Abbott Risk Consulting Limited

ARC-1247-002-R1

National Fire Chiefs Council Planning Guidance for Battery Energy Storage System (BESS) Compliance Report – Newfields BESS

Issue 1 – March 2025

Prepared for:

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Executive Summary

This National Fire Chiefs Council (NFCC) Planning Guidance for BESS Compliance Report has been prepared in relation to the Newfields BESS and associated infrastructure (the site) on land at Newfields Farm, Rownall Road, Wetley Rocks, Staffordshire, ST9 0BS.

The focus of this report is primarily on the BESS element of the site. The development is most likely to use Lithium Ferrous Phosphate (LFP) chemistry, although at this juncture the exact make and model of BESS is yet to be determined. LFP chemistry cells are much less susceptible to thermal runaway, being less energy dense than Nickel Manganese Cobalt (NMC) chemistry cells. The Appellant will accept a planning condition which states; 'that the battery cell chemistry will not be of the NMC type'.

This NFCC Compliance Report reviews the proposed site layout and construction against the recommendations detailed in the NFCC Planning Guidance for BESS (2022) [Ref. 1], drawing on the 14 key elements. It provides the claimed compliance status with supporting evidence.

Abbreviations

ALARP	AS Low As Reasonably Practicable
ARC	Abbott Risk Consulting Ltd
BESS	Battery Energy Storage System
BMS	Battery Management System
CO	Carbon Monoxide
ECU	Environmental Conditioning Unit
ERP	Emergency Response Plan
FDSS	Fire Detection and Suppression System
fph	failures per hour
FRS	Fire and Rescue Service
H_2	Hydrogen
HF	Hydrogen Fluoride
HSE	Health and Safety Executive
LFP	Lithium Ferrous Phosphate
NFCC	National Fire Chiefs Council
NMC	Nickel Manganese Cobalt
R2P2	Reducing Risk, Protecting People
TR	Thermal Runaway

Contents

1.0 Introduction

This NFCC Compliance Report has been developed by Abbott Risk Consulting Ltd (ARC) in the role of the Safety Subject Matter Expert. The NFCC Compliance Report has been prepared on behalf of Newfields BESS Ltd (the Appellant) in relation to the Newfields BESS associated with the site, originally submitted under Planning Application SMD/2024/0019.

The Site BESS solution, in terms of BESS manufacturer and model, has yet to be determined, however it is currently proposed that LFP chemistry cells will be used. This is subject to change and will be driven by the availability of technology at the time of construction of the site. Reference to LFP is solely to illustrate the capability that is possible for developments of this type and the safety measures that are generically available. The developer will employ technology that presents the same or a better risk profile as that currently available using LFP chemistry cells. LFP chemistry cells are much less susceptible to thermal runaway, being less energy dense than NMC chemistry cells. The Appellant will accept a planning condition which states; 'that the battery cell chemistry will not be of the NMC type'.

This NFCC Compliance Report has been developed to provide an overview to how the proposed layout and construction complies with the NFCC Planning Guidance for BESS [Ref. 1]. This NFCC Compliance Report provides the evidence to demonstrate alignment with NFCC Planning Guidance. The final design and equipment details is based on the site layout plan and associated details provided.

NFCC Planning Guidance [Ref. 1] remains, as it states in the title, 'guidance' and the recommendations based therein are not binary requirements. NFCC Planning Guidance is not a Statutory Instrument, Regulation or Approved Code of Practice, it is guidance provided by the NFCC for Regional Fire and Rescue Service (FRS) to consider in their deliberations on BESS installations and site design.

2.0 Background

The NFCC Planning Guidance for BESS (2022) [Ref. 1] has been primarily used for this assessment. The Appellant is aware that this guidance is currently subject to review and reissue and a consultation draft was circulated for comment in July 2024. To accommodate this the Appellant has reviewed the 'consultation draft' NFCC Guidance, henceforth referred to as NFCC Planning Guidance for BESS (2024) to distinguish from the current extant 2022 issue. The Appellant has consulted with the Staffordshire FRS and revised the design in response to feedback received. The Staffordshire FRS have confirmed that they have no objections with regard the site layout and design from a firefighting perspective [Ref. 7].

3.0 Aim

The overall safety aim is that the levels of risk of accident, death or injury to personnel or other parties, and to the environment due to the construction, operation and decommissioning of the development are broadly acceptable or tolerable and 'As Low As Reasonably Practicable' (ALARP) in accordance with the health and Safety Executive (HSE) Reducing Risk, Protecting People (R2P2) [Ref. 2]. The aim of this Compliance Report is to address the safety reason for refusal from Staffordshire Moorlands Planning Committee [Ref. 3].

