 1 below, provides an overview of access routes and hard standing areas which have given consideration to fire service vehicle dimensions: Table 1: Typical fire and rescue service vehicle access route specification, reproduced from Approved Document B (Table 15.2) Notes: Fire appliances are not standardised. The building control body may, in consultation with the local fire and rescue service, use other dimensions. The road base can be designed to 12.5 tonne capacity. Structures such as bridges should have the full 17 tonne capacity. The weight of high reach appliances is distributed over a number of axles, so infrequent use of a route designed to accommodate 12.5 tonnes should not cause damage. Diagram 15.3 from Approved Document B provides a schematic demonstrating a dead-end situation: Figure 4: Schematic demonstrating a dead-end situation, reproduced from Approved Document B (Diagram 15.3: Turning facilities) This diagram illustrates the required turning facilities for fire and rescue service vehicles near buildings. It shows a straight access road leading to a building on the left-hand side. At the end of the access road, adjacent to the building, a fire engine is depicted in a designated area. The key requirement highlighted is that fire and rescue vehicles should not need to reverse more than 20m from the end of an access road. To comply with this, a turning facility must be provided. The diagram shows a T-shaped junction at the end of the access road, referred to as a "turning circle, hammerhead or other point at which a vehicle can turn", allowing the vehicle to safely turn around. The maximum distance allowed between the end of the access road and the turning point is labelled as "20m max"."		
12	Spacing between BESS The emergency response plan should assume that the fire will not spread beyond the BESS container of origin. Fire and rescue operations should be limited to boundary cooling of surrounding BESS and monitoring the BESS involved in the thermal event. This outcome can be achieved through a number of different routes, including: Adequate separation between the BESS enclosure/cabinet to ensure that the radiant heat from a thermal event in one BESS enclosure/cabinet will not trigger a secondary event, and	The BESS equipment will undergo large-scale fire testing (by an approved testing laboratory) in addition to UL 9540A testing up to the cell-level. It will incorporate early detection, explosion prevention, ventilation, and fire containment to prevent propagation. The final separation between the outdoor enclosures and from other equipment/buildings and exposures will comply with NFPA 855 (2026 Edition), local regulations, and manufacturer specifications. Smoke and fire detection will meet NFPA 72 standards, and all Critical Safety Systems will be tested and verified for proper operation, as detailed throughout this document. The technical specification will mandate advanced safety features, including thermal barriers, active cooling	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	Provision of fire-resistant materials that will prevent direct flame impingement or radiated heat affecting adjacent BESS and prevent the incident developing beyond BESS of origin. The provision of a suppression system to the BESS cabinet/enclosure is unlikely to compensate for reduced spacing between BESS. A BESS enclosure may have been tested to a standard such as UL 9540A. If this shows that propagation does not occur between BESS cabinets/enclosures, it is possible to reduce separation to a minimum of 3ft or 0.914m as set out in NFPA 855: Standard for the Installation of Stationary Energy Storage Systems (2023) (NFPA standards can be viewed online for free by registering on their website). Any further reductions in distance should only be made based on technical advice from a competent person. It is important for the reader to consider NFPA 855 in its entirety to ensure that separation distances are not taken out of context. Section 9.4.2.2 (Annex A) of NFPA 855 further clarifies the limitations of the standard. If the developer cannot demonstrate that a thermal event/fire can be contained to the BESS enclosure/cabinet of origin, the developer should be referred to guidance on the separation distances within the current edition of NFPA 855. NFCC does not support vertical stacking arrangements of containers or BESS cabinets/enclosures. This is because stacking elements on top of each other increases the level of risk in terms of vertical fire spread between the BESS, fire loading, and difficulty in gaining access. Spacing to other buildings beyond perimeter of site Distances between BESS cabinets/enclosures and occupied buildings will vary based on individual site designs. Proposed distances should take into account risks, including the impact of any vapour cloud. Any mitigation factors that have been incorporated into the site design should also be considered. An initial minimum distance of 30m is proposed between BESS cabinets (or associated infrastructure such as transformers and switchgear) and occupied buildings, before considering any mitigation such as blast walls. This distance is based upon the 100ft distance for remote installations cited in NFPA 855:2023.	systems, and fire-resistant materials, to prevent thermal runaway and ensure operational reliability. The minimum separation distance between BESS containers will be 0.914m subject to meeting the UL 9540A standard or equivalent.	
13	Site conditions In addition to the risk of an incident occurring within the BESS, the site needs to be maintained in order to prevent a fire spreading to the BESS, or indeed fire loading. This is because combustible materials or poor separation between BESS cabinets/enclosures can create a ‘bridge’ or path for flaming or radiant heat to travel between units. It is important that no combustible material is adjacent to BESS cabinets/enclosures and that clear access is maintained. Areas within 3m of BESS cabinets/enclosures should be kept clear of combustible vegetation. Additionally, all other vegetation within the curtilage of the site should be managed appropriately to avoid increased risk of a fire on the site. Areas with wildfire risk or vegetation that could result in a significant fire should be considered as part of the assessment. Additional separation	This recommendation has already been addressed through similar requirements outlined in this guidance. The Site’s O&M provider will be responsible for vegetation management, ensuring a 3m clearance from vegetation to BESS containers. The BESS facility layout design will comply with regulations and NFPA 855 regarding the final grouping and separation distances between battery enclosures, other equipment, buildings and other exposures. The technical specification will mandate advanced safety features, including thermal barriers, active cooling systems, and fire-resistant materials, to prevent propagation and ensure operational reliability.	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	distances should be included in the design to help prevent fire spread to the BESS. This also helps to avoid an increase in the ambient temperature within the BESS cabinet/enclosure beyond safe operating limits.		
14	Water supplies Pumping fire appliances in the UK typically have a water storage capacity of approximately 1,800–2,000L of water. This capacity can be exhausted in under five minutes per appliance. Therefore, an additional on-site water supply must be accessible to fire and rescue services in the event of an emergency. There should be enough water available to meet firefighting requirements and to manage a reasonable worst-case scenario. Depending on the site, this may be provided through storage tanks, on-site lagoons, hydrants, or mains water supply. The amount of water required will vary depending on a number of factors, including: The size of the incident to be dealt with, for example 1 x BESS cabinet/enclosure The principles set out in the emergency response plan and the expected role of the fire and rescue service (firefighting strategy) Access and facilities for personnel on site BESS cabinet/enclosure location and proximity to infrastructure or populated areas The requirement to supplement any on-site firefighting facility such as a dry pipe sprinkler or deluge system Several manufacturers of BESS now advocate that if a thermal event occurs in a BESS unit and this progresses to thermal runaway, the BESS cabinet/enclosure should be allowed to consume itself or in other words, burn itself out. Furthermore, an increasing number of BESS manufacturers suggest that applying firefighting jets to the BESS cabinet/enclosure will have limited effect and could prolong the duration of the thermal event unnecessarily. In these instances, water fog or spray pattern branches should only be directed to areas to ensure the incident does not spread to adjacent BESS. If it can be confirmed that the manufacturer's recommended firefighting tactic for the BESS cabinet/enclosure is to defensively firefight and boundary cool whilst allowing the BESS cabinet/enclosure to consume itself without spreading to neighbouring cabinets, this may reduce the water requirements – and thus the drainage / environmental protection requirements – significantly. Water requirements will vary depending on the layout, design and number of BESS cabinets on the site. The number of elevations that would need to be cooled to prevent fire spread should be considered in the discussions with developers. Ingress Protection (IP) ratings of BESS cabinets/enclosures should be known, to understand the risks associated with boundary cooling.	This recommendation has already been addressed through similar requirements outlined in this guidance. The BESS site will ensure adequate water availability for firefighting purposes, coordinating with local fire authorities to match resources with suppression needs. The Applicant will provide on-site water reserves, comprising two 228 m^3 tanks, meeting the minimum requirements of NFRS, NFPA 855, and ARC. The water supply will deliver 1,900 LPM for at least 2 hours, enabling effective cooling of nearby BESS enclosures~~.~~ if deemed necessary and appropriate by the NFRS. This strategy complies with local water management and safety regulations, ensuring a robust firefighting capability. Additionally, compliance with IEC 60529, with a minimum rating of IP54 for enclosures, shall be required. The BESS fire suppression system will include automatic detection and alarm (audible and visible) systems and shall not be used as the primary mitigation; instead, priority will be given to early detection, explosion prevention, ventilation and fire containment. The water storage tanks designed to be used for firefighting will be located at least 10m away from any BESS container/cabinet to allow for safe access and usage. The locations will be consulted on with NFRS as part of the detailed design.	Partially Compliant (Full compliance upon selection of equipment supplier).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	In order to form an emergency response plan, it is imperative to follow the manufacturer's instructions. This is to ensure that any incident is resolved swiftly and safely with minimal damage to the environment and the local area. Any required installations of fire hydrants and connections to any dry pipe on the BESS site should comply with BS 9990 Non-automatic firefighting systems in buildings code of practice (current edition). They should be identified in accordance with BS 3251 Indicator Plates for Fire Hydrants (current edition). Fire hydrants provided should achieve a flow rate of no less than 25L/sec at any hydrant on the site. This figure is based on the National Guidance Document on the Provision of Water for Firefighting (2025), produced by Water UK and the Local Government Association (LGA). The flow rate for transportation has been selected as the comparative value for flow rates, rather than that of a domestic housing development or an industrial setting. Where a flow of 25L/sec cannot be achieved, it would be prudent to provide an equivalent static supply of water on site that will provide for the same flow rate for a duration of 120 minutes. This equates to approximately 180,000L of water. The management of water run-off should be considered as part of the site design (for example, drainage systems, interceptors, and bunded lagoons). Water supplies for any on-site suppression system must be independently calculated by a competent fire engineer, based on the design fire size of the BESS. Any static water storage tanks designed to be used for firefighting should be located at least 10m away from any BESS container/cabinet to allow for safe access and usage. They should be clearly marked with appropriate signage and be easily accessible to fire and rescue service vehicles. Their location should be considered as part of a risk assessed approach that takes into account potential fire development and impacts. Outlets and connections should be agreed with the local fire and rescue service. Any outlets and hard suction points should be protected from mechanical damage (for example, through use of bollards).		
15	Signage Signage to indicate the presence of a BESS should be installed in a suitable and visible location on the outside of BESS cabinets/enclosures. Safety signage should be installed in accordance with Health and Safety (Safety Signs and Signals) Regulations. Signage should also include of the following details: Relevant hazards posed The type of technology associated with the BESS Any suppression system fitted 24/7 emergency contact information signs on the exterior of a building or enclosure. (This should be sized such that at least one sign is legible at night at a distance of either 30m or from the site boundary, whichever is closer, as stated in NFPA 855:2023).	As stated in Section A5.4.2.1 (Roles and Responsibilities) of this FSMP, a Competent/Designated Person(s) will ensure that Fire Action Notices and fire signage are appropriate and kept up to date as part of the Site's Fire Safety Management and Emergency Response Plans. The BESS OEM shall provide and install all appropriate fire safety and hazard signage and marking compliant with applicable regulations, codes, and standards. All signage and labelling of equipment, in particular safety labels, will be in English and, where applicable, be appropriate for external use (i.e., permanent, UV resistant, chemical resistant and weatherproof).	Partially Compliant (Full compliance upon issuance of final layout drawings and completion of ERP).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
16	Outline battery safety management plan To ensure the provision of risk information to the fire and rescue service, the site operator should develop and share an outline battery safety management plan with the local fire and rescue service point of contact. The layout and design of each operator's outline battery safety management plan will vary, but it should contain the following broad subject areas: How the fire and rescue service will be alerted A facility description, including infrastructure details, operations, number of personnel, and operating hours A site plan depicting key infrastructure: site access points and internal roads, firefighting facilities (for example, water tanks, pumps, booster systems, fire hydrants, and fire hose reels), drainage, and neighbouring properties Details of the emergency response coordinator, including the subject-matter expert for the site Safe access to and within the facility for emergency vehicles and responders, including to key site infrastructure and fire protection systems Details and explanation of warning systems and alarms on site and locations of alarm annunciators with alarm details (smoke, gas, temperature) Hazards and potential risks at the facility and details of their proposed management The role of the fire and rescue service at incidents involving a fire, thermal event or fire spreading to the site Emergency shutoff or isolator locations	This Outline FSMP has been prepared with the intention that, following DCO grant, and once a preferred make and model of battery has been identified, this Outline FSMP will be refined further, in consultation with relevant bodies including NFRS and the Environment Agency, into a final FSMP which will be submitted for the approval of Newark and Sherwood District Council (NSDC). The Applicant aims to adopt the recommended measures set out in this document. Where this occurs, the risk of a fire occurring should be significantly reduced throughout the construction and operational phases of the project. Proactive measures will also be set out in this document aiming to deter the spread of fire should it occur on-site. During the construction phase, the Applicant will liaise with NFRS to ensure that the site complies with legislation and that NFRS are familiar with the facility. The Applicant will have continual liaison with NFRS throughout the operational life of the facility, to ensure the preparation of a clear and detailed response strategy as part of a comprehensive emergency response plan (ERP) in the case of a thermal event.	Compliant
17	Site plans and maps In addition, site plans should be provided to the fire and rescue that include: The layout of structures Any areas where hazardous and flammable materials are stored on site (location of gas cylinders, process areas, chemicals, piles of combustible wastes, oil and fuel tanks) All permanent ignition sources on the site and show they are a minimum of 6m away from combustible and flammable waste Any areas where combustible waste is being treated or stored, including non-waste material All separation distances Any areas where combustible liquid wastes are being stored Main access routes for fire engines and any alternative access Access points around the site perimeter to assist firefighting Hydrants and water supplies Areas of natural and unmade ground The location of fixed plant or storage location of mobile plant when not in use The location of spill kits Any other relevant site-specific information	As depicted in the preliminary site layout (EN010162/APP/6.3.5.4), the site features the intended configurations of equipment and structures, two access entry points with perimeter 'loop' roads around the battery enclosures, 4.5 m-wide roads, a minimum of 3.7 m wide emergency access road, appropriate turning circles, no dead-ends and sufficient separation between the equipment and internal roads to accommodate fire and rescue service vehicle access and manoeuvrability. The final site layout will be compliant with NFCC guidance on minimum turning circles and will provide further details on separation distances, water supplies and drainage features, including SuDS and holding pond. The final layout will be informed by NFRS recommendations and made available to them.	Partially Compliant (Full compliance upon selection of equipment supplier, issuance of final layout drawing and completion of ERP).

