Kevin D Westwood
Associates

Kevin D Westwood Associates Limited
43 Wilton Castle
Wilton Castle Lane
North Yorkshire
TS10 4FB

27th November 2024

EDF Renewables
Cardinal Place
80 Victoria Street
London
SW1E 5JL

Subject: Validation of the Walpole BESS Outline Battery Safety Management Plan

I am writing to confirm that the Outline Battery Safety Management Plan (OBSMP) developed for the proposed Walpole Battery Energy Storage System (BESS) has been reviewed and assessed against the expectations outlined in the National Fire Chiefs Council (NFCC) Guidance.

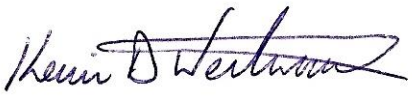
The document demonstrates alignment with the fire hazard management principles required by the NFCC guidance, including fire prevention, fire detection, suppression systems, and emergency planning. The measures outlined in the document have been designed to address fire safety requirements for planning purposes and provide a clear initial framework for the development and future operational safety of the BESS

As a Chartered Fire Engineer, I have verified that the OBSMP meets the necessary standards and achieves good industry practice for fire hazard management.

Please do not hesitate to contact me should you require any additional information or further clarification.

Yours sincerely,

Kevin D Westwood



B Eng.(hons) C Eng. MIFireE, MEI, F-JOIFF, F-FEATHER
Distinguished Advisor, Chartered Engineer
Mobile: +44 7494477989
Email: kevin.westwood@kevindwestwood.com

OUTLINE BATTERY SAFETY MANAGEMENT PLAN

Walpole BESS

Document prepared by Envams Ltd for:

Hollygreen Energyfarm Ltd (100% owned by EDF Renewables)

December 2024



Contents

1 Executive summary 2
1.1 Summary 2
2 introduction 3
2.1 Scope of the OBSMP 3
2.2 Risk Identification 3
2.3 Design Objectives 3
2.4 The Tite 4
2.5 The Development 4
3 Relevant Guidance 5
4 Walpole BESS Design Approach 6
4.1 Introduction 6
4.2 The Location of the BESS 6
4.3 Prevention of Thermal Runaway and its impacts 6
4.4 Other NFCC Guidance Requirements 8
4.4.1 Other Information Required Prior to Construction 8
4.4.2 System Design 8
4.4.3 Environmental Impacts 19
5 Construction 20
5.1 Incident Management and Response Planning 20
5.2 Construction 21
5.3 BESS Transportation 21
5.4 Installation 21
6 Operation 21
6.1 Operational responsibilities 21
6.2 BESS Management system 21
6.3 Security 22
6.4 Maintenance 22
7 Decommissioning 23
8 Fire & Rescue Service Consultation 24
8.1 Lincolnshire Fire and Rescue Service 24
9 Conclusion 25
Appendix A - Linconshire Fire and Rescue Service Consultation 26

1 EXECUTIVE SUMMARY

1.1 SUMMARY

This Battery Safety Management Plan (BSMP) has been prepared by Envams Ltd on behalf of Hollygreen Energyfarm Ltd (100% owned by EDF Renewables) (the "Applicant"). It provides a comprehensive overview of the key measures designed to ensure fire safety during the construction, operation, and decommissioning of the Battery Energy Storage System (BESS), referred to as "the Development." The Development is located on land within the consented Sutton Bridge Solar Farm, located at grid reference 548402, 319426 (hereafter referred to as "the Site").

The purpose of this OBSMP is to provide planning-related battery safety information required by South Holland Council to support the determination of a planning application for the Walpole BESS project. To ensure a robust and informed design, the Applicant has engaged in consultation with Lincolnshire Fire and Rescue Service (LFRS) during the development process. This collaboration ensures the integration of local expertise and aligns with best practices for battery safety and emergency response.

The OBSMP outlines the proposed approach to battery safety in the context of the latest guidance and best practices known at the time of writing. It also recognizes that new technologies or improved risk mitigation measures may emerge, and the OBSMP will be updated prior to construction, if required, to reflect advancements in fire safety or operational protocols.