4.0 Scope

The scope of the NFCC Compliance Report for the proposed BESS development and capability covers the physical and functional aspects of the equipment. The site is relatively flat and is outlined by the red line boundary on the site, as detailed in the site location and layout plans, submitted as part of the Planning Application. The BESS facility and associated ancillary infrastructure (March 2025 version based on Sungrow BESS Units) is illustrated at Figure 1 [Ref. 5]. The original BESS facility and associated ancillary infrastructure (May 2024 version based on Fluence BESS Unit) [Ref. 6] is at Figure 2 and provided for comparison and clarity.

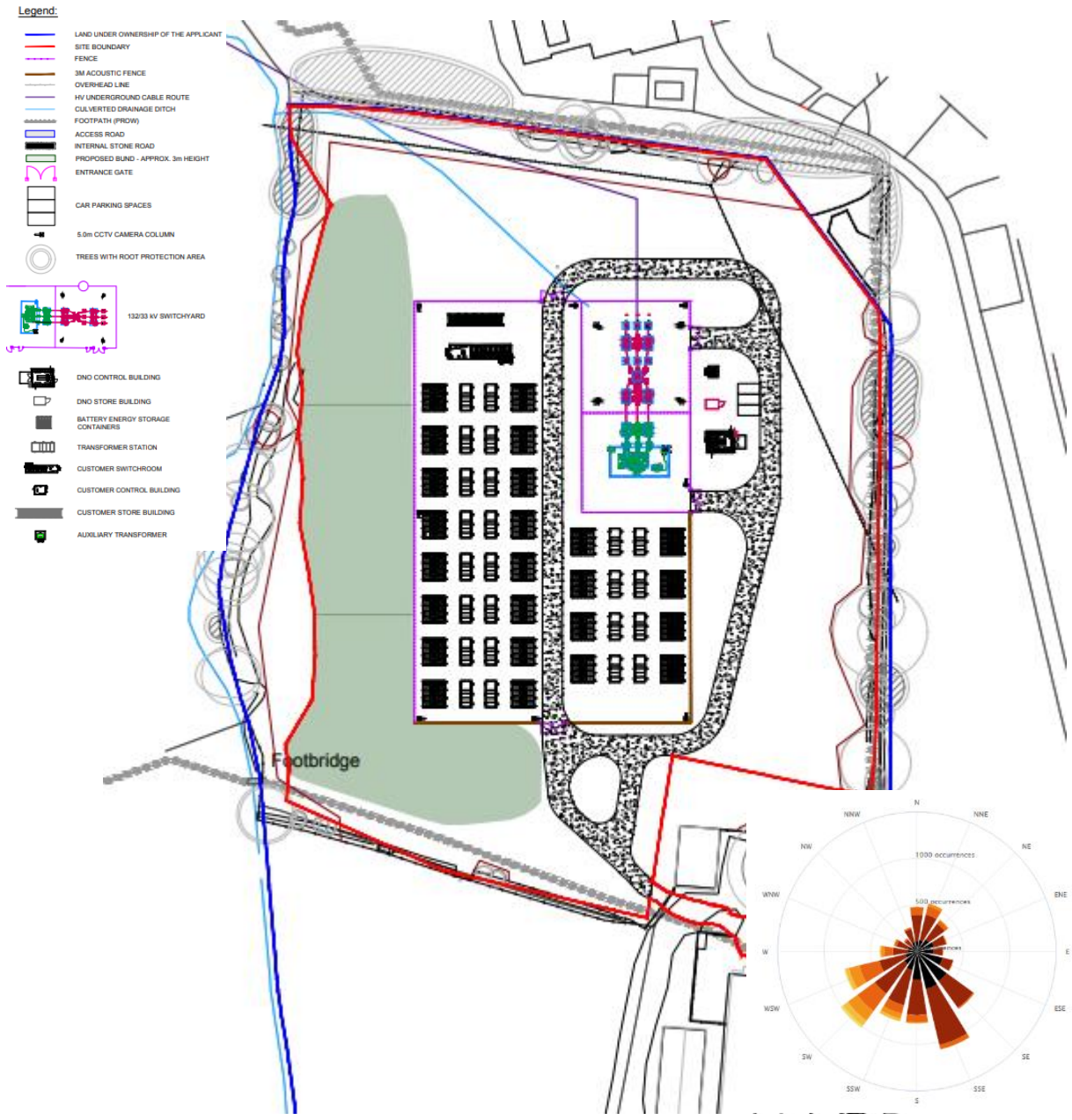


Figure 1 – March 2025 Site BESS Layout (Wind Rose Overlay not part of the original submission)