Ref.	**NFCC Guidance** Recommendation	Compliance Statement	Compliance
	Drainage runs, pollution control features such as drain closure valves, and fire water containment systems such as bunded or kerbed areas (this may be easier to show on a separate drainage plan) Plans provided must show all sensitive receptors within a 1km radius of the site that could be affected by a fire. Examples of sensitive receptors may include: Schools, hospitals, nursing and care homes, residential areas, and workplaces Protected habitats, watercourses, groundwater, boreholes, wells, and springs supplying water for human consumption (Further habitat information can be found on the Defra MAGiC map) Roads, railways, bus stations, pylons (on or immediately adjacent to the site only), utilities, and airports Plans should have a compass rose showing north and the prevailing wind direction.		
18	Environmental impacts Suitable environmental protection measures should be provided, and developers should liaise with the Water Undertakers or the Environment Agency to understand any impacts Protection measures should include systems for containing and managing water run-off. System capability/capacity should be based on anticipated water application rates, including the impact of water-based fixed suppression systems. Sites located in flood zones should have details of flood protection or mitigation measures.	The Environment Agency is listed as a statutory consultee on the FSMP, as part of Requirement 7 of the DCO. Site-wide drainage strategy, including considerations for firefighting water run-off and containment measures, such as bunds for transformers and spill trays for liquid-cooling systems, will be installed, including leak detection sensors for the battery containers. A spill response plan will be developed and added to the ERP. The Applicant will engage with the Nottinghamshire Fire and Rescue Service, independent technical advisors, OEMs and EPC Contractor to create site-specific risk analyses and hazard identification, including environmental hazards and impact. The BESS technical specifications will require adequate management and containment of wastewater and toxic spills, including the provision of an automated penstock on the outfall of the containment system, addressing transformer oil, cooling system refrigerants, and firewater drainage, in compliance with NFPA 855. The penstock will have a backup power system. Additional details of the Site's drainage system can be found in Section A5.4.3.8 (Fire Suppressant) of this FSMP.	Partially Compliant (Full compliance upon completion of ERP)
19	Recovery The operator should develop a post-incident recovery plan that addresses the potential for re-ignition of BESS and de-energising the system. The plan should also include provisions for removal and disposal of damaged equipment and contaminated fire water effluent.	As stated in Section A5.4.2.1 (Roles and Responsibilities) of this FSMP, the Fire Safety Manager will liaise with NFRS to include post-incident meetings to discuss response, lessons learned and improvements to procedures. The Applicant will develop the ERP before energisation of the site; the ERP will be created in consultation with the NFRS and will include post-incident de-brief / remediation measures. The Applicant will incorporate instructions from the BESS manufacturer for safety procedures on-site.	Partially Compliant (Full compliance upon completion of ERP)