Key Design and Management Principles

The following principles underpin the design and management of the BESS to ensure its safe operation throughout its lifecycle:

Standards and Best Practices:

The BESS has been designed in accordance with published standards, international guidance, and industry best practices, ensuring safety and compliance with recognized benchmarks.

Fire Risk Mitigation:

The system includes measures to minimize the risk of thermal runaway, incorporating advanced fire detection and automated suppression systems for rapid response to potential hazards.

Separation Distances:

Separation between BESS units complies with the spacing requirements specified in National Fire Protection Association (NFPA) 855, reducing the risk of fire propagation between units.

Access Provisions:

An alternative access route to the BESS compound has been incorporated to ensure emergency service access in alignment with National Fire Chiefs Council (NFCC) guidance (2022).

Monitoring and Maintenance:

All equipment will be monitored, maintained, and operated in strict accordance with the manufacturer’s instructions, ensuring optimal performance and safety.

Emergency Response Plan:

A comprehensive Emergency Response Plan (ERP) will be developed in collaboration with Lincolnshire Fire and Rescue Service (LFRS) to ensure preparedness and coordinated action in the event of an incident.

The Walpole BESS project will ensure that safety remains at the forefront of its design and operational planning. This preventative and proactive approach minimizes risks while aligning with regulatory and industry expectations, delivering a safe and reliable energy storage solution.

2 INTRODUCTION

2.1 SCOPE OF THE BSMP

This Battery Safety Management Plan (BSMP) has been prepared to provide the planning-related battery safety information required by South Holland District Council to evaluate and determine the planning application for the Walpole Battery Energy Storage System (BESS) project.

The BSMP outlines the measures and strategies that will be implemented to ensure the safe design, operation, and management of the proposed BESS. It serves as a framework for addressing fire safety and risk mitigation throughout the system's lifecycle. The document includes the following key sections:

- Introduction, Background, Risk Identification, Design Objectives, and Guidance:

  This section provides an overview of the project, identifies potential risks, and outlines the objectives guiding the safe design and operation of the BESS in compliance with relevant standards.

- BESS Design Approach:

  Details the siting and location of the BESS, the integration of safety systems, provisions for emergency response, and the design's alignment with applicable safety guidance and best practices.

- Consultation Record:

  Documents the engagement with Lincolnshire Fire and Rescue Service (LFRS) during the design process, highlighting how their feedback has informed the project's safety measures and emergency planning.

Safety remains a primary consideration for the Walpole BESS project, providing stakeholders with clear and actionable information to support informed decision-making.

2.2 RISK IDENTIFICATION

All forms of energy generation and electrical installations inherently carry a degree of risk related to equipment failure. For Battery Energy Storage Systems (BESS), the most significant potential hazard is thermal runaway, a condition that, if left uncontrolled, can escalate into a fire. The primary objective of this Outline Battery Safety Management Plan (OBSMP) is to outline the measures incorporated into the BESS design to mitigate this fire risk and to provide a structured response to any emergency incident, should it occur.

While thermal runaway presents the most critical safety concern, other commonly deployed electrical components within the BESS—such as transformers, inverters, and switchgear—carry their own specific fire risks. These risks are well understood and managed through existing industry guidance and regulatory codes. Consequently, this document focuses specifically on addressing the safety considerations and mitigation measures for the battery component of the BESS, where the risks and hazards are unique and require tailored approaches.

By identifying these risks and addressing them through robust design and operational strategies, the OBSMP ensures that the Walpole BESS operates safely, minimizing potential hazards to health, property, and the environment.

2.3 DESIGN OBJECTIVES

The design of the BESS prioritizes safety through the implementation of robust measures aimed at reducing risks and enhancing emergency response capabilities. The following objectives guide the design and operation of the BESS:

<u>Minimize the Likelihood of a Fire Occurring:</u>

The BESS is equipped with advanced systems to prevent conditions that could lead to thermal runaway or other fire-related incidents. This includes incorporating high-quality components,

automated monitoring systems, and adherence to international safety standards, such as NFPA 855 and guidance from the NFCC.

Facilitate Early Detection and Intervention:

Early detection systems, such as gas sensors, smoke detectors, and thermal monitoring devices, are integrated into the BESS to identify potential issues at the earliest stage. These systems operate in conjunction with the Battery Management System (BMS) to trigger automated safety responses and notify operators of abnormal conditions.