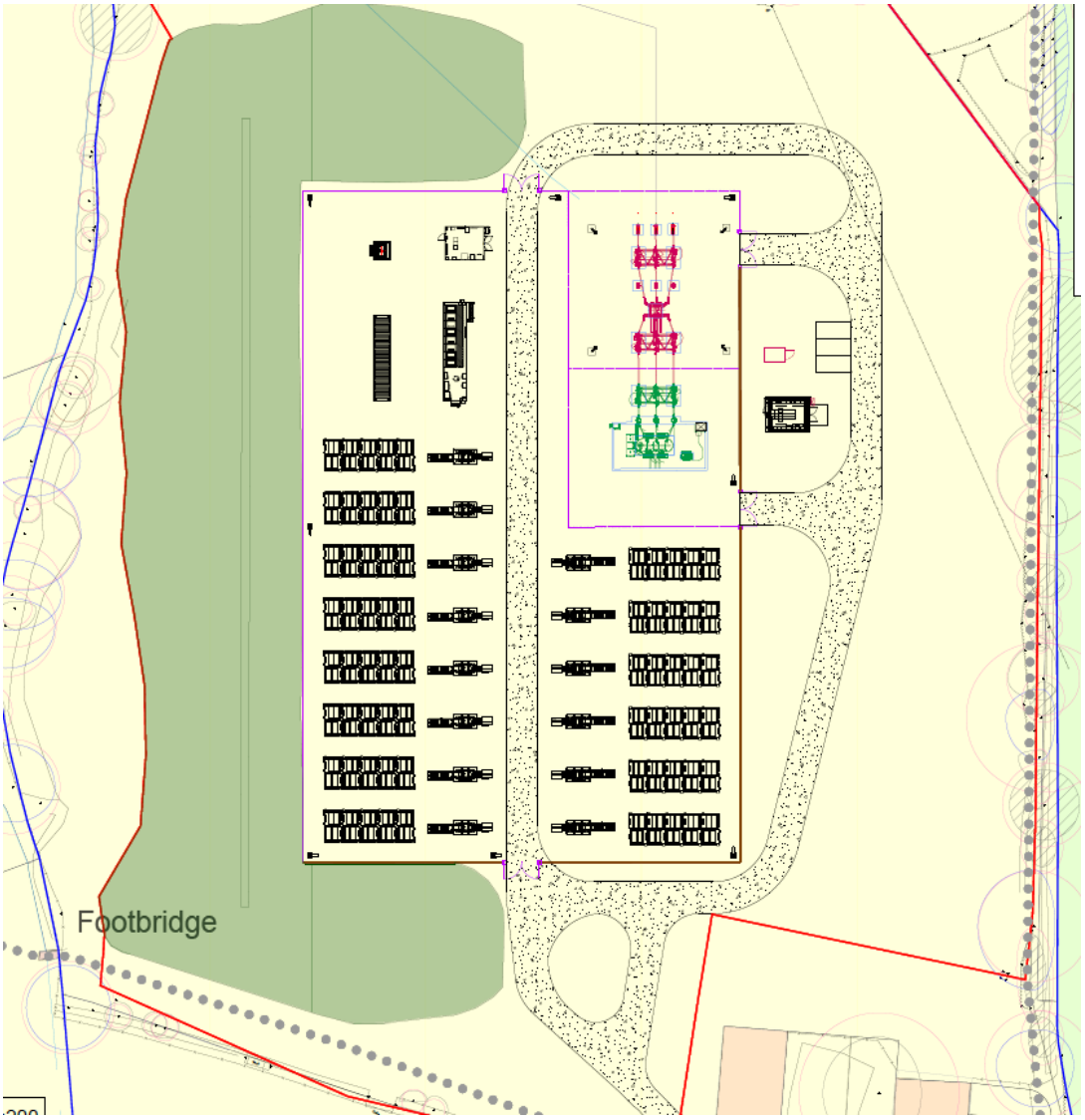


Figure 2 – May 2024 Site BESS Layout

4.0 BESS - Overview

The exact BESS unit type has yet to be determined for the development, however the option currently available and under consideration is based on LFP chemistry. This type has been considered as being used for this development, although this is subject to change if an alternative technology of equal or better safety becomes available. The current, March 2025, layout is based on Sungrow BESS and has allowed the Applicant to:

1. Reduce the number of BESS units from 140 to 48.

2. Increase the spacing between the BESS units from 3.0m to 3.5m.

3. Reduce the height of the acoustic wall.

There is no material difference to the site road infrastructure or design that detracts from the Staffordshire FRS 'acceptability' of the site regarding NFCC compliance.