Table A5.4.7 – FM Global – Guideline 5-33 Electrical Energy Storage Systems

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
2.2.1 – 2.2.3	Energy Storage System (ESS) Selection 2.2.1 Verify with the manufacturer or integrator that the LIB-ESS design, including cell type, battery management system (BMS), etc., is appropriate for the application. 2.2.2 Establish a management of change procedure to ensure that batteries or BMS components are compatible with modified system requirements or that replacements are appropriate to the existing system requirements. 2.2.3 Do not use refurbished or previously used ESS components, including cells or modules.	The BESS OEM will propose solutions based upon the requirements provided by The Applicant. The relevant contractors will conduct Grid studies to ensure suitability for the intended application. The O&M contractor retains responsibility for spares management and record logs, all spare BESS components will be sourced directly from the BESS OEM as part of The Applicant's spares strategy. The BESS OEM will not re-use components, this will be explicitly stated within the technical specification.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.3.1	Location 2.3.1.1 Locate energy storage systems in accordance with one of the following, listed in order of preference: A. In an enclosure outside and away from critical buildings or equipment in accordance with 2.3.2 (Figure 2.3.1, location 1) B. In a dedicated building containing only LIB-ESS and associated support equipment in accordance with 2.3.3 (Figure 2.3.1, location 2) C. In a dedicated exterior cut-off room that is accessible for manual firefighting operations and is constructed in accordance with 2.3.4 (Figure 2.3.1, location 3) D. In a dedicated interior corner cut-off room that is accessible for manual firefighting and is constructed in accordance with 2.3.4 (Figure 2.3.1, location 4) E. In a dedicated interior cut-off room that is accessible for manual firefighting and is constructed in accordance with 2.3.4 (Figure 2.3.1, location 5)	The BESS will be located outside and away from critical infrastructure in accordance with the first order of preference from clause 2.3.1.1.	Compliant
2.3.2	Outdoor LIB-ESS Enclosures and Containers 2.3.2.1 Select or construct LIB-ESS enclosures/containers using only non-combustible materials. Separation distance is based on doors being located on only one side of the enclosure and no vents or unprotected openings on any other sides. It is also based on active systems (HVAC or liquid cooling) maintaining cell or module temperatures in the target enclosure or container. 2.3.2.2 For containerized LIB-ESS comprised of lithium iron phosphate (LFP) cells, provide aisle separation of at least 5 ft (1.5 m) on sides that contain access panels, doors or deflagration vents. 2.3.2.4 Provide separation between solid walls having no openings based on installation-level testing that demonstrates thermal runaway cannot propagate between containers. Where a fire test report is not available or the test did not result in a fire in the unit of origin, provide separation as indicated in Sections 2.3.2.2 or 2.3.2.3 as appropriate. 2.3.2.4.1 If any penetrations are present, the separation should be extended, or the penetrations should be protected or equipped with FM Approved fire-safe wall penetrations. 2.3.2.4.2 Where explosion vents or other penetrations are provided, ensure they are arranged and directed away from surrounding equipment and buildings.	The BESS will be located outside and away from critical infrastructure in accordance with the first order of preference from clause 2.3.2.1 opposite. The BESS enclosures will be manufactured using non-combustible materials as per the project requirements. The Project minimum separation distances between BESS containers will be compliant with the NFPA 855 and NFCC guidance requirements, informed by UL9540A (or equivalent) testing and based on the manufacturers' recommendations.	Partially Compliant (Full compliance upon selection of equipment supplier.)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
	In a fire, these enclosures may have vents or penetrations that could allow hot gas and products of combustion to escape the enclosure, causing an exposure to adjacent equipment or buildings. Penetrations could include electrical conduit, doors, HVAC units, etc. 2.3.2.5 Provide a minimum space separation between LIB-ESS enclosures and adjacent buildings or critical site utilities or equipment in accordance with Data Sheet 1-20, Protection Against Exterior Fire Exposure, using hazard category 3 for the exposing building occupancy.		
2.3.3	Dedicated ESS Building or Enclosure Larger Than 46.5 m^2 Treat any prefabricated container or enclosure that is larger than 46.5 m^2 as a building.	Not applicable. The BESS Enclosures shall not exceed 16.2 m x 2.6 m (42.12 m^2) to comply with NFPA 855 requirements for Outdoor BESS enclosures or cabinets.	Compliant
2.3.4	ESS Cut-off Rooms 2.3.4.1 For multiple racks installed in a single row or back-to-back, install solid, non-combustible fire barriers between adjacent racks. 2.3.4.2 Provide a minimum 1-hour fire-rated room, floors, walls, and ceiling in accordance with Data Sheet 1-21. A. Provide FM Approved fire doors with the same room rating. B. Provide FM Approved fire barriers for all floor, ceiling, and wall penetrations. 2.3.4.3 Install ESS with minimum separation in accordance with 2.3.5. 2.3.4.4 Provide mechanical ventilation in an ESS cut-off room at a rate of at least 1 cfm/ft2 (0.3 m3/min/m2) of floor area. (See 2.5.5) 2.3.4.5 Provide damage-limiting construction. 2.3.4.5.1 Design DLC in accordance with Data Sheet 1-44, Damage-Limiting Construction, using propane as the representative gas.	There are no ESS cut-off rooms as the BESS containers are located outside.	Compliant
2.3.5	Separation Distances for Indoor LIB-ESS Racks 2.3.5.1 Provide 6 ft (1.8 m) minimum separation from the accessible face of an LIB-ESS rack to non-combustible materials, non-combustible construction elements, and the accessible faces of adjacent LIB-ESS racks. The accessible face is the side that has a door, vent or can be opened, allowing fire to escape the rack of origin. 2.3.5.2 Provide 9 ft (2.7 m) minimum separation from the accessible faces of LIB-ESS racks to combustibles and combustible construction elements. 2.3.5.3 Separation between non-accessible sides of adjacent racks should be determined by an installation-level fire test demonstrating that thermal runaway cannot propagate between racks. Where a test report is not available or the test did not result in a fire in the rack of origin, assume thermal runaway will propagate between racks. See Section 2.4 for expected fire duration.	The BESS facility design will follow regulations and NFPA 855 as highlighted by the NFRS. The project requires minimum separation distances between the accessible faces of the enclosures to comply with NFPA 855 and NFCC guidance requirements, in addition to testing as per UL 9540A up to the installation level. The Applicant will include UL 9540A compliance as part of the tendering exercise, and this will drive final grouping and separation distances from enclosure to enclosure, and from each enclosure to exposures. The Applicant will submit the UL 9540A test report from the BESS OEMs for sign-off by the NFRS prior to construction commencing. This will also be agreed with the insurer of the BESS prior to proceeding with the application. The BESS enclosures shall be tested to UL 9540. The project requires a minimum separation distance between the accessible faces of the enclosures to comply with NFPA 855 and NFCC guidance requirements, in addition to testing per UL 9540A up to the installation level.	Partially Compliant (Full compliance upon selection of equipment supplier.)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
2.4	Protection This section does not apply to containerised outdoor LIV-ESS. It applies to dedicated LIB-ESS Building or Enclosure Larger Than 500 ft^2 (46.5 m^2) and LIB-ESS in Cutoff rooms and Indoor LIB-ESS Racks. 2.4.1 Provide automatic sprinkler protection designed to a 0.3 gpm/ft^2 (12 mm/min) over the room area, with an additional allowance of 250 gal/min (946 L/min) for hose streams.2.4.2 Ensure the water supply is capable of providing sprinkler water and hose stream requirements for the duration of the fire event (see Section 3.2). The expected duration will depend on the number of racks in a single fire area. The fire area is comprised of a row or rows of racks where minimum separation is not provided in accordance with 2.3.5. The duration should be estimated as 45 minutes times the number of adjacent LIB-ESS racks. The room design should address drainage or other mitigation of the water release. See Data Sheet 1-24, Protection Against Liquid Damage, for more information. 2.4.2.1 Where the sprinkler demand requires a water supply duration greater than what is available, provide the following: A. Install noncombustible floor-to-ceiling partitions with penetrations protected by FM Approved fire stops between adjacent racks perpendicular to the rack door or opening to prevent fire spread. Ensure the partitions extend at least 12 in. (0.3 m) from the face of the rack. See Figure 2.4.2.1. Determine the horizontal distance between thermal barriers based on how many racks can be protected by the available water supply. B. Install a solid metal partition on the back (non-aisle) of each rack to prevent heat transfer to adjacent racks in the next row. Where the rack design incorporates a solid metal back (no ventilation openings), additional partitions are not needed. (See Figure 2.4.2.1.) 2.4.3 Provide a smoke detection system within the enclosure, cut-off room, or ESS area designed and installed in accordance with Data Sheet 5-48, Automatic Fire Detection.	The Applicant will procure equipment with a UL 9540A test report, this test report is evidence that will be submitted to the NFRS and/or LPA to demonstrate that the chosen BESS equipment will not propagate from module to module, unit to unit, or system to system depending upon the level of testing performed. The Applicant will appoint an independent assessor to review the UL 9540A test report in accordance with NFPA 855 prior to submission to NFRS (this will be an independent consultant, with no prior knowledge of the project). The interpretation of the test report from the independent engineer will drive the final site design, with guidance from NFRS. The chosen BESS OEM's equipment will have evidence that for UL 9540A and CSA TS-800 testing no fire propagation occurred at the unit and installation levels of the BESS. The chosen fire protection and suppression system will prevent ignition and propagation. Measures will be implemented to prevent fire or thermal events from spreading to adjacent equipment. The Applicant's firefighting strategy will include cooling nearby BESS enclosures using the available water supply on site if deemed necessary and appropriate by the NFRS. The Applicant has included water tanks that meet the minimum requirements of NFRS, NFPA 855 and ARC. The water supply will provide 1,900 litres per minutes (LPM) for at least 2 hours, The Applicant have made provision for two tanks, each containing 228 m^3 of firefighting water.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.5.1	Equipment and Processes 2.5.1 Electrical System Protection 2.5.1.1 Perform a system short circuit and protection coordination study to ensure the adequacy of rating and relay settings for existing circuit breakers when the electrical energy storage system adds power to the existing electrical system at a facility. For additional information on short circuit and protection coordination, see Data Sheet 5-20, Electrical Testing.	The BESS OEM will be requested to provide short circuit studies in accordance with the technical specification. The BoP Contractor will retain responsibility for all electrical plant studies in accordance with the technical specification.	Partially Compliant (Full compliance upon selection of equipment supplier and provision of studies.)
2.5.2	Equipment Protection 2.5.2.1 Provide a disconnect device for maintenance needs or abnormal events for each rack. 2.5.2.2 Provide a method of manual, remote, and local disconnect for the LIB-ESS. A remote disconnect should be in an accessible area that is monitored 24/7. A local disconnect should be provided adjacent to the ESS space.	Each BESS rack / cabinet shall be procured with an independent method of isolation as described within the technical specification. Local disconnects for each BESS container are likely to be included within the BESS container and Inverter/Transformer skids, this will be fully defined when supplier selection has been concluded. Ambient temperature within each BESS is recorded and alarms are programmed to the SCADA.	Partially Compliant (Full compliance upon selection of equipment supplier)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
	2.5.2.3 Provide temperature monitoring with high alarm for LIB-ESS room, building, or enclosure. Have alarms routed to a continuously attended location or specific operations personnel.		
2.5.2.4	LIB-ESS Rack 2.5.2.4.1 Provide DC ground fault protection for grounded battery systems. For ungrounded battery systems, provide DC ground fault monitoring with alarming function. Have the alarm routed to a constantly attended location or specific operations personnel. 2.5.2.4.2 Provide overcurrent protection against overload and short-circuit faults. 2.5.2.4.3 Provide overvoltage and under-voltage protection against overcharging and over-discharging.	DC Ground Fault Protection will be provided by the BESS OEM, this will be confirmed in the technical specification for the BESS equipment. An insulation monitoring device (IMD / active device) will be provided to maintain insulation monitoring against ground. The IMD is often integrated into the PCS, however insulation faults and warnings need to be integrated into the inter-tripping of the BESS. Overcurrent protection will be included within the BESS design and is monitored by the BMS, this will be stated within the technical specification for the BESS equipment. OVP and UVP will be included within the BESS design and is monitored by the BMS, this will be confirmed in the technical specification for the BESS equipment.	Partially Compliant (Full compliance upon selection of equipment supplier)
2.5.3	Battery Management System Safety Functions 2.5.3.1 Provide battery management systems with the following safety functions: A. High cell temperature trip (cell level): This function isolates the module or battery rack when detecting cell temperatures that exceed limits. A common design is to have modules hard-wired in series within a rack. Therefore, the smallest unit that can be isolated is generally the rack. Where a design accommodates it, isolating a module is acceptable. B. Thermal runaway trip (cell level): This function trips the entire system when a cell is detected to have entered a thermal runaway condition. In scenarios involving a thermal runaway, this function is the first to activate when thermal runaway conditions are detected. C. Rack switch fail-to-trip (rack level): This function identifies any failure from the pack switch to trip once a trip command is initiated. The rack switch is also known as the “pack switch.” It is a switch that disconnects a single rack in response to an abnormal condition. The rack switch is shown separately from the “master” level in Figure 2.5.3.1 for clarity. It is generally incorporated into the BMS. D. Inverter/charger fail-to-trip (supervisor level): This function initiates a trip command to an upstream breaker to isolate the ESS if the inverter/charger fails to respond to a trip command. The “supervisor” control system controls the entire system, including the combination of racks, the environmental support systems, and the charging/discharging status. The supervisor level should isolate the LIB-ESS if the inverter/ charger fails to trip on an appropriate signal, or if communication is disrupted between the inverter/charger and the supervisor control.	The technical specification for the BMS shall state that the BMS monitors the condition of cells and racks and the interactions between racks. This functionality shall include but not be limited to monitoring the voltage, currents and temperature and balance of the State of Charge (SoC) of the aggregated cells, device feedback and sensor validity and ensuring the battery system and individual cells are operating within their operating range. The BMS shall generate alarms via the central SCADA (Supervisory Control and Data Acquisition) platform EMS (Energy Management System) if any of the monitored parameters exceed the limits set by the system manufacturer and shall take the necessary action to prevent damage to the Goods by operating the relevant hardware protection systems. Any failure of the BMS or the monitoring devices shall provide an alarm and, depending on the severity of the failure, initiate a controlled shutdown sequence for part or all of the battery system.	Partially Compliant (Full compliance upon selection of equipment supplier)
2.5.3.2	Online Condition Monitoring	The technical specification for the BMS shall state that the BMS will transmit all of the required data to the SCADA and finally to the operations control room and to a remote server. These will be	Partially Compliant (Full compliance upon selection of equipment supplier)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
	2.5.3.2.1 Provide online condition monitoring systems that will monitor battery room temperature and the following parameters, at a minimum, at the battery module and/or cell level: Charging and discharging voltage and current Temperature Internal ohmic (resistance) Capacity State of charge (SoC) State of health (SoH) Alarm or fault log 2.5.3.2.2 Provide online condition monitoring systems with the following features: A. The ability to transmit data to a constantly attended location or specific operations personnel B. The ability to generate alarms when unusual conditions are detected C. The ability to analyse monitored parameters and generate a summary of the condition of the battery D. Security to prevent unauthorized changes of critical parameter limits, such as voltage, temperature, and current, which are essential to maintain reliable lithium-ion battery operation. E. Self-diagnostic capability	available via a historian which will record the plant data for a minimum period of time (usually 12 months or more). Alarms shall be integrated into the central SCADA EMS. The alarms shall be interfaced to allow transmission and management of each alarm state to the operations control room. Alarms and events shall be accurately time-stamped. The alarms shall be capable of acceptance and resetting from the operations control room and local site. Alarm levels shall be appropriate for the manning levels of the Company's control centre. All alarm initiating contacts shall be 'not fail to danger' in accordance with normal control and instrumentation practice. In general, the alarm initiating contact shall open to alarm, i.e., normally closed contacts.	
2.5.3.3	Early Intervention Thermal Runaway Prevention 2.5.3.3.1 Incorporate an early intervention system to automatically and electrically isolate the LIB-ESS, using one of the following approaches: 1. High cell temperature: The cell manufacturer should provide the threshold temperature indicating an abuse condition based on 100% SOC. The majority of cells within a module should be constantly monitored. 2. Off-gas detection: Provide gas detectors capable of detecting the volatile organic compounds associated with the off-gas event that precedes thermal runaway.	The project requires a BMS that can monitor and control cell temperature measurement and signalling, alarm generation in response to temperature anomalies and automatic shutdown protection systems. The battery protection system together with the BMS will be capable of automatic early detection and electrical isolation of a thermal runaway event via constant monitoring of the cells' temperature or by off-gas detectors capable of identifying the volatile organic compounds that commonly precede thermal runaway.	Partially Compliant (Full compliance upon selection of equipment supplier)
2.5.4	Power Conversion Equipment 2.5.4.1 Provide overcurrent protection against overload and short-circuit faults on the AC side. 2.5.4.2 Provide surge arrestors on the AC side for voltage transient "voltage spike" protection. For additional information on voltage transient protection, see Data Sheet 5-11. 2.5.4.3 Provide transformer electrical protection in accordance with Data Sheet 5-4, Transformers or 5- 20, Electrical Testing, as applicable.	The technical specification for the BESS shall include: 1. Overprotection against overload and short-circuit faults on the AC Side. 2. Surge arrestors or protection on the AC side. 3. Transformer electrical protection.	Partially Compliant (Full compliance upon selection of equipment supplier)
2.5.5	Air Circulation/Mechanical Ventilation 2.5.5.1 Locate the circulation/ventilation system to take suction at or near the ceiling.	The technical specification for the BESS units shall state that to prevent explosions caused by off-gassing, particularly hydrogen accumulation, due to inadequate air circulation in the battery containers, hydrogen detectors shall be installed to alarm at 10% Lower Explosive Limit (LEL) in the battery containers. A forced	Partially Compliant (Full compliance upon selection of equipment supplier)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
	2.5.5.2 Install an FM Approved hydrogen detector that will alarm if the level of hydrogen exceeds 10% LEL, electrically isolate the LIB-ESS, and initiate emergency exhaust ventilation in accordance with Section 2.5.5.3. 2.5.5.3 Install an emergency exhaust ventilation system that will increase the ventilation rate to 2.5 cfm/ft2 (0.75 m3/min/ m2) of floor area if hydrogen is detected at 10% of the LEL, and exhaust all air directly to outdoors. 2.5.5.3.1 Route the emergency exhaust ventilation system through a system of blowers, fans, and ductwork terminating outdoors away from air inlets, doorways, and other openings. 2.5.5.3.2 Construct ductwork of non-combustible materials. 2.5.5.3.3 Provide make-up air inlets in exterior walls, in a remote location from exhaust outlets to prevent entrainment of exhaust gases. 2.5.5.4 Arrange the circulation/ventilation system controls to alarm to a constantly-attended location or to specific operations personnel.	circulation/ventilation system will be provided to vent off-gases to safe levels and activate emergency exhaust ventilation at a maximum of 25% LEL to rapidly exhaust air directly outdoors. The system's design will incorporate non-combustible ductwork, carefully routed to prevent water ingress and explosive gas leakage to other areas of the container and will include alarm notifications to a constantly attended location. This system will be integrated into the site's emergency response plan (ERP) and will have a clear marking of the ventilation system's disconnect switch to ensure emergency responders do not inadvertently disconnect the power supply during an incident.	
2.6.1	Operation 2.6.1.1 Install, operate, and maintain batteries and battery management systems in accordance with manufacturer's recommendations. 2.6.1.2 As part of commissioning, verify proper operation of all monitoring and protective devices. A. Inspect the battery system thoroughly for indication of overheating, abnormal vibration, abnormal noise, or malfunction. This should occur daily for a minimum of one week of normal operation. B. Perform infrared scanning and check battery operating and monitoring parameters to determine if any damage was sustained in shipping and installation.	All manufacturers' recommendations shall be followed, commissioning of the BESS modules will be completed by the BESS OEM's expert engineers. On-site resources will be used throughout the commissioning phase for monitoring.	Partially Compliant (Full compliance upon selection of equipment supplier, and review of recommendations)
2.6.2	Equipment Maintenance 2.6.2.1.1 Perform electrical system inspection, testing and maintenance of LIB-ESS systems in accordance with Data Sheet 5-20, Electrical Testing. Establish and implement a LIB-ESS system inspection, testing, and maintenance program. See Data Sheet 9-0, Asset Integrity, for guidance on developing an asset integrity program	Maintenance will be performed in accordance with the BESS OEM's recommendations. The BESS OEM's recommendations will be checked against Data Sheet 5-20, and an agreed scope will be developed with the BESS OEM.	Partially Compliant (Full compliance upon selection of equipment supplier, and review of maintenance recommendations)
2.6.2.2	Battery Management System 2.6.2.2.1 The inspection, testing, and maintenance program for the BMS should include at least the following: A. Periodic system self-test to ensure all critical systems are available and operational. B. Periodic pack switch maintenance. This may involve cycling the switch to ensure mechanical integrity and tightness of cable connections by torquing to specifications.	All maintenance procedures and schedules will be created by the BESS OEM and will be regularly updated as requested by the BESS OEM. The Applicant intends to appoint a specialist O&M contractor to monitor and maintain the BESS, transformer, UPS and other related systems performance. The Applicant will endeavour to ensure that the BMS maintenance schedule indicated opposite has been included with any planned maintenance regime including augmentation of battery modules / enclosures if required. Spare battery modules will be periodically checked in accordance with the BESS OEM's guidance, this is not performed by the BMS, but by the O&M contractor manually.	Partially Compliant (Full compliance upon selection of equipment supplier, and review of recommendations)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
	C. HVAC maintenance. This may include change of air filters at periodic intervals. These intervals may vary depending on the location of the site. Dusty locations may require more frequent air filter replacement. Other HVAC maintenance items may include coolant check, compressor/heater core check and duct/cable check. D. Periodic check of spare battery modules to ensure they are maintained in charged state. E. Periodic tracking of state-of-health (SOH) values, which is the percent of remaining capacity (based on design capacity) in the battery packs. 2.6.2.3 Establish a battery replacement program for aged batteries. Review the battery replacement program regularly and include, at a minimum, the following components: A. The OEM design life expectancy of the LIB-ESS batteries. This will be a number in years that the system is expected to perform adequately. After this point, the batteries should be replaced. This establishes the replacement timeline. B. Regular monitoring of the LIB-ESS SOH, which is the percent of remaining capacity based on design capacity. This information should be available through the BMS, which continuously tracks SOH. Unexpected component malfunctions or failures and operating outside design parameters can age batteries faster than when operating within design limits. The BMS will be able to monitor these unexpected issues and adjust the SOH of the system. C. Regular review of the replacement program, ensuring there is a method of adjusting the replacement timeline. The plan should allow for adjusting the replacement timeline if feedback from the BMS shows the SOH indicates accelerated ageing. The following factors justify earlier replacement: 1. Significant changes or trends in the condition monitoring data that indicate development problems with the battery system 2. Advice from the OEM on design problems that require replacement 3. Operating experience and failure history that indicates the battery should be replaced 4. Exposure to severe operating conditions D. A method of managing changes. This should consider major changes that affect the life expectancy and replacement timeline of the LIB-ESS. Changes could include replacement of the BMS, modifying the thermal management system, and changes in application or operational modes (e.g., modifying the BMS to operate based on an arbitrage mode vs. electric supply capacity).		
2.7	Training 2.7.1 Have operations personnel trained by the supplier/manufacturer of the ESS equipment. 2.7.2 Provide other training in accordance with Data Sheet 10-8, Operators.	The Applicant will include specialised training on the specific equipment deployed at the site as part of the technical specification for the O&M contractor from the BoP contractor. The successful BESS OEM will be expected to produce specific training for personnel who will frequently attend the facility from the O&M contractor.	Partially Compliant (Full compliance upon provision of training)