Minimize the Consequences of a Fire Event:

Should a fire occur, the design ensures containment and suppression to limit its impact. This includes fire-resistant materials, thermal barriers between units, and automated suppression systems to prevent fire spread. The layout incorporates separation distances based on best practices, reducing the potential for escalation.

Ensure the Safety of On-Site Personnel and Surrounding Areas:

The BESS design prioritizes the protection of personnel and nearby communities by maintaining rigorous safety protocols. Access to hazardous areas is restricted, and clear emergency response plans ensure that risks to on-site workers and surrounding areas are minimized.

Enable Safe Operations for Firefighters:

The facility is designed to support emergency responders by providing safe access and operational clarity. Features include clear signage, e-stop locations, and readily accessible fire hydrants. The layout also ensures appropriate turning radii and access routes, as recommended by NFCC guidance, enabling safe and efficient firefighting operations.

The Walpole BESS will meet the highest standards of safety and operational reliability, protecting people, property, and the environment throughout its lifecycle.

2.4 THE SITE

The proposed BESS is located within the operational Sutton Bridge Solar Farm. The Site lies to the east of the River Nene, approximately 500 meters southeast of Sutton Bridge Power Station and 1.25 kilometers south and east of the village of Sutton Bridge.

The Site encompasses an area of approximately 3.77 hectares and is designated to house the BESS along with its associated infrastructure. Access to the Site will be provided through the existing entry point used for the solar farm, located off Centenary Way, which connects to the A17 approximately 1.5 kilometers to the east.

The Site is situated in a predominantly rural area, surrounded by open arable agricultural land. The River Nene lies approximately 830 meters to the west, providing a natural landmark in the vicinity. The nearest settlements include Sutton Bridge to the north, Walpole Cross Keys to the northeast, and Walpole St Andrew to the southeast.

The location of the site is shown in Appendix B for reference.

2.5 THE DEVELOPMENT

The Proposed Development comprises a BESS with associated infrastructure and equipment. This includes fencing, security cameras,cabling, and access tracks. The design also incorporates sustainable drainage systems(SuDS), as well as ecological and landscape mitigation measures to minimize environmental impacts and enhance the Site's integration with its surroundings.

The construction phase is anticipated to last approximately 9 to 12 months, during which any impacts will be short-term and temporary. The Proposed Development is designed to have an operational lifespan of 40 years. At the end of this period, the BESS will be decommissioned in alignment with best practices and prevailing regulatory guidance, ensuring the Site can be returned to its original state. The Proposed Development is therefore considered temporary and fully reversible.

Within the BESS compound, new hardstanding will be limited to the foundations supporting buildings, containers, transformers, and other electrical installations, as well as the access tracks. The access track will be surfaced with porous aggregate to support sustainable drainage and reduce surface runoff.

3 RELEVANT GUIDANCE

At the time of writing, there is limited specific guidance in the UK dedicated solely to Battery Energy Storage System (BESS) development. To ensure the design of the proposed BESS aligns with best practices and meets regulatory expectations, the Applicant has considered a range of national and international standards and guidance documents. The following references have informed the design and management of the BESS:

- Planning Practice Guidance (August 2023) – Paragraph 034 Ref ID: 5-034-20230814.
- National Fire Protection Association (NFPA) 855 (2023): Standard for the Installation of Stationary Energy Storage Systems.
- Underwriters Laboratories (UL) 9540A: Standard Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.
- United Kingdom Power Networks (UKPN) Engineering Design Standard 07-0116 (2016): Fire Energy Storage Systems.
- UK Government (2024): Health and Safety in Grid Scale Electrical Energy Storage Systems.
- National Fire Chiefs Council (NFCC) (November 2022): Grid Scale Battery Storage System Planning Guidance for Fire and Rescue Services (FRS).
    - Proposed Revision (July 2024): While not republished at the time of writing, the latest draft revisions were considered.
- Additional documents referenced in NFCC guidance:
    - State of Victoria (Country Fire Authority) (2022): Design Guidelines and Model Requirements: Renewable Energy Facilities.
    - FM Global (2017): Property Loss Prevention Data Sheets: Electrical Energy Storage Systems Data Sheet 5-33 (Interim revision, July 2023).
    - The Energy Institute (2019): Battery Storage Guidance Note 1 – Battery Storage Planning.
    - The Fire Industry Association (2020): Guidance Note on Lithium-Ion Battery Fires.
    - DNV GL (2017): Recommended Practice-0043 – Safety, Operation, and Performance of Grid-Connected Energy Storage Systems.