4.1 Frequently Asked Questions

Appendix A of this NFCC Compliance Report contains frequently asked questions and is provided for assurance and a greater awareness of BESS and Lithium-Ion technologies in general.

4.2 NFCC Recommendations

The NFCC Report Grid Scale BESS Planning – Guidance for FRS [Ref. 1], details the NFCC recommendations for BESS installations for use by regional FRS. These have been distilled at Table 1 cognisant of the site layout at Figure 1.

4.3 FRS Consultation

The site location falls within the jurisdiction of the Staffordshire FRS. The Planning Application has received a response from the FRS, which replicates and directs to the NFCC Guidance for BESS [Ref. 1], for site design and development. This report has distilled the recommendations contained in the Staffordshire FRS response and provides evidence to demonstrate alignment.

4.4 Building Regulations

Whilst BESS installations are not subject to control under the restrictions of the Building Regulations 2010 (as amended), Building Regulations are concerned with the safety of individuals in and around a building. BESS sites are remotely monitored with only sporadic site visits for maintenance purposes. All the facilities located on site are external and are considered as enclosures, as opposed to buildings or structures. Enclosures are not obliged to satisfy Requirement B2 of the Building Regulations; however, the requirements have been applied where reasonably practicable to demonstrate a good level of fire safety (please refer to Table 1 below).

This aside the BESS installation will be designed and constructed to align with the functional requirements of Part B (Fire Safety) to Schedule 1 of the Building Regulations 2010 (as amended), which includes the following:

- B1 – Means of warning and escape.
- B2 – Internal fire spread (linings).
- B3 – Internal fire spread (structure).
- B4 – External fire spread.
- B5 – Access and facilities for the Fire Service.