Ref.	FM Global Guideline Statement	Compliance Statement	Compliance
2.8	Human Factors 2.8.1 Housekeeping 2.8.1.1 Do not store combustible material in LIB-ESS enclosures, buildings, or cut-off rooms.	The Applicant will have allocated dedicated storage for spare equipment and materials on-site, this will be defined within the technical specification.	Partially Compliant (Full compliance upon selection of equipment supplier, and review of recommendations)
2.8.2	Emergency Response and Pre-Incident Planning 2.8.2.1 Develop an emergency response plan to address the potential fire hazards associated with energy storage systems. Refer to Data Sheet 10-1, Pre-Incident Planning, for general guidelines on establishing and maintaining an emergency response plan. 2.8.2.2 Develop a pre-incident plan with the fire service in accordance with Data Sheet 10-1, Pre- Incident Planning. Arrange and prepare the plan with documented procedures to expedite safe entry and emergency response to fires in the LIB-ESS area, including the following: Manual disconnection Access routes Manual fire protection methods Manual smoke ventilation (if provided) SDS for battery cells 2.8.2.3 Develop a post-incident recovery plan that addresses the potential for reignition of LIB-ESS, as well as removal and disposal of damaged equipment. 2.8.2.3.1 A fire watch should be present until all potentially damaged ESS equipment containing Li-ion batteries is removed from the area following a fire event. The water supply should be replenished as quickly as feasible. Fires involving Li-ion batteries are known to reignite. Li-ion batteries involved in or exposed to fires should be adequately cooled to prevent reignition. 2.8.2.3.2 Identify the equipment needed to safely remove and replace damaged equipment and the supporting infrastructure to facilitate prompt removal. The plan should include service or equipment providers needed for recovery infrastructure. The OEM or integrator should provide guidance on decommissioning, removal of damaged equipment, and proper disposal in accordance with local regulations.	The Applicant will develop the ERP prior to energisation of the site, the ERP will be created in consultation with the NFRS. The Applicant will incorporate instructions from the BESS manufacturer for safety procedures on site.	Partially Compliant (Full compliance upon completion of ERP)
2.9	Utilities 2.9.1 In extreme environments, provide an emergency power supply to the HVAC systems. An extreme environment mentioned here is one that could allow cell-level temperatures to rise or fall outside the maximum operating temperature range of -4.0° F (-20° C) to 120° F (50° C) despite BMS control. 2.9.2 Ensure LIB-ESS enclosures with common HVAC components, such as a common condensing unit (cooling tower), are designed to shut down the LIB-ESS in the event of a component failure.	The site is located within an area of the UK that has a reliable temperature profile typically below the ambient temperature required within the BESS containers. Where auxiliary power is lost, the BESS will immediately stop exporting or importing power and allow the batteries to cool to the local ambient temperature as this is typically below the operating temperature range of the BESS. The Applicant will make provision for a UPS within the auxiliary circuit to provide short-term temporary power for monitoring purposes. Where the cooling system experiences a fault and can no-longer cool the battery containers, this will result in an automatic isolation of the affected container.	Partially Compliant (Full compliance upon selection of equipment supplier)

Table A5.4.8 – EASE – BESS Safety Best Practices Guideline

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
2.1	Product safety - Preventive Measures: Battery Design (cell/module/pack/rack) To ensure a consistent minimum level of safety for Battery Energy Storage Systems (BESS) worldwide and to reduce the compliance burden on stakeholders, it is recommended that international harmonisation of standards be pursued. Establishing unified global standards will facilitate the adoption of best safety practices across all regions, enhancing safety and streamlining regulatory compliance. Although not mandatory, consideration should be given to revising the sample size for thermal propagation type tests. Although current standards typically require testing a single sample, increasing the sample size to 3 could provide more reliable data, accounting for the inherent variability in thermal runaway outcomes even under identical test conditions. This larger sample size would lead to more robust safety assessments.	The Applicant will procure equipment certified to UL 9540, UL 1973, IEC 62619, and IEC 63056, and tested as per UL 9540A, aligning with the latest safety standards to align with the latest international best practices and promote global harmonisation. The technical specification will mandate advanced safety features, including thermal barriers, active cooling systems, and fire-resistant materials, to prevent thermal runaway and ensure operational reliability. Thermal propagation tests will be performed as required by the latest edition of NFPA 855 and as per the UL 9540A test method.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.2	Product safety - Preventive Measures: Battery Management System (BMS) To enhance BMS safety, the following should be considered when sufficient level of technology development is reached: • Incorporating advanced diagnostic and predictive maintenance tools within the BMS. • Ensuring seamless compatibility between the BMS and other system components. • Enhance the scope of BMS testing to include large-scale operational scenarios, ensuring real-world applicability and reliability. • Enhance the safety design of BMS to avoid fire caused by short circuit of the BMS itself. • BMS should be functional, backed up by an UPS so that data can be monitored and used to assess the severity and development of the fault. This can give input on how to safely react to the incident.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The chosen BESS equipment will be compliant with IEC 62619, UL 1973, and UL9540/IEC 62933-5-2. Additionally, the technical specification for the BMS shall state that the BMS shall proactively monitor and manage system health, seamlessly integrate with all components, and ensure operational reliability. It will include safeguards to prevent fire hazards from internal faults and be supported by a UPS to maintain data monitoring during incidents, enabling effective response and mitigation. Further, the BMS shall continuously monitor cell and rack conditions, including voltage, current, temperature, and SoC balance, triggering alarms via the SCADA EMS for unwanted behaviours and activating protection systems or controlled shutdowns as needed. The BMS shall also detect, isolate and report thermal runaway events early through temperature monitoring or off-gas detection.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.3	Product safety - Preventive Measures: Thermal Management System To improve thermal management safety, it is recommended to: • Ensure cooling systems are designed for optimal performance under critical conditions without relying on uninterruptible power supplies (UPS), as their high-power demand (30kW–60kW) makes continuous operation impractical. Additionally, running liquid cooling systems during failure scenarios may increase risks if leaks occur. • Ensure leakage alarms or warnings from the Thermal Management System are communicated to the BMS without fully integrating control functions into it, as the BMS already manages multiple critical battery operations. • Conduct comprehensive risk assessments for cooling systems and validate them through recognised certification processes.	The Applicant will ensure that their chosen BESS OEM equipment complies with the latest editions of UL 1973 and UL 9540. Furthermore, the technical specification for the BESS shall specify a thermal management system that ensures optimal performance under critical conditions, with safeguards to prevent thermal runaway and ensure operational reliability. The specification shall also require leakage warning capabilities and containment measures for refrigerant-based cooling systems.	Partially Compliant (Full compliance upon selection of equipment supplier.)