<u>Advisory Note</u>

The current advisory note for planning applications emphasizes the importance of consulting with the local fire authority and incorporating the NFCC guidance cited above. As such, this Outline Battery Safety Management Plan (OBSMP) focuses on addressing the key safety considerations highlighted within these documents, ensuring that the project adheres to recognized best practices and aligns with the expectations of local and national regulatory bodies.

4 WALPOLE BESS DESIGN APPROACH

4.1 INTRODUCTION

This section outlines the design approach undertaken for the BESS, developed in alignment with the guidance referenced in the Relevant Guidance section, particularly the NFCC (2022) guidance. It also incorporates the outcomes of consultation with Lincolnshire Fire and Rescue Service (LFRS) and findings from environmental studies conducted to support the broader planning application.

The design reflects an iterative process, integrating best practices and addressing key safety and environmental considerations. It has been tailored to meet the unique requirements of the Site, ensuring compliance with the guidance while accommodating the outcomes of consultation and study results. Where possible, the design meets or exceeds the standards outlined in the NFCC guidance, ensuring a robust and forward-thinking approach to safety and operational reliability.

This comprehensive design framework underpins the project's commitment to delivering a safe, sustainable, and compliant energy storage solution.

4.2 THE LOCATION OF THE BESS

The location of the BESS has been carefully planned from the outset, ensuring compliance with relevant guidance and best practices. The following considerations have been integrated into the design to optimize safety, accessibility, and compatibility with the surrounding environment:

Battery Unit Spacing:

The positioning of BESS enclosures within the Site adheres to the NFPA requirement for a minimum spacing of 3 meters between battery units, reducing the risk of fire propagation.

Vegetation Clearance:

The battery units are sited at least 10 meters away from existing and proposed vegetation, meeting the recommendations outlined in the NFCC (2022)guidance. This buffer reduces the risk of fire spread to or from vegetation.

Emergency Access:

An alternative access route to the BESS compound has been incorporated into the design. This ensures continued access for emergency vehicles if the main access track becomes inaccessible during an incident, as required by the NFCC (2022) guidance.

Proximity to Residential Properties:

The nearest residential property is approximately 450 meters east of the Site. This exceeds the minimum distance recommended by the NFCC (2022) guidance, minimizing potential impacts on nearby residents.

Prevailing Wind Considerations:

Based on local meteorological data, the prevailing wind direction at the Site is from the west. The access routes have been designed with this in mind to ensure safety and ease of movement for emergency responders.

This strategic siting and location approach ensures that the BESS is appropriately positioned to minimize risks, facilitate safe operations, and align with regulatory expectations.

4.3 PREVENTION OF THERMAL RUNAWAY AND ITS IMPACTS

Lithium-ion batteries, while efficient and reliable, contain materials that may ignite under rare conditions where excess heat is generated due to potential short circuits or chemical reactions. This can create the conditions necessary for a fire. A Battery Management System (BMS) or Energy Management System (EMS) is a critical component of BESS

design, equipped to detect, alert, and activate suppression systems within the BESS container to mitigate these risks.

Fire Risk Categories

The fire risks associated with BESS can be classified into three primary categories:

1. Electrolyte Fire Risk (Class B):

   Lithium-ion cells contain a flammable electrolyte, often based on an organic compound such as ethylene carbonate. This substance poses a fire risk if spilled, which can occur only in the event of mechanical damage to the cell (e.g., drop, puncture, crush) or catastrophic failure.

   Mitigation Measures:

   - Careful handling during installation.
   - Visual inspections post-installation.
   - Continuous monitoring through the BMS/EMS.

2. Electrical Fire Risk (Class C):

   The energized electrical components of the energy storage system, such as conductors and overcurrent protection devices (OCPDs), inherently carry fire risks.