Criterion	NFCC Recommendation	Status	NFCC 2022 Comment
1	Access - Minimum of two separate access points to the site	**Compliant**	The site has a single point of access from the public highway, the site access road splits prior to reaching the BESS compound, providing primary access at the southern boundary of the site, Figure 1 refers, and there is a further road, running adjacent to the eastern side of the site compound, leading to a point of entry on the northern side of the BESS compound. The Staffordshire Moorlands Planning Committee Decision [Ref. 3] states that "*the development would have only one point of access into the site through the farm buildings, contrary to guidance, which leads to concerns for fire service access and the overall safety of the site*". This is incorrect, the NFCC Planning Guidance [Ref.1] recommends two points of access to the site and there is no mention of the design of this access or how it is to be engineered into the design. The Staffordshire FRS in consultation on this Planning Application have made no mention or concerns over the access design arrangements for this site and have confirmed that the design of the site is acceptable for the Staffordshire FRS [Ref. 7]. The turning circle to the south of the site, at the primary point of access into the compound, was added to the design in response to feedback received from the Staffordshire FRS in May 2024. Further review of the local metrological data indicates that the prevailing winds are from the southeast to southwest, there are very limited occasions when the wind is from the north to northeast, as such obscuration of the access into the site from the south and north at the same time is not possible, Figure 1 refers.
2	Roads/hard standing capable of accommodating fire service vehicles in all weather conditions. As such there should be no extremes of grade	**Compliant**	The proposed primary access tracks serving the site will be a crushed stone surface a minimum of 4.5m wide. There is no extreme of grade at the site. Access roads have been subject to vehicle tracking and is considered suitable for FRS vehicles. Swept Path Analysis has been conducted and the roads at the site require to withstand site construction vehicle traffic more than 20 tonne gross vehicle weight. All roads will be maintained throughout the life of the site. All internal services roads have been designed with a 10m radii and are compatible for a DB32 Fire Appliance [Ref. 7].
3	A perimeter road or roads with passing places suitable for fire service vehicles	**Compliant**	The BESS compound access road is a minimum of 4.5m wide hard surface access running around the perimeter the site allowing access to all BESS units, the perimeter road layout (looping around the site both external and internal to the security fence), Figure 1 refers, allows for FRS vehicles to drive in and drive out using a combination of the two points of access and egress to the BESS compound. In addition, the provision of the turning circle to the south of the site, added to the design as part of the feedback received from Staffordshire FRS, and prior to the southern point of access allows for the FRS Appliance to manoeuvre and pass. Section 13.4 of Approved Document B5 states that FRS vehicles should not have to reverse more that 20m from the end of an access road – given the provision of a circular perimeter service road the requirement for FRS vehicles to reverse is minimised to situations in which use of the perimeter service road is not possible, and in these circumstances, reversing more than 20m is not a requirement. Section 13.4 references Table 13.1 of the Approved Document B5 which contains typical FRS vehicle access route specifications – the site meets these specifications.
4	Road networks on sites must enable unobstructed access to all areas of the facility	**Compliant**	The BESS compound access service roads run around the BESS units, thus allowing access to all BESS units. All junctions and bends have been designed to accommodate FRS Appliances. The site meets the requirements of Approved Document B5 Vol 2 allowing all points on the site to be within 45m of a fire appliance.
5	Turning circles, passing places etc. size to be advised by FRS depending on fleet	**Complaint**	The BESS compound access service roads allow access to all BESS units, Figure 1 refers in two differing directions and allow for FRS vehicles to drive in and drive out without the need to reverse. Liaison and consultation with the FRS will establish if these arrangements are satisfactory. It is proposed, following observations raised by the Planning Committee, that additional passing points on the route to the BESS compound and within the compound are included in the design, this is illustrated in Figure 2. The site is designed such that all routes have the capacity to allow for a Fire Tender (based on DB32 Fire Appliance).
6	Distance from BESS units to occupied buildings & site boundaries. Initial min distance of 25m	**Compliant**	There are no occupied buildings within 25m of the BESS compound, the nearest residential dwelling is more than 45m distance to the southeast (Newfields Farm).
7	Access between BESS unit – minimum of 6.0m suggested. If reducing distances, a clear, evidence based, case for the reduction should be shown	**Compliant**	The suggested 6.0m separation is based on a 2017 Issue of the FM Global Loss and Prevention Datasheet 5-33 (footnote 9 in the NFCC Guidance refers). This Datasheet was revised in July 2023 and again in Jan 2024, it now details the following: 1. 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. For containerized LIB-ESS comprised of Lithium NMC cells where wall construction is unknown or has an ASTM E119 rating less than 1 hour, provide aisle separation of at least 13 ft (4.0 m) on sides that contain access panels, doors, or deflagration vents. For containerized NMC LIB-ESS where wall construction is documented as having at least a 1-hour rating in accordance with ASTM E119, aisle separation of at least 8 ft (2.4 m) is acceptable. Additionally, the Department for Energy Security and Net Zero published in March 2024 their Health and Safety Guidance for BESS in which it is stated that the separation distance, for sides with access panel, doors or deflagration panels should be a minimum of 1.5m. Following this revision to the Datasheet, the BESS containers on site will be compliant with the minimum distances and conformance to ASTM E119 1-hour fire rating will be confirmed on the down select of the BESS units to be procured. Current NFCC Guidance recommends 6.0m, unless deemed acceptable to be closer based on manufacturers UL testing / fire rating qualification. The BESS units on the site are 3.5m apart, which given current FM Global and Department for Energy Security and Net Zero (DESNZ) guidance, is twice the recommended 1.5m spacing.

Criterion	NFCC Recommendation	Status	NFCC 2022 Comment
			BESS technology is so rapidly changing and at the planning stage, the manufacturer and type of BESS unit is not usually known, and prevalence has been set by the decisions made for the Langford and Cleve Hill BESS sites.
8	Site Conditions – areas within 10m of BESS units should be cleared of combustible vegetation	**Compliant**	Although on a greenfield site the BESS and other installations will be positioned on concrete foundations that forms part of the fire water runoff retention bunding design. There is some landscaping proposed within 10m of BESS units. However, a fence will be between the two. The acoustic fence along the southern and part of the eastern boundary can also be fireproofed. We can do the same for the other fence along the western boundary in front of the bund (currently shown as palisade).
9	Water Supplies	**Compliant**	The Appellant received a formal offer for a water connection at the site in October 2023. The detail of this connection (including the precise point of connection, flow rate, and fire hydrant position) will be determined during detailed design with input and agreement from Severn Trent and Staffordshire FRS.
10	Signage	**Compliant**	Signage will be positioned at the entrance to the site, including a site layout plan and details of key personnel.
11	Emergency Plans	**Compliant**	An Emergency Response Plan (ERP) will be developed for the site.
12	Environmental Impacts	**Compliant**	There have been no environmental impact concerns raised for the site. A Flood Risk Analysis and Surface Water Drainage Strategy has been completed [Ref. 4]. The consultation response from the Staffordshire County Council acknowledges the Flood Risk Analysis and Surface Water Drainage Strategy and imposes a condition no development shall begin until the final detailed surface water drainage design has been submitted to and approved by the Local Planning Authority in consultation with the Lead Local Flood Authority. The design must be in accordance with the principles outlined in the approved Flood Risk and Surface Water Drainage Assessment Document) and must demonstrate: 1. Final detailed design (plans, network details and full hydraulic calculations) of the surface water drainage scheme, the attenuation features (attenuation tank), petrol interceptor and Hydrobrake. Calculations shall demonstrate the performance of the drainage system for the 1-year, 2-year, 30-year and 100-year return periods including an allowance for climate change. 2. Final management and maintenance plan for surface water drainage to ensure that surface water drainage systems shall be maintained and managed for the lifetime of the development. To include the named body responsible for management and maintenance of the system. The development shall thereafter proceed in accordance with the approved details.
13	System design, construction, testing and decommissioning	**Compliant**	Testing and decommissioning will only be available in later stages of the programme. Compliant at this juncture in the planning process.
14	Deflagration Prevention and venting	**Compliant**	This element will not be apparent up to the point the decision is made as to what BESS is being used. Deflagration venting is possibly most effective when fitted to the roof of the BESS units, deflecting blast upwards and away from FRS personnel. Compliant at this juncture in the planning process.