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
2.4	Product safety - Preventive Measures: BESS Enclosure Design To ensure a reliable BESS enclosure design, the following should be considered: • Conduct site-specific risk analyses for environmental and operational factors. • Use enclosures rated IP54 or higher for outdoor installations. • Tailor fire resistance rating to the installation and design, to achieve the desired mitigation o Perform real-world fire testing under thermal and mechanical stresses. • Perform environmental durability tests, such as accelerated ageing. Enclosures should retain their protective features throughout the BESS's operational lifespan of 15–25 years. Factors such as corrosion resistance for metallic enclosures and UV stability for non-metallic materials must be addressed. • Establish maintenance protocols, including regular inspections and coating reapplications. • Verify manufacturing quality and installation to ensure proper sealing and alignment of openings.	The Applicant will ensure that their chosen BESS OEM's utilise equipment enclosures that ensure reliable and safe operation. The BESS shall comply with the latest editions of IEC 62619, IEC 62933-5-2, UL 1973, UL 9540, NFPA 70, and NFPA 855. Additionally, compliance with IEC 60529, with a minimum rating of IP54 for enclosures, shall be required. The Applicant will ensure that their chosen BESS OEM's equipment has fire resistance ratings tailored to the installation and design, resulting from UL 9540A and CSA TS-800 testing, and other relevant tests. Furthermore, the technical specification will require that the enclosure design shall address factors such as corrosion resistance and UV stability and shall include prescribed maintenance protocols to ensure the enclosure retains its protective features throughout the BESS's operational lifespan. The Applicant will engage with the Nottinghamshire Fire and Rescue Service, independent technical advisors, OEMs and EPC Contractor to create site-specific risk analyses and hazard identification.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.5	Product safety - Preventive Measures: Hazard mitigation analysis A specific and iterative Hazard Mitigation Analysis (HMA) should be conducted for each project and product in accordance with IEC 62933-5. This analysis must consider the safety of the Battery Energy Storage System (BESS) throughout its entire lifecycle. Alternatively, the HMA methodology outlined in NFPA 855 can be used, as it eliminates the need for Original Equipment Manufacturers (OEMs) to comply with two different standards. Regardless of the chosen approach, the HMA conducted for a BESS project must comprehensively address all hazards identified by the applicable regulations and cover the environmental impact assessment requirements set by the authorities having jurisdiction.	The Applicant will engage with the Nottinghamshire Fire and Rescue Service, independent technical advisors, OEMs and EPC Contractor to create a comprehensive Hazard Mitigation Analysis (HMA) to be conducted following the latest editions of NFPA 855 or IEC 62933-5-2/1. The HMA shall consider the safety of the BESS throughout its entire lifecycle, addressing all identified hazards and meeting environmental impact requirements. The analysis shall be specific to the project and product.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.6	Product safety - Containment Measures: Fire detection and alarm To enhance fire safety, the following measures should be considered: • Install an automatic fire detection system with audible and visible alarms across the site. • Network in-unit fire panels for centralised monitoring. If absent, use external detection based on manufacturer or site design. • Integrate fire detection with the Battery Management System (BMS) or other manufacturer-provided interfaces for real-time risk monitoring. • Place annunciator panels at site entrances for quick emergency access. • Re-commission the facility only after confirming all risks are mitigated and safety conditions restored. • Regularly review detection systems, as they are rarely activated. • Incorporate gas detection (e.g., H_2 sensors) to detect hazards before ignition. Advanced options include pressure sensors in cells to identify swelling before thermal runaway. Where feasible, use gas, smoke, or infrared (IR) heat detection	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The Applicant will ensure that their chosen BESS OEM equipment features an automatic fire detection system in compliance with the latest editions of IEC 62933-5-2, EN 54, NFPA 855, UL 9540, and IEC 60079. The system shall incorporate robust detection capabilities to provide early warnings of potential hazards, with audible and visible alarms, networked for centralised monitoring and integrated with the BMS for real-time risk monitoring. Furthermore, the BESS facility specification shall require the prominent display of clear and legible safety information at site entrances. The O&M requirements will also include provision for regular reviews of the detection system.	Partially Compliant (Full compliance upon selection of equipment supplier.)

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
	to provide early warnings before fire develops. short circuit) before smoke even occurs (as heat precedes smoke in a thermal event).		
2.7	Product safety - Containment Measures: F-Stop mechanism and other shut-down mechanisms To enhance the effectiveness of F-Stop mechanisms, the following should be considered: • Design F-Stop systems to disconnect non-critical components during fire or explosion scenarios while preserving the operational functionality of the BMS and firefighting or explosion prevention systems. However, in current designs, the cooling system shuts down when F-Stop is triggered, so its continued operation may not always be feasible. • Facilitate effective communication between F-Stop mechanisms and the BMS without direct integration, as F-Stop is not currently controlled by the BMS. Instead, the BMS may disconnect certain racks in response to alarms. • Conduct rigorous testing to validate F-Stop performance across multiple fault conditions, including thermal events and electrical failures. • Address F-Stop reliability through functional safety assessments (e.g., FMEA, HARA). Compliance with UL 9540 (Class B or SIL2) or IEC 61508 SIL 2, where applicable, should be considered sufficient to determine the need for redundancy. If required, incorporate redundancy to eliminate single points of failure and enhance system reliability during emergencies.	The BESS technical specification will require the implementation of a reliable F-Stop mechanism, designed to disconnect non-critical components during fire or explosion scenarios while maintaining the operational functionality of the BMS and firefighting or explosion prevention systems. The Applicant will ensure that their chosen BESS features an F-Stop mechanism designed to facilitate effective communication with the BMS. The F-Stop mechanism shall be tested to validate its performance across multiple fault conditions. The specification shall also require functional safety and risk assessments to address F-Stop reliability and shall consider compliance with UL 9540 (Class B or SIL2) or IEC 61508 SIL 2 aiming at determining the need for redundancy to eliminate single points of failure.	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.8	Product safety - Containment Measures: Explosion control To ensure effective explosion hazard mitigation, all internationally recognised fire safety approaches should be permitted, including explosion prevention systems, explosion protection systems, and engineered explosion control systems. The regulatory framework should remain technology-neutral, allowing both passive and active safety architectures, provided they comply with or exceed established safety standards. To improve explosion prevention and control, the following principles should be applied: • Implement a combination of explosion prevention and protection systems, ensuring they are tailored to the specific BESS designs and architectures available on the market. • Use NFPA 68 and NFPA 69 as frameworks to design effective venting and prevention solutions. • Prioritise real-world testing and risk assessments to validate system performance under expected operating conditions. • Provide clear documentation and training for operators and first responders on system functionality and emergency procedures. Note: Regulatory requirements should allow for flexibility in meeting safety objectives, recognising that different technologies and approaches may offer equivalent or even superior levels of protection. An evidence and performance-based approach, rather than prescriptive hardware mandates, would enable solutions to be tailored to different BESS designs and architectures while upholding the highest safety standards.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The Applicant will procure equipment compliant with NFPA 855, certified to UL 9540, and tested in accordance with UL 9540A and CSA TS-800. Furthermore, the BESS technical specification shall mandate compliance with NFPA 68 and NFPA 69, with system design informed by the results of UL 9540A testing and other real-world testing. Incorporating both active venting with detection and forced ventilation, in addition to deflagration venting, is preferred by The Applicant and will be given priority in the BESS selection process, to provide enhanced explosion control measures.	Partially Compliant (Full compliance upon selection of equipment supplier.)

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
2.9 2.9.1	Product safety - Mitigation Measures: Fire safety strategy - Battery fires It is imperative to allow for flexible fire safety strategies adapted to different BESS designs and architectures. While installation environment requirements may be subject to national or local regulations, fire safety strategies should allow for adaptability to accommodate various system designs. Controlled burning is a viable approach, as confirmed throughout the world, and evidence from large-scale fire tests must support this decision. Whereas water can extinguish fires and prevent/stop thermal propagation, it cannot stop a thermal runaway once initiated within a battery cell. However, direct water injection can be a viable fire suppression strategy where feasible. This approach may be necessary when a "let-it-burn" strategy is no longer sufficient to prevent fire spread. It is good practice for BESS manufacturers to provide evidence of the effectiveness and reliability of the suppression method by providing a third-party report. Nevertheless, the presence of water on-site should be determined by local jurisdiction. Below are advantages and disadvantages to be considered: Factor: Fire Suppression Advantages: Can reduce peak heat load when supplied through dry piping into the BESS enclosure (if designed by OEM). Disadvantages: Limited suppression effectiveness—may prolong the fire event without fully extinguishing it. Factor: Cooling Adjacent Units Advantages: Helps prevent cascading fire propagation to nearby BESS units or infrastructure. Disadvantages: Excessive use may lead to water runoff carrying toxic byproducts – this also applies to fire suppression. Factor: Controlled Burning Strategies Advantages: Fire brigades can use water to manage a controlled Fire burn, preventing spread to vegetation or critical assets. Disadvantages: Requires careful planning to avoid unintended thermal effects. Factor: Toxic Emission Mitigation Advantages: Can dilute hazardous emissions, reducing environmental and health impacts. Disadvantages: Can spread contaminants if runoff is not properly contained. Factor: Electrical Safety Advantages: No noted advantages Disadvantages: High conductivity increases risk of electrical shock or short circuits. Factor: Thermal Runaway Risk Advantages: No noted advantages Disadvantages: May intensify thermal runaway under certain conditions.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The BESS facility firefighting strategy includes cooling nearby BESS enclosures using the on-site water supply- if deemed necessary and appropriate by the NFRS. The water supply system shall meet or exceed the requirements of NFPA 855, and provide a minimum of 1,900 litres per minute (LPM) for at least 2 hours. The strategy shall also consider the results of UL 9540A and CSA TS-800 testing, and require that the BESS remain in place until the thermal event has fully ended, as determined by the BESS OEM emergency response team and local fire authorities.	Partially Compliant (Full compliance upon selection of equipment supplier and provision of studies.)