   Mitigation Measures:

   - Following recognized design guidelines (e.g., NEC, IEC).
   - Selection of appropriately rated equipment.
   - Use of insulated, touch-safe covers where feasible.

3. Thermal Runaway (Class D):

   Thermal runaway occurs when a cell, after reaching a critical temperature, enters a positive feedback loop, where the internal oxidation reaction accelerates, leading to rapid heat generation and combustion. This process is fuelled by the interaction between the flammable electrolyte and oxygen released from the cathode during high-temperature conditions.

   Mitigation Measures:

   - Designing to prevent triggering conditions, monitored and managed by the BMS/EMS.

Conditions Monitored and Controlled by the BMS/EMS

The BMS/EMS is equipped to monitor and protect against key conditions that could lead to thermal runaway:

1. Overcharging/Overvoltage:

   - Overcharging can damage the separator layer, leading to short circuits.
   - The BMS/EMS prevents voltage from exceeding safe limits and adjusts charging behaviour as batteries near full charge to avoid stressing the separator.

2. Over discharging:

   - Low states of charge (SOC) may result in overcurrent or dendrite formation in the separator, leading to short circuits.
   - The BMS/EMS prevents overcurrent by monitoring and controlling discharge levels.

3. Overtemperature:

   - The reaction between the electrolyte and the cathode’s compounds becomes exothermic at temperatures above 90°C, potentially leading to cell failure.

- The BMS halts operation when the cell surface temperature exceeds 55°C, using sensors to monitor temperature across multiple points.

4. Under temperature:
   - Charging at low temperatures can cause separator damage due to plating.
   - The BMS regulates charging rates across low-temperature bands to prevent failure.
5. Imbalance:
   - Maintaining balance across all cells within a module or string is critical to avoid stress hotspots.
   - The BMS monitors State of Charge (SOC) and State of Health (SOH) to ensure uniform electrical stresses and conducts cell balancing during resting periods.

The integrated BMS/EMS serves as the first line of defence against thermal runaway and other fire risks. Through continuous monitoring, proactive adjustments, and automated safety responses, the BESS design effectively minimizes risks and ensures safe operation under a variety of conditions. This system-driven approach reflects industry best practices and aligns with international safety standards.

4.4 OTHER NFCC GUIDANCE REQUIREMENTS

4.4.1 Other Information Required Prior to Construction

Before the commencement of construction and operation of the Battery Energy Storage System (BESS), various site-specific emergency response plans (SSERP's) will be developed. These plans will include detailed procedures and protocols, some of which will be prepared in consultation with Lincolnshire Fire and Rescue Service (LFRS) to ensure alignment with their operational requirements.

It should be noted that these SSERP's are not a planning requirement, and, for reasons of safety and security will not be published as part of the Outline Battery Safety Management Plan (OBSMP).

4.4.2 System Design

The system design characteristics relevant to this OBSMP are set out in Table 1.

Table 1 – Relevant NFCC information requirements relating to system design, construction, testing and decommissioning

NFCC Information Requirements	Planning Application Details
1. The battery chemistries being proposed (e.g. Lithium-ion Phosphate (LFP), Lithium Nickel Manganese Cobalt Oxide (NMC)).	Lithium-Iron-Phosphate
2. The battery form factor (e.g. cylindrical, pouch, prismatic)	Prismatic
3. Type of BESS e.g. container or cabinet	Container
4. Number of BESS containers/cabinets	48