Table 1 - NFCC Recommendations Cross-Referenced to the Site BESS

5.0 Conclusions

5.1 Conclusions

It is concluded that the proposed site layout and construction is compliant with the recommendations detailed in the NFCC Planning Guidance for BESS [Ref. 1] and this has been validated by the Staffordshire FRS [Ref. 8 refers].

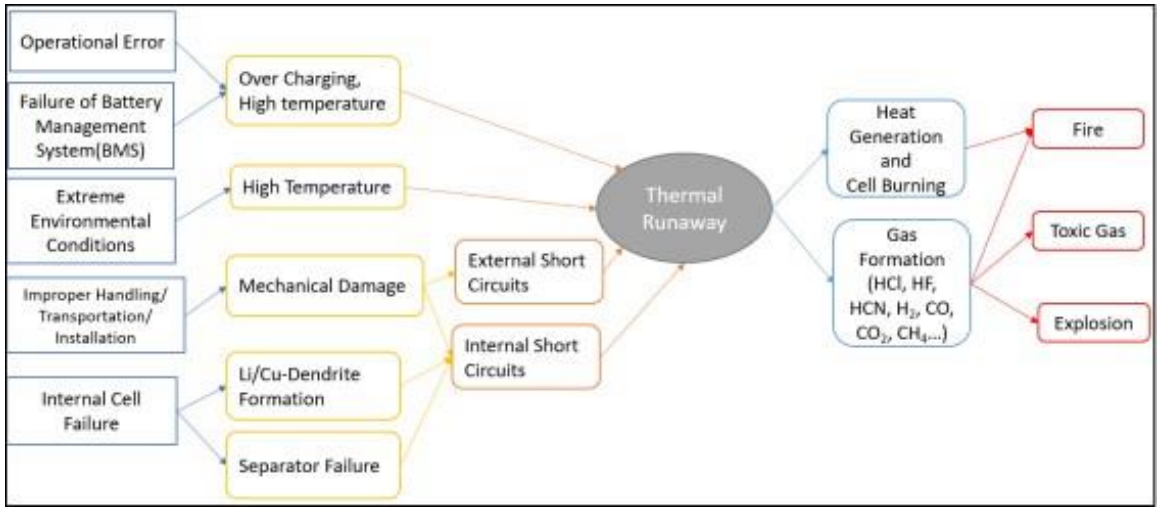
This NFCC Compliance Report demonstrates compliance with existing and potentially emerging NFCC Guidance.

6.0 References

1. NFCC Grid Scale BESS Planning – Guidance for FRS dated Nov 2022
2. Reducing Risk, Protecting People (HSE Publications) - https://www.hse.gov.uk/risk/theory/r2p2.pdf
3. Staffordshire Moorlands Planning Committee Decision - SMD/2024/0019 dated 27 Sept 2024.
4. Flood Risk & Surface Water Drainage Assessment - KRS.0612.002.R.001.G dated Jan 2024.
5. 20240503_Newfields_Farm_BESS-PL-LA-OA dated May 2024.
6. 1105-02-05-NF-SL-04032025 dated 4 March 2025
7. APEX Transport Planning Report Ref: C21133/TS02 – Annex E.
8. Email Matt White (SFRS) confirming Newfields acceptable dated 18 Sept 2024.