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
2.9.2	Product safety - Mitigation Measures: Fire safety strategy – Non-Battery fires Where the risk of fire in non-battery related components is unacceptable, i.e., if there is a risk of fire/heat reaching the battery modules, the fire origin could be detected by a suitable fire/heat detection and fixed extinguishment system placed inside or outside as the BESS design allows for it. The battery must be appropriately separated from other flammable components to avoid the spread of fire, as specified in Section 2.4 of this document.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The BESS facility design shall comply with regulations and NFPA 855.. UL 9540A compliance testing shall be conducted up to the installation level, and the test report from the BESS OEM shall be submitted for approval by the NFRS and insurer prior to construction. The BESS enclosures shall meet UL 9540 standards	Partially Compliant (Full compliance upon selection of equipment supplier.)
2.10	Product safety - Mitigation Measures: Large scale fire testing To ensure safety and compliance, BESS manufacturers must provide evidence of adherence to NFPA 855:2026 Large-Scale Fire Testing (or equivalent). In case of other methods chosen, their evidence has to be precisely described and verified. The test report should confirm that no fire propagation occurs between BESS units or in advanced solutions no fire propagation occurs between sub-units (e.g., packs) of a BESS to prevent container fire. This evidence helps site owners, customers, and authorities understand BESS fire behaviour.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The Applicant will procure BESS equipment with UL 9540A and CSA TS-800 test reports, to demonstrate no fire propagation between modules, units, or systems. An independent assessor will review the report, guiding the final site design. The chosen BESS OEM's equipment will prevent fire propagation, and the fire suppression system will prevent internal propagation. The firefighting strategy will include cooling nearby enclosures using on-site water supply if deemed necessary and appropriate by the NFRS, with two 228 m^3 water tanks providing 1,900 LPM for at least 2 hours, meeting NFRS, NFPA 855, and ARC requirements.	Partially Compliant (Full compliance upon selection of equipment supplier.)
3.1	Site safety - Mitigation Measures: Location requirements Site assessments should be conducted at project inception and revisited periodically. These assessments could address: • Fire and smoke risks for nearby communities. • Drainage systems for water runoff, including municipal water integration for firefighting. • Scaled regulations tailored to system size. • Clear emergency escape routes and on-site firefighting strategies. • Environmental risk for the site has to be assessed and mitigated.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The BESS will be designed and installed in compliance with NFPA 855, IEC 62933-5-2, and tested in accordance with UL 9540A and/or CSA TS-800, with a focus on mitigating fire propagation risks. A robust emergency planning strategy will be established, informed by the NFRS and considering local conditions, to ensure clear emergency escape routes, on-site firefighting strategies, and effective management of environmental risks. Regular site assessments will be conducted to revisit and refine these strategies as needed.	Partially Compliant (Full compliance upon completion of ERP)
3.3	Site safety - Mitigation Measures: Water availability at site Coordinate water availability with site-specific risks. Focus should be put on: • Providing on-site reserves or connecting to public supplies. • Consulting fire authorities to match resources with suppression needs. • Ensuring compliance with local water management and safety regulations.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The BESS site will ensure adequate water availability for firefighting purposes, coordinating with local fire authorities to match resources with suppression needs. The Applicant will provide on-site water reserves, comprising two 228 m^3 tanks, meeting the minimum requirements of NFRS, NFPA 855, and ARC. The water supply will deliver 1,900 LPM for at least 2 hours, enabling effective cooling of nearby BESS enclosures. This strategy complies with local water management and safety regulations, ensuring a robust firefighting capability.	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier.)

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
3.4	Site safety - Mitigation Measures: Hazardous liquids containment Implement strong containment measures to properly handle wastewater. Ensure the systems include: • Secondary containment for transformer oil leaks, in compliance with NFPA 30, NFPA 850, and IEEE C57.12. • Spill trays or bund walls to capture glycol leaks from liquid cooling systems. • Oil-water separators and filtration to prevent hazardous discharge into the environment. • Leak detection sensors to monitor potential spills and ensure timely response. • Proper drainage and wastewater treatment to handle contaminated runoff from fire suppression and prevent pollution of soil and water sources.	The site will implement hazardous liquids containment measures, including drainage and bunding capabilities. The BESS technical specifications will require adequate management and containment of wastewater and toxic spills, including the provision of an automated penstock on the outfall of the containment system, addressing transformer oil, cooling system refrigerants, and firewater drainage, in compliance with NFPA 855. The penstock will have a backup power system.	Partially Compliant (Full compliance upon selection of equipment supplier.)
3.5	Site safety - Mitigation Measures: Container spacing Container spacing at BESS sites should be determined through a comprehensive risk-based analysis that accounts for: • Fire protection, including suppression system access. • Emergency response measures including fire brigade response time and capabilities. • Installation-specific factors like BESS enclosure fire rating, size, capacity, and battery chemistry. • Spacing necessary for preventive and corrective maintenance. • Insights from large-scale fire tests and simulation data to estimate the required clearance for preventing fire propagation under standard conditions.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The BESS facility design shall comply with regulations and NFPA 855.. UL 9540A compliance testing shall be conducted up to the installation level, and the test report from the BESS OEM shall be submitted for approval by the NFRS and insurer prior to construction. The BESS enclosures shall meet UL 9540 standards.	Partially Compliant (Full compliance upon selection of equipment supplier.)
3.6	Site safety - Mitigation Measures: Spacing towards Power Conversion System (PCS) Spacing in between Power Conversion Systems (PCS) should minimise risks. Key measures for this include: • Maintain distances based on flammability and arcing potential. • Include fire barriers in high-risk areas. • Regularly update designs to align with PCS technology advancements.	The BESS facility design will comply with regulations and NFPA 855. A minimum separation distance, based on final supplier specifications, shall be maintained between BESS enclosures and PCS or MV Station (whenever applicable). UL 9540A compliance testing shall be conducted up to the installation level, and the test report from the BESS OEM shall be submitted for approval by the NFRS and insurer before construction.	Partially Compliant (Full compliance upon selection of equipment supplier.)
3.7	Site safety - Mitigation Measures: Spacing towards environment (Buildings / Fence / Vegetation) Key spacing considerations include: • Clear vegetative barriers to prevent fire spread. • Buffer zones for buildings and fences to minimise heat damage. • Engage authorities and communities to address risks in urban and rural settings.	This recommendation has already been addressed through similar requirements outlined in the other technical publications referenced in this document. The BESS facility design will comply with regulations and NFPA 855. The operator will engage an O&M provider to maintain the site, including vegetation management, ensuring a 3m clearance from vegetation to BESS containers. The Applicant will require UL 9540A and/or CSA TS-800 compliance as part of the tendering process, which will determine the final grouping and separation distances between battery enclosures, other equipment, and buildings. UL 9540A test reports from BESS OEMs will be submitted for NFRS sign-off prior to construction, and insurer agreement.	Partially Compliant (Full compliance upon selection of equipment supplier.)

Ref.	EASE Best Practice Recommendation	Compliance Statement	Compliance
3.8	Site safety - Mitigation Measures: Gas/smoke/noise emissions To ensure safety and minimise impacts, emissions from BESS fires should be managed as follows: • In emergency response plans, include evacuation, first-responder safety, and strategies based on thermal runaway research. • Mitigate noise impacts by complying with local noise regulations. A BESS development planning application should include an Acoustic Impact Assessment, typically reviewed by the Environmental Health Officer (EHO) or an equivalent authority. The energy storage system must meet strict noise limits set by local authorities to prevent adverse effects on residential areas. • Align with local and regional regulations, balancing operations with community well-being.	The BESS will comply with requirements from NFPA 855, IEC 62933 -5-2, IEC 63056, UL 9540, UL 9540A, and relevant local regulations and directives relating to noise emissions.	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier.)
4.1	Personnel safety - Mitigation Measures: Emergency Response Plan Emergency response plans must prioritise personnel safety and align with recognised standards. They should incorporate practical, evidence-based strategies to minimise risks during incidents: • When a large-scale fire testing shows that the fire is confined to a single BESS unit, firefighters should adopt a defensive approach. Allowing the fire to self-extinguish reduces risks to responders. • When necessary, cool adjacent units or exposed assets using fog nozzles with a wide-angle cone. This approach is advisable when large-scale fire testing has not been performed or when additional cooling is required. • Personnel should never manually open the doors of a smoking or burning BESS. If access is needed, use remote or robotic equipment from a safe distance to avoid creating an explosive atmosphere by introducing oxygen.	This recommendation has already been addressed through similar requirements outlined in other sections of this document. A comprehensive ERP will be developed in collaboration with the Nottinghamshire Fire and Rescue Service (NFRS) and independent technical advisors. The ERP will outline procedures for site personnel, operations control room staff, and first responders in the event of a thermal event, fire, or explosion. The plan will address key considerations, including hazard identification, safe access, and firefighting infrastructure, and will be reviewed and updated regularly to ensure effectiveness. The ERP will be agreed with NFRS before construction commences and will provide critical information for first responders to evaluate and respond to incidents on site.	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier.)
4.2	Personnel safety - Mitigation Measures: Training (personnel /firefighters) Training programmes must be based on the established emergency response strategy, which is specifically designed for people at BESS locations. Key features include: • Providing firefighters with comprehensive training to ensure effective response during emergencies. • Creating customised training modules for both personnel and emergency responders, aligned with regional and national standards. • Regularly updating training to reflect advancements in battery technology and evolving safety practices.	This recommendation has already been addressed through similar requirements outlined in other sections of this document. The Applicant will ensure compliance with training requirements through specialised training programs for site personnel and local firefighters. The O&M contractor will provide training on specific equipment deployed at the site, while the BESS OEM will develop customised training for personnel who frequently attend the facility. Site personnel and local firefighters will receive regular training on emergency response priorities and actions, with updates and reviews to ensure the plan remains effective, and aligns with standards.	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier.)

Table A5.4.9 – Allianz Risk Consulting Recommendations

Allianz Risk Consulting Recommendation	Compliance Statement	Compliance
Fire Department Invite the fire department to your property to discuss BESS hazards. An adequate emergency response is the key to avoiding an uncontrolled fire. Keep in mind that some	The Applicant will engage with the Nottinghamshire Fire and Rescue Service and independent technical advisors for the production of the FSMP. The Applicant will seek to involve NFRS during the production	Full compliance upon completion of ERP