NFCC Information Requirements	Planning Application Details
5. Size/capacity of each BESS unit (typically in MW/h)	1.5MW - 2.5MW
6. How the BESS units will be laid out relative to one another.	4 Containers per MVS unit
7. A diagram / plan of the Site.	See the Site Layout Plan, planning drawing reference WAL-EDFR-BESS-CIV-PLN-301.04.
8. Evidence that Site geography has been considered (e.g. prevailing wind conditions).	The prevailing winds are from the west, and the Site has been designed with two access points to ensure flexibility and safety. The primary access point, located to the east, will be used during both construction and operation. An additional access point, situated to the south, provides alternative entry. This dual-access design minimizes the likelihood of both access points being blocked in the event of an incident. Furthermore, the proposed water tank is strategically positioned at the primary access point to the east, ensuring its accessibility upon entry to the Site.
9. Access to, and within, the Site for FRS assets[1]	The Site will be fully lined with gravel, with a 4-meter-wide access track extending to the end of the Site. Turning circles have been incorporated into the design, and a swept path analysis has been completed to ensure adequate turning areas for a Lincolnshire Medium Rescue Pump (MRP). The minimum turning radius is set at 15 meters. Additionally, the access roads are designed to support a "standard axle" load capacity, equivalent to that of a public road. This ensures they can accommodate equipment installation during construction and emergency vehicle access or equipment replacement during Site operations. A separate swept path analysis was conducted for the internal access roads, influencing the design of entry points and turning areas within the Site.
10. Details of any fire-resisting design features	The BESS enclosures are specifically designed to minimize the risk of fire propagation. Each enclosure features a 1-hour fire-rated wall for back-to-back configurations. This means that if containers are placed back-to-back, it would require 2 hours of continuous burning for a fire to spread to the adjacent container. Additionally, a 3.3-meter separation distance is maintained between rows of enclosures to further mitigate the risk of fire propagation.

[1] The FM Global document referenced in the NFCC guidance section on “access between BESS units and unit spacing” was updated in July 2023 and therefore the standard minimum spacing referred to in that section should be considered with reference to the updated version of the FM Global data sheet.

NFCC Information Requirements	Planning Application Details
11. Details of any: a. Fire suppression systems b. On Site water supplies (e.g. hydrants, EWS etc) c. Smoke or fire detection systems (including how these are communicated) d. Gas and/or specific electrolyte vapour detection systems e. Temperature management systems f. Ventilation systems g. Exhaust systems h. Deflagration venting systems	The following safety features have been integrated into the BESS to mitigate fire risks, manage hazardous gases, and ensure operational safety: a. Aerosol Suppression System: Each enclosure is equipped with a thermally activated aerosol canister. When the internal temperature reaches a critical threshold, the canister releases a suppression compound into the enclosure. The canister is designed to store double the volume of aerosol required to match the enclosure's air volume and is optimized for Class E fires. b. On-Site Water Tank: A 230 m^3 water tank will be installed on-site in compliance with NFCC (2022) guidance to support firefighting efforts. c. Fire Detection and Alarm Systems: Each BESS container is internally fitted with a photoelectric smoke detector and externally mounted siren and strobe alerts. These are networked to a Fire Alarm Control Panel (FACP), which is connected to the Battery Management System (BMS) and Energy Management System (EMS) for remote monitoring. Each row of enclosures is equipped with a UL-listed or EN 54-compliant FACP, which networks smoke detectors for centralized monitoring. FACPs across rows can be integrated and monitored remotely. d. Gas Detection System: Each enclosure is equipped with CO and H_2 sensors: CO sensor: Detects carbon monoxide at levels of 300 ppm. H_2 sensor: Detects hydrogen at 5% of the Lower Flammability Limit (LFL). A Programmable Logic Controller (PLC) aggregates sensor data from each enclosure and transmits it to the Supervisory Control and Data Acquisition (SCADA) system. Alarms and warnings include metrics for temperature, humidity, H_2, and CO levels. e. Liquid Cooling System: Enclosures are liquid-cooled and equipped with temperature sensors that communicate with the SCADA system. If overtemperature conditions are detected, the BMS receives an alert and initiates corrective actions to stabilize the system. f. and g. Ventilation System: The enclosure's ventilation system is triggered by the H_2 sensor to maintain safe gas concentrations. Based on the enclosure's free air volume of 3.9 m^3, the system achieves 96.3 air changes per hour, with an airflow rate of 376 m^3/hour. In testing, the system demonstrated the capacity to ventilate up to 480 m^3/hour, limiting flammable gas concentrations to 25% of the LFL within the enclosure.