Appendix A – Frequently Asked Questions

Ser	Question	Answer
1	How does a BESS work?	A BESS employs technology to temporarily store electrical energy, very much in the same manner as a mobile phone or laptop battery, but on a much bigger scale. The energy can be stored and released when demand on the National Grid is high and assists in balancing out variations in demand. BESS can also be connected to a solar photovoltaic (PV) farm and store energy throughout the day for release in the evening and in this mode of operation is a green renewable technology. An alternative use for BESS is to store electrical energy generated by energy suppliers during period of low demand and releasing in periods of high demand, thus balancing out changes in supply and demand on the National Grid.
2	How safe is a BESS?	The Department for Energy Security and Net Zero, promulgates on a regular basis the Renewable Energy Planning Database. From the quarterly extract (dated Oct 2024) the data has been filtered for BESS installations in the UK and the following salient points are deduced: 1. As of Oct 2024, there are approx. 117 BESS sites are operational across the UK, 8 having been decommissioned and a further 91 are under construction. 2. The total energy capable of being stored is estimated at 2.5GW 3. Since 2006 BESS have accumulated approximately 741 years of operation (this equates to approx. 6.5 million hours of operation). 4. There have currently been only two reported BESS fires in the UK that have required FRS attendance, these occurred at Carnegie Road, Liverpool in Sept 2020 and East Tilbury in Feb 2025, the cause of the latter is yet to be declared. Given the 6.5 million hours of operation, extrapolates out to approx. 3.0E-07 (0.0000003) failures per hour (fph) for BESS in the UK. 5. Nobody in the UK has been killed in a BESS incident.
3	Lithium-Ion is sensitive to temperature variations – how is this controlled?	The LFP batteries are housed in a Metal container which is fitted with an Environmental Conditioning Unit (ECU). The ECU maintains the temperature and humidity within the container, allowing the Lithium-Ion batteries to operate within the optimum temperature range. The temperature of individual cells in each battery is monitored by the Battery Management System (BMS) and is reported back to the container level BMS which adjusts the internal temperature in response. Should the ECU develop a fault the container will isolate charge and discharge the batteries until the fault has been rectified. All faults in the BESS are remotely fed to the Operational Control Room.

Ser	Question	Answer
4	What is Thermal Runaway?	TR is the term used to describe an internal short-circuit in one of the battery cells that can lead to cell over-pressure and the venting of combustible gases. Should this gas ignite then the cell will increase in pressure and the resulting fire will be self-sustaining until all the material in the cell is expended. Short circuits in cells are generally a result of: 1. Cell penetration by a foreign object (not usually an issue for a BESS as the batteries are housed in sturdy containers). 2. Impurities in the electrolyte (deposited during the manufacturing process), which over time can lead to the formation of dendrites (electrolytic crystals) which puncture the membrane isolating the anode and cathode – this can, but not always result in a short-circuit and TR. Dendrite formation was a common problem in early NMC battery chemistries but is not prevalent in LFP battery chemistries as selected for this installation. 3. Over temperature in the cell because of: a. Over-charging (which is controlled by two separate BMS – battery and rack). b. High ambient temperature – controlled by the ECU. The illustration below provides an outline of the possible causes of TR. 

5	How can TR be controlled?	TR is not always inevitable, and the nature of the cell design is such that early warning signs of a stressed cell can be detected by the BMS. Initial signs of cell degradation are an increase in the time it takes the cells to reach full charge (maximum voltage) and a decrease in the time it takes to discharge. These indicators are picked up by the BMS and if persistent the BMS will isolate (prevent charge and discharge) to the battery and inform the centralised control room. In turn an engineer will be dispatched to remove the defective battery and replace it with a serviceable item. Since the early inception of BESS safeguards the designs have developed and are now detailed in UL1973 and BESSs are assessed against UL9540A. If these indicators are not present, and the cell enters early stages of short-circuit the over-pressure in the cell will result in the venting of off-gas which is detected by the off-gas detectors built into the container Heating, Ventilation and Air Conditioning unit (or the ECU). This will result in the container disabling the charge and discharge (the act of charging and discharging the batteries generates heat, which is what we want to avoid) and setting the ECU to maximum volume setting. This has a twofold effect, it clears the container of combustible gas and cools the internals, taking the energy out of the cells (the cells used in a BESS, like other batteries, do not perform well in low temperature conditions). It should be noted that most BESSs only operate at between 80-90% of capacity to provide an engineering margin that mitigates the probability of over-charging the cells. The UL9540A testing shows that Hydrogen (H_2) is the main product during off-gassing in the event of a battery failure. Therefore, it is more relevant to monitor for H_2 rather than Carbon Monoxide (CO). This forms part of the explosion prevention strategy in the BESS design in addition to the ventilation system and deflagration vent. The design of the BMS (in accordance with NFPA 855) recommends that the system should provide early detection of: • Charging and discharging voltage and current • Temperature • Internal ohmic (resistance) • Capacity • State of charge • State of health • Alarm or fault log