Allianz Risk Consulting Recommendation	Compliance Statement	Compliance
fire fighters will not fully understand the hazards and may assume that lithium-ion batteries are the same as lithium batteries. Key questions to discuss with the fire department include: What is the main difference between extinguishing and cooling? How to handle a damaged battery? How to manage the flammable and toxic gases? Plan training exercises with the fire department when the system is commissioned. Standard Operating Procedures (SOP) & Standard Operating Guidelines (SOG) are of major importance and should be updated and tested on a regular basis.	of the emergency response plan that will be created for the site prior to the construction phase commencing. The Emergency Response Plan (ERP) will outline the steps to be taken by any personnel on site, personnel in the operations control room and provide key information for first responders who attend the site. The ERP will contain key information from the BESS OEM, The Applicant, and related parties to allow the first responders to evaluate the steps to be taken on site. The BESS OEM, BoP Contractor and O&M Contractor will be required to maintains SOPs as part of their quality plan.	
Construction and Location Install BESS outdoors a minimum of 20 m (65 ft.) from important buildings or equipment. Maintain a minimum of 3 m (10 ft.) separation from lot lines, public ways and other exposures. Within the module, maintain a minimum of 1 m (3 ft.) separation distance between enclosures for all units up to 50 kWh when not listed, or up to 250 kWh when listed. Install a thermal barrier where the minimum space separation cannot be provided. If the BESS must be located indoors, install in a 2-hour fire rated cut-off room, which is accessible directly outdoors for manual firefighting. Restrict the access to competent employees or sub-contractors. Ensure enclosures are non-combustible.	The BESS facility design will follow regulations and NFPA 855. NPFA 855 allows the separation distance between containers to be reduced to 0.9 m, where large scale fire testing has been completed in accordance with UL 9540A or equivalent standards, and the UL 9540A test report is approved by the NFRS / LPA. The Applicant will include UL 9540A compliance as part of the tendering exercise, and this will drive final grouping and separation distances between enclosure to enclosure, and from each enclosure to exposures. The Applicant will submit the UL 9540A test report from the BESS OEMs for sign-off by the NFRS prior to construction commencing. It is recommended that this is also agreed with the insurer of the BESS prior to proceeding with the application. The BESS enclosures shall comply with UL 9540.	Partially Compliant (Full compliance upon selection of BESS OEM)
Material, Equipment and Design BESS should be tested in accordance with UL 9540A, Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems. This standard evaluates thermal runaway, gas composition, flaming, fire spread, re-ignition and the effectiveness of fire protection systems. Data generated can be used to determine the fire and explosion protection requirements for a BESS. Place capacitor, transformer, and switch gear in separate rooms according to best engineering practices.	The chosen BESS equipment will be tested as per UL 9540A, the BESS OEM will conduct testing initially at cell level, and then progress to module, unit and system level as required to demonstrate compliance with UL 9540A. UL 9540A testing evaluates the design of the BESS equipment and is used to establish minimum clearance distances. The Applicant has allowed for a spacing of 8 m between the Transformer Station and BESS enclosures, final spacing shall be determined by the BESS OEM following provision of the UL 9540A test report(s). Any modification to the clearance distances and associated infrastructure post-consent will be completed through the discharge of DCO requirements process. Any transformers and switchgear shall be housed within a fenced off compound using CAT2 Mesh Fencing. Each transformer will have its own bund and comply will the relevant clearance distances as described by the selected manufacturer and verified through calculations. Any switchgear will be housed within an independent Switchgear room within the compound.	Partially Compliant (Full compliance upon selection of equipment supplier)
Ventilation and Temperature Control Install adequate ventilation or an air conditioning system to control the temperature. Maintaining temperature control is vital to these batteries' longevity and proper operation	The manufacturer of the BESS designs the temperature control and ventilation of the BESS. Following commissioning, the operations and maintenance of the system will be the responsibility of the O&M	Partially Compliant (Full compliance upon selection of equipment supplier)

Allianz Risk Consulting Recommendation	Compliance Statement	Compliance
as they degrade exponentially at elevated temperatures. On the other hand, energy capacity of batteries drop at low temperatures. Ensure ventilation is provided in accordance with the manufacturer's recommendations. Install and maintain the ventilation during all stages of a fire. Ventilation is important since batteries will continue to generate flammable gas as long as they are hot. Also, carbon monoxide will be generated until the batteries are completely cooled through to their core	contractor. A decision has not been reached on the cooling methodology, this will either be liquid or air cooled. The cooling functionality is extensively tested during the initial design of the BESS enclosures. The Applicant will ensure that their chosen BESS OEM's equipment complies with NFPA 68 (Deflagration Venting) or NFPA 69 (Explosion Protection Systems). This is required as a mitigation against the build up of flammable gases if a thermal event was to occur and is required as part of compliance with NFPA 855.	
Gas Detection and Smoke Detection Install a very early warning fire detection system, such as aspirating smoke detection. Install carbon monoxide (CO) detection within the container or BESS room.	The Applicant will ensure that their chosen BESS OEM's equipment contains smoke detection, and a heat detector / CO detector, or at a minimum monitoring of BMS data to detect early warning signs of an impending issue. Any detection will include audible and visual alarms, plus alarms on the HMI interface / link to The Applicant's operations control room.	Partially Compliant (Full compliance upon selection of equipment supplier)
Fire Protection and Water Supply Install sprinkler protection within BESS rooms and ideally within BESS containers. The sprinkler system should be designed to provide 12.2 l/min/m² over 232 m². Water has been proven to be the best agent to fight a fire involving lithium-Ion batteries. It is important to note that other extinguishing agents, such as aerosols or gaseous extinguishing systems, will extinguish the fire, but they do not provide cooling like water. Insufficient cooling allows a hot and deep-seated core to remain. The heat will rapidly spread back through the battery and reignite remaining active sections. This is the primary reason ARC recommends the use of water for fighting the fire and cooling the batteries. Implement a procedure for battery submersion in the pre-emergency plan performed by the fire department. Submerging batteries in water (preferably outdoors) after they burn has proven to be effective at cooling the batteries and neutralizing the thermal threat. They will continue to release gases, mostly carbon monoxide, but also flammable gas such as hydrogen. Therefore, never submerge several batteries in a confined space without adequate ventilation. Ensure that sufficient water is available for manual firefighting. The ability of the fire department to control a fire involving a BESS depends on the presence of an adequate water supply and their knowledge of the hazards. The following should be considered: An external fire hydrant should be located within 100 m (330 ft.) of the BESS room or containers. The water supply should be able to provide a minimum of 1,900 l/min (500 gpm) for at least 2 hours.	The Applicant will procure equipment with UL9540 certification (or IEC 62619) and a UL 9540A test report, this test report is evidence that will be submitted to the NFRS and/or LPA to demonstrate that the chosen BESS equipment will not propagate from module to module, unit to unit, or system to system depending upon the final level of testing performed. The Applicant will appoint an independent assessor to review the UL 9540A test report in accordance with NFPA 855 prior to submission to NFRS (this will be an independent consultant, with no prior knowledge of the project). The interpretation of the test report from the independent engineer will drive the final site design, with guidance from NFRS expected. The chosen BESS OEM's equipment will have evidence that for UL 9540A testing no fire propagation occurred at any level of the BESS unit. The chosen fire suppression system will prevent cell-to-cell propagation and may include water-based systems with the use of sprinklers, complete with available connections for the fire rescue service. If no suppression system is present in the units, alternative measures will be implemented to prevent fire or thermal events from spreading to adjacent equipment. The Applicant's firefighting strategy will include cooling nearby BESS enclosures using the available water supply on site if deemed necessary and appropriate by the NFRS. The Applicant has included water tanks that meet the minimum requirements of NFRS, NFPA 855 and ARC. The water supply will provide 1,900 litres per minutes (LPM) for at least 2 hours, The Applicant has made provision for two tanks, each containing 228 m^3 of firefighting water. Due to the UL9540A testing, the BESS should remain in place until the thermal event has fully ended (decided by the BESS OEM emergency response room and NFRS).	Partially Compliant (Full compliance upon completion of ERP, and selection of equipment supplier.)

Allianz Risk Consulting Recommendation	Compliance Statement	Compliance
Maintenance Follow original equipment manufacturer recommendations for the inspection, testing and maintenance of BESS. In addition, ensure that the following are completed: Measure the internal resistance of the cells. Replace the cells when a dramatic drop is detected. Keep in mind that the internal resistance is mainly independent of the state of charge but increases as the battery ages. Therefore, it is a good gauge of predictable life. Perform infrared scanning at least once per year. Check for fluid leakage. Implement electric terminal torquing procedures to maintain connection and contact integrity.	The Applicant will appoint an O&M contractor with specific BESS maintenance experience. The chosen contractor will retain responsibility for maintaining the BESS, and The Applicant will provide oversight along with the BESS OEM to ensure that all maintenance activities are completed as planned. Battery cells are continually monitored using the BMS, and anomalies, such as voltage drop or unbalanced charge are flagged using the SCADA to the operations control room operators. We do not expect cell replacement to occur unless this activity occurs under the BESS OEM's operations and maintenance teams.	Partially Compliant (Full compliance upon selection of equipment supplier.)

A5.4.3.5 FIRE SAFETY TRAINING

32 All staff will receive appropriate fire safety training. The main features of the training will be as shown in Appendix A.

33 Training should be provided at the intervals stated in the schedule; however, it may be appropriate to update training in circumstances such as changes to the site layout, introduction of new fire risks, changes to the emergency procedures. Such issues should be highlighted through the ongoing fire risk assessment process.

34 Detailed records should be kept of all fire safety training, including the dates, subjects covered and names of those receiving the training.

35 Local firefighters and first responders responsible for responding to emergencies at the BESS facility will receive training as per Appendix A.

A5.4.3.6 FACILITIES FOR FIRE FIGHTING

36 There are certain facilities on the site to assist with Fire Service operations. These are:

- Fire vehicle access route;
- Emergency response plan;
- Emergency control operations control room, manned continuously to provide guidance;
- Fire water tanks;
- Fire alarm system to BS5839-1:2017; and
- Fire water drainage.

37 NFRS will be invited to site to familiarise themselves with the site, BESS equipment and the firefighting facilities. Ongoing liaison will be maintained throughout the development and operation of the BESS facility.

38 Safe working distances will be discussed with the chosen BESS OEM, evaluated with NFRS and then agreed in writing as part of the fire safety risk assessment conducted by the Principal Contractor under their duties as part of the Construction Design and Maintenance Regulations 2015. This will then be adopted by the O&M contractor and periodically reviewed with NFRS as part of the fire safety risk assessment for the operational site.

A5.4.3.7 EVACUATION / EMERGENCY PROCEDURES

39 All staff should be trained in necessary actions in the event of fire.

40 The emergency evacuation procedures are in Appendix C. Evacuation procedure notices will be displayed at key locations around the BESS facility as a reminder to staff.

41 The BESS facility will not be permanently manned, and it is expected that personnel shall only attend site for routine maintenance, troubleshooting and site inspection reasons.

42 The evacuation strategy for fire is for total simultaneous evacuation. All site occupants present will evacuate from all areas of the site when the fire alarm warning is given.

43 There is a specific assembly point to which all occupants must report in the event of an evacuation.

44 Attendance records and the visitor book will be taken to the assembly point to enable a roll call to be made.

45 Contact details for the operations room will be shared with NFRS prior to commissioning, these will be clearly sign-posted throughout the BESS facility, and at the BESS facility gates within the Information Box.

46 NFRS will be issued with a copy of the ERP for the BESS facility, and this will also be made available within the BESS facility as a back-up in paper format.

47 Attending Fire Service crews will be met at the Site Main Entrance if personnel are present, and a rollcall will be shared. Where no personnel are present~~, NFRS will contact~~ on site, the remote-operations control room will contact the NFRS and ~~check the visitors~~share relevant information, such as the visitors' sign-in log and ~~proceed with~~ any other applicable safety guidance ~~from the remote operations control room~~. Further details will be agreed as part of the FSMP in consultation with NFRS.

48 Emergency lighting will be provided to all common escape routes and the system should comply with the recommendations given in BS 5266: Part 1.

49 All escape routes are to be distinctively and conspicuously marked by emergency exit signs following the recommendations of BS ISO 3864-1 and BS 5499-4.

A5.4.3.8 FIRE SUPPRESSANT

50 As outlined in Environmental Statement Technical Appendix A9.1, FRA, [EN010162/APP/6.4.9.1] based on recommendations in NFPA 855 Standard for the Installation of Stationary Energy Storage Systems and NFCC - Grid Scale Battery Energy Storage System planning - Guidance for FRS, a static supply of on-site water for a duration of 120 minutes and a requirement of 1,900 l/min of fire suppression water has been used to calculate the volume of fire suppressant water required to be stored onsite in the event of a container fire.

51 This equates to 228 m^3 of storage.

52 The SuDS structures serving each catchment of the BESS compound will be sized to accommodate the 1 % AEP + 40 % CC and an additional 228 m^3 as an additional holding basin, and this will be sufficient for storing the full fire suppressant volume.