Ser	Question	Answer
		The BMS is designed to provide early detection and warning of an issue prior to TR occurring in a battery. The system is designed to monitor and isolate affected equipment to prevent the TR occurrence. In the worst-case scenario, it will mitigate the probability of a TR event propagating to other battery packs utilising the safety system design and layout of the battery units.
6	How is a BESS fire controlled and suppressed?	If the TR is not controlled and spreads, known as TR Propagation the Fire Detection and Suppression System (FDSS) will activate. The BESS units that are to be installed at this site could employ an aerosol based FDSS: 1. Aerosol systems are better in terms of extinguishing the fire and benefit against gaseous systems, which generally suppress the fire by reducing the level of oxygen in the container. 2. Aerosol system generally require a more complex and intricate delivery system to reach all areas of the container, as such they are targeted systems. 3. Gaseous systems are instantaneous in operation, the gas being kept under pressure in bottles. Aerosol, by the nature of the deployment as a fine mist, take a little longer to reach all areas of the container. 4. Gaseous system requires a sealed environment in which to operate. As such if the container is opened and oxygen reintroduced it can lead to the fire reigniting, as such they require the ECU to close prior to activation (to prevent the ECU from pushing out the extinguishing medium).

Ser	Question	Answer
7	Can water be used to extinguish a Lithium-Ion fire?	The use of water to extinguish a BESS fire has some drawbacks and disadvantages over bespoke FDSS aerosol mediums, these being: 1. Due to the design of the LFP batteries and racks (in which they are contained), the inability of water to cool the cell interiors may result in reignition of a fire once the water application is halted. 2. The high conductivity of water may cause short circuiting of cells presenting collateral damage risk and increase the spread of the fire internal in the BESS. 3. A high volume of water is required to cool the cells below the critical temperature to prevent TR propagation, this results in a high volume of fire water runoff and a potential environmental impact. 4. The application of water on a BESS fire increases the generation of gases such as CO, H_2 and Hydrogen Fluoride (HF). Applying water causes incomplete combustion of organic substances inside the battery resulting in production of CO rather than Carbon Dioxide (CO_2); when water is applied, H_2 is released that, without combustion, can react with phosphorus pentafluoride, if present in free form, to produce gaseous HF. Whilst the NFCC Guidance suggests the utilisation of water suppression systems with BESS units (based on data from 2017), current test data analysis is determining that improvements in battery cell technology and construction and under normal operating conditions, LFP batteries are far more stable than other battery systems. Considering the addition of early detection, warning, and safety systems in the form of Battery Management Systems, gas detection and explosion protection and aerosol suppression, the provision of water suppression systems is not required under NFPA 855. It is noted that water suppression systems can also cause other issues in electrical systems. In addition, test engineers within the BESS field are now considering whether water cooling is causing a negative effect when dealing with TR, as it can prolong the event by slowing down the degradation of the cell electrolytes that fuel the reaction. It is important to note that water suppression does not stop TR occurring. The UL9540A testing also confirms that there is no flaming from the batteries when entering failure mode.

8	What are the environmental consequences of a BESS fire?	In the event of a BESS fire several chemicals in gaseous form can be released and the composition and concentration of the plume (also referred to as the vapour cloud). In the event of an LFP fire amongst the general gases released are CO, HF, Oxygen and Hydrogen. The BESS fire (Carnegie Road, Liverpool – Sept 2020) was monitored and the resultant composition of the plume was determined as being negligible in toxic gas concentration. The Moss Landing, California fire plume and smoke was monitored at 1 second intervals by the US Environment Agency and the level of toxicants found to be within US environmental limits. Should the resulting fire be treated with water in the presence of HF the result can be the formation of a HF acid which can be detrimental to the environment, especially the aquatic habitat. To prevent this, it is possible to contain the fire runoff water but often best, in rural locations, to let the fire run its course and burn-out. It is worth noting that the fire runoff water at Carnegie is considered to have been neutralised by the lime-based gravel covering used at the base of the BESS and on testing was found to be a low alkaline level, as opposed to acidic.
9	How is the BESS site secured?	BESS sites are secured through fences / walls and monitored remotely via security cameras. Warning signs along the fence indicates the presence of electrical storage facilities within the site.
10	How is the serviceability of the BESS assured?	The Health and Usage data for each BESS is remoted to the Operational Control Room and the serviceability of each battery determined on an hour-to-hour basis. Given that the batteries have a finite number of cycles over a given period it is envisaged that the batteries will be renewed multiple times in the 40-year life of the site.