53 An automatic penstock will be placed on the outlet of the SuDS structure and would be shut off in the event of a fire suppression event. It would remain closed until testing of the captured water has taken place. Water will then be removed offsite by tankers to a licenced facility. A backup power system will also be in place in case of power failure.

54 There will also be an impermeable lined (clay or synthetic liner or appropriate method at the time of construction to be agreed with the EA) holding basin available for spent firefighting water to be pumped to in the event of a battery fire during heavy rainfall. As such, the SuDS system will

not reach capacity during such an event. Following a fire-fighting event, the lining or clay base of the detention basin could be replaced if testing identified that contaminants were present.

55 It is recommended that the BESS Compound has a shallow bund or cut-off permitter drain to limit the potential for run-off to leave the Development and drain to the cellular storage.

A5.4.4 MONITORING

A5.4.4.1 EVACUATION DRILLS

56 An evacuation drill will be carried out at the frequency stated in Appendix A. Routine drills will be organised and monitored by the Fire Safety Manager. Records will be kept of each evacuation drill.

A5.4.4.2 CHECKS, MAINTENANCE AND TESTING

57 All fire safety equipment and systems will be subject to routine checks, tests and maintenance at periods recommended by manufacturers / suppliers, British Standards or general fire safety guides. The testing and maintenance schedule is included at Appendix D.

A5.4.4.3 RECORD KEEPING

58 Fire safety records should be kept up to date and available for inspection on site. The summary of fire safety records to be kept is as follows:

- Staff fire safety training;
- Equipment and systems testing and checks;
- Equipment and systems routine maintenance and servicing;
- Fire alarm activations;
- Fire events;
- Fire risk assessment and associated action plans;
- Fire safety officer visits and associated correspondence;
- Lessons learned and actions implemented following discussion with NFRS; and
- Evacuations planned and unplanned.

A5.4.5 AUDIT AND REVIEW

A5.4.5.1 FIRE RISK ASSESSMENT

59 The fire risk assessment should be reviewed at least annually.

60 A review will also take place in the event of significant changes, such as;

- Increase in number of people likely to be in the site;
- Proposed alterations in the layout of the site;
- Increase in fire loading in the site; and
- Proposed changes to this fire safety management plan or the arrangements specified within it.

61 The fire risk assessment and procedures should also be reviewed following any occurrence of fire (no matter how minor) or any reported fire-related near-miss.

A5.4.5.2 RESPONSE TO CHANGES

62 Whenever changes are made which:

- Necessitate review of fire risk assessment (as specified in A5.4.5.1 above), or
- Affect the management structure or arrangements of the premises,

the impact of those changes on this FSMP should be assessed and amendments made as necessary.

A5.4.5.3 RECORDS AUDIT

63 The fire safety records detailed in Section A5.4.3.5 and Section A5.4.4.3 above should be audited annually by personnel with designated responsibility.

A5.4.5.4 FSMP FORMAL REVIEW

64 The FSMP should be the subject of an annual review. The results of the review should be recorded by The Applicant digitally, and any necessary changes will be made and implemented. The FSMP should then be shared with all relevant parties, such as the Insurers, NFRS, O&M Contractor and any financing partners.

65 The review will be undertaken by a competent person nominated by personnel with designated responsibility.

A5.4 APPENDIX A – TRAINING SCHEDULE

66 Training will be provided as appropriate to those with designated responsibilities.

Table A5.4.A-1 – Training Schedule

Training	Content	Frequency
General Fire Safety Induction – All Staff and Local FRS	Site layout familiarisation Identification of escape routes and assembly point Fire detection, suppression and warning arrangements Emergency procedures	On commencement
Routine Staff Training – All Staff and Local FRS	Emergency plan and procedures Roll call procedures Fire prevention (including BESS) Roles and responsibilities Key points from fire risk assessment False alarms – review and prevention measures Fire events (and near-misses) Special instruction relevant to particular role (e.g. calling fire service, assisting person as part of PEEP)	Initial and annual refresher
Evacuation Practice	Full evacuation drill testing all procedures Review and communication of feedback to all	6 monthly (for each shift group)
Portable Fire Extinguisher Training (Designated Staff only)	Practical firefighting using portable equipment of types as installed in the premises	Initial and periodic refresher
Nominated Person Training / Fire Warden	Role and responsibilities detail Routine fire checks Understanding fire-related systems and equipment Assisting evacuation process Checking premises / areas safely Liaison with Fire Service Reporting procedures for faults, near-misses	Initial and annual refresher

A5.4 APPENDIX B – STANDARD PERSONAL EMERGENCY EVACUATION PLANS (PEEPS)

67 Standard PEEPS are for use when a person who requires assistance in an emergency comes to the premises as a visitor. In other circumstances it will be appropriate to have a specific PEEP for anyone requiring one

68 NB: Specific PEEPs are beyond the scope of these FSMP recommendations.

PLAN 1 – PERSON WITH SIGHT IMPAIRMENT

Requirement

69 Person is partially sighted or blind making it difficult to locate and negotiate escape routes.

Escape Procedure

70 The person's host will take them to a safe position outside the site. (It is not anticipated that visitors with sight impairments will be allowed unaccompanied access around the site).

Specialist Equipment

71 None specified for this plan.

Fire Warden Assistance

72 None specified for this plan.

Communication

73 Information on escape routes, fire alarms and procedures will need to be detailed verbally at the reception area when signing in as standard printed information will not be adequate.

PLAN 2 – PERSON WITH HEARING IMPAIRMENT

Requirement

74 Person has hearing impairment making it difficult to hear the fire alarm clearly.

75 OR

76 Person is totally deaf making it impossible to hear the fire alarm.

Procedure

77 The person will be alerted by their host, or by a companion / colleague who is visiting with them.

78 OR

79 The person will be alerted by seeing a fire alarm visual warning device.

80 It is anticipated that an independent escape can then be made following the signed escape routes.

Specialist Equipment

81 Some visual warning devices are in place where visitors may be unaccompanied, e.g. toilets.

Fire Warden Assistance

82 None specified for this plan.

Communication

83 Availability of visual information in the reception area to inform visitors of escape routes and procedures

A5.4 APPENDIX C – EMERGENCY PROCEDURES

84 These are the emergency fire procedures. Notices displaying this information are displayed in the switchrooms, and available within the information box for first responders.

FIRE EMERGENCY RESPONSE PLAN

What People / Staff Should Do If They Discover a Fire

85 Raise the alarm by operating the nearest fire alarm call point (and then act as follows):

What People / Staff Should Do If They Hear the Fire Alarm

- Leave the site by the nearest exit.
- Evacuate to the designated assembly point.
- Do not stop or return to collect personal belongings.
- Close any doors en-route without delaying your escape.
- Remain at the assembly place.
- Return to the site only when authorised to do so by authorised personnel or attending Fire Officer.
  NB: A person who discovered the fire should immediately pass any information to the supervising manager at the assembly point.

86 For those with specific designated duties:

- Call the Fire & Rescue Service by dialling 999.
- Inform the operations control room.
- Tackle the fire only if trained and where appropriate.
- Those with responsibilities for assisting persons with Personal Emergency Evacuation Plans should respond as required following the actions as identified in the Plan.
- Ensure any visitors are escorted from the site to the assembly point.
- During joint occupation (Contractor still present), notify the Contractor following the agreed protocol.

What Designated Staff Should Do if a False Activation has Occurred:

- Reset the Fire Alarm.
- Advise staff that it is safe to return to the site.
- Record the event in the Logbook.

87 Visitors

- All Visitors are logged in and out of the site by use of the Visitors Book.
- All Visitors are made aware of the Fire Evacuation Procedures on arrival.
- The designated person will take the Visitors Book to the Assembly Point in the event of an evacuation and perform a roll call.
- The Fire & Rescue Service will be made aware of any suspected missing person(s).

Contacting the Fire & Rescue Service

- TheIn the event of a confirmed dangerous condition, the Fire & Rescue Service will be called by a designated staff member from the operational control room, or personnel on site conducting maintenance activities.
- Although the Fire Alarm will send a signal to the Automatic Monitoring Centre, a confirmatory 999 call will still be made upon confirmation of a potentially dangerous condition.

Fire & Rescue Service Liaison Procedure

88 On the arrival of the Fire & Rescue Service the following will be done:

- The designated staff member / operator control room member will make themselves known to the Officer in Charge of the attending crew on their arrival (meeting them at the designated location);
- The designated staff member will provide all known details to the Fire & Rescue Service on arrival;
- The designated staff member will continue to act as liaison / point of contact at the direction of the Fire Incident Commander.

Battery Energy Storage Specific Information

89 The following information shall be made available prior to construction of the BESS facility, and included within the information box at the site entrance:

- Lithium-Ion battery chemistries, and procedure from the OEM for tackling the fire
- Methods of isolation for each individual BESS enclosure and the full site, including actions to be taken depending upon the scenario.
- Toxic gas mixtures
- Environmental related considerations including where fire water should be applied, and fire runoff activities (i.e., opening of the penstock)
- Responsibility and handling of damaged batteries

Specific Information for the Fire & Rescue Service

90 The designated staff member or operations control room will give the Fire & Rescue Service specific information such as:

- Location of the fire / incident;
- Location of fire panel;
- Missing persons;
- Flammable material stores;
- Location of high risk areas;
- Any unusual activities such as site works or temporary structures.

91 Contractor to include the procedure to follow if they have a fire emergency on their site with regards to notification of responsible persons/tenants.

A5.4 APPENDIX D – MAINTENANCE / TESTING SCHEDULE

Table A5.4.D-1 – Recommended Maintenance Schedule

System	Frequency	Comment
Fire Alarm (Audio & Visual)	Monthly	User operation test
	Quarterly, Six-monthly, Annually	Check / service by specialist contractor
BESS Smoke Detectors	As agreed with BESS OEM	All sensors checked in accordance with interval specified by BESS OEM including link to SCADA / HMI
BESS Heat Detectors	As agreed with BESS OEM	All sensors checked in accordance with interval specified by BESS OEM including link to SCADA / HMI
BESS Fire Suppression and Explosion Protection	As agreed with BESS OEM	All fire suppression devices checked in accordance with interval specified by BESS OEM including link to SCADA / HMI
BESS Audible Alarm	As agreed with BESS OEM	All fire alarms checked in accordance with interval specified by BESS OEM including link to SCADA / HMI
BESS Visual Alarm	As agreed with BESS OEM	All fire alarms checked in accordance with interval specified by BESS OEM including link to SCADA / HMI
Emergency Lighting	Monthly	User operation test
	Annually	Check / service by specialist contractor
Substation Fire Suppression System	Weekly	Check by user
	Quarterly, Six-monthly, Annually, 3-yearly, 10-yearly	Check / service by specialist contractor
Water Tanks	Weekly	Check by user for obstructions
	Annually	Check / service by specialist contractor
Fire Doors	Six-monthly	Inspection by user
Fire Exits	Monthly	User check for ease of opening
Fire Extinguishers	Monthly	Inspection by user
	Annually	Check / service by specialist contractor

System	Frequency	Comment
Fire door / shutter release mechanisms	Weekly	Operation check by user
	Annually	Check / service by specialist contractor
Automated SuDS Penstock	Weekly	Operation check by user
SuDS Structures e.g. basins	As per the frequency outlined in the SuDS Manual for each structures – see the Outline Drainage Strategy [EN010162/APP/6.4.93].	Check / service by specialist contractor

*Different frequencies may be appropriate – manufacturers or supplier's recommendations should be followed