NFCC Information Requirements	Planning Application Details
	h. Deflagration Panel: Each BESS enclosure is fitted with a deflagration panel compliant with NFPA 69. These panels are designed to structurally fail at a pressure lower than the enclosure's threshold, directing any blast overpressure upwards and away from emergency personnel. This feature mitigates the risk of explosions and ensures responder safety.
12. Identification of any surrounding communities, sites, and infrastructure that may be impacted as a result of an incident.	The nearest residential properties are located more than 450 meters from the Battery Energy Storage System (BESS). In accordance with NFCC (2022) guidance, the battery units are sited at least 10 meters north of the Site's overhead lines and existing vegetation, minimizing potential risks and impacts. A BESS Consequence Analysis (EDF, 2023) was conducted to model the potential effects of a cell venting event, which could include: • Toxic release of gases. • Thermal radiation from a fire. • Overpressure resulting from an explosion. The results of the analysis indicate no adverse impacts to sensitive receptors in the vicinity of the Site. Furthermore, the prevailing westerly winds reduce the likelihood of impacts on nearby solar farms located to the west and south. In the unlikely event of alternative wind directions, the unmanned nature of these neighbouring sites ensures that any impacts remain negligible. These scenarios will be addressed within the Emergency Response Plan (ERP) to ensure preparedness and appropriate mitigation. The Site-Specific Emergency Response Plan (ERP) will detail potential impacts to all identified receptors and outline corresponding mitigation measures. This plan will ensure that any consequences of a venting event are managed effectively, safeguarding both the Site and the surrounding environment.
13. Testing	The Applicant will ensure that all equipment used in the BESS complies with stringent safety standards. Specifically, the equipment will have successfully passed the UL9540 testing process, which evaluates fire propagation risks at the cell, module, and container levels. This rigorous testing ensures that the design meets international benchmarks for fire safety and performance. Additionally, BESS equipment will undergo testing at the cell, module, and rack levels in accordance with UL9540A, a complementary test standard that provides detailed evaluations of thermal runaway risks and fire propagation behaviour. This ensures a robust assessment of safety across all critical components.

NFCC Information Requirements	Planning Application Details
	The procurement process further strengthens the safety framework by acting as an additional barrier. Bids will only be solicited from vendors who can demonstrate: • A comprehensive testing and safety program. • Certification of compliance with UL9540A standards. This approach guarantees that only equipment meeting the highest safety and reliability standards is used in the development, enhancing both operational safety and long-term reliability.
14. Design	The typical design of BESS incorporates a range of safety and operational features at the battery module level, ensuring robust performance and risk mitigation. These features include: • Battery Management System (BMS): Monitors and controls critical battery conditions such as temperature, voltage, and current to ensure safe operation. • Overcurrent and Overvoltage Protection: Prevents electrical damage to the battery system by limiting excessive currents and voltages. • Ventilation System: Reduces the accumulation of off-gases by ensuring adequate airflow within the battery enclosure. • Temperature Management System: Maintains appropriate operating temperatures to enhance performance and prevent overheating. • Emergency Shutdown System: Disconnects the battery from the grid and halts further charging or discharging in the event of an emergency, minimizing risks. • Isolation System: Provides protection against electrical hazards and prevents the risk of electrical shock during operation or maintenance. • Ground Fault Protection: Detects and responds to ground faults, ensuring safe system operation and minimizing electrical risks. • Internal Safety Features: o Internal fuses and contactors at the rack, string, and bank levels to prevent short circuits.

NFCC Information Requirements	Planning Application Details
	○ Overcharge safety devices to prevent damage from excessive charging. ○ Passive separation of internal components to minimize the spread of thermal events. ○ Venting devices to safely release pressure or gases in abnormal conditions. • Thermal Monitoring: Tracks temperature variations across the system to identify potential issues and enable pre-emptive corrective actions. These measures have been implemented to enhance the safety, reliability, and operational efficiency of the BESS, ensuring compliance with industry standards and best practices.
15. Detection and monitoring	The scheme incorporates advanced monitoring systems designed to detect abnormal operations and initiate a safe system shutdown before issues escalate. These monitoring systems operate independently of the primary control systems and equipment, ensuring unbiased detection and response to potential abnormalities. **Key Safety Features** To enhance safety and mitigate risks, the following measures have been implemented: • Thermal Management: Automated power consumption controls and cut-out functionality activate when parameters exceed safe limits, reducing the likelihood of thermal events. • Cell Health Monitoring: Continuous monitoring of individual cell health includes self-checking alarm statuses to prevent thermal runaway. The Battery Management System (BMS) can isolate individual cells if thermal runaway is detected. • Intelligent Rack Management: Load balancing across the entire battery pack ensures optimal performance and reduces localized stress. • Automated Battery Cooling Systems: Equipped with fail-safe mechanisms, these systems respond dynamically to temperature variations, preventing overheating. • Real-Time Data Monitoring: Continuous monitoring of both internal cell data and external weather conditions enhances situational awareness and enables proactive risk management. • Emergency Stop Mechanisms:

NFCC Information Requirements	Planning Application Details
	Both remote and local emergency stop systems are available for immediate system shutdown in critical situations. • Thermal Protection Bulkheads: Internal bulkheads provide 1-hour thermal passive protection to contain and delay fire propagation. • Fire Detection Systems: Custom-designed to detect hydrogen (H_2) and carbon monoxide (CO) as early indicators of cell failure. Standard heat and smoke detection systems are also employed to provide a comprehensive approach to fire detection. • Fire Suppression Equipment: System-level aerosol-based fire suppression equipment is integrated, meeting the requirements of NFPA 855, NFPA 69, NFPA 68, and NFPA 2010. These measures collectively mitigate potential hazards, ensuring a timely and effective response to abnormal situations or fire incidents. They significantly enhance the overall safety and risk management of the BESS.
16. Suppression systems	Each BESS enclosure is equipped with a thermally activated aerosol canister designed to combat Class E fires effectively. When the internal temperature reaches a critical threshold, the canister is triggered, releasing a suppression compound throughout the enclosure. • Key features of the suppression system include: • Double Aerosol Capacity: The canister stores aerosol at twice the volume of the enclosure's air capacity, ensuring sufficient coverage to suppress fires effectively. Thermal Activation: The system is designed to respond automatically when temperatures reach pre-defined safety thresholds, minimizing response time. For additional details on suppression systems, including integration with fire detection measures, please refer to Row 11 above.
17. Deflagration prevention and venting	Each BESS enclosure is equipped with a deflagration panel designed in accordance with NFPA 69. These panels are engineered to structurally fail at a pressure lower than the enclosure's overall structural rating, providing a controlled venting mechanism. Key features of the deflagration panel include: • Explosion Mitigation: The panel prevents catastrophic failure by venting excess pressure, mitigating the risk of an explosion. • Blast Direction: Overpressure from the blast is directed upwards and away from emergency

NFCC Information Requirements	Planning Application Details
	response personnel, ensuring their safety during an incident. For further details, including its integration with other safety systems, refer to Row 11.
18. Access	In accordance with NFCC (2022) guidance, the Site has been designed to ensure safe and efficient access for emergency services under various conditions. Key access features include: • Dual Access Points: Two separate access points to the Site have been incorporated, accounting for different wind conditions and directions to ensure uninterrupted access during emergencies. • Access Roads: ○ 4-meter-wide roads capable of accommodating fire service vehicles, including in adverse weather conditions. ○ No extreme grades to facilitate smooth and safe vehicle movement. • Unobstructed Facility Access: All areas of the facility are designed to remain unobstructed, allowing emergency responders to reach critical locations without delay. • Turning Areas for Emergency Vehicles: Provisions have been made for adequate turning areas to accommodate a Lincolnshire Medium Rescue Pump (MRP). A swept path analysis, included in the Transport Statement Addendum, verifies compliance, with a minimum turning radius of 15 meters.
19. Access between BESS units and unit spacing	The proposed 3.3-meter spacing between enclosures in this scheme exceeds the 3.1-meter separation recommended in NFPA 855. This distance is significantly greater than the 1.5-meter separation recently updated in the FM report, which the NFCC had previously referenced for its spacing requirements. In addition to the increased separation, the design incorporates suitable features to minimize the risk of fire propagation, as outlined earlier in this document. These measures, reviewed and deemed sufficient by a competent fire engineer, provide robust justification for the proposed spacing while ensuring compliance with safety standards.
20. Distance from BESS units to occupied buildings and site boundaries	The nearest residential properties are located more than 450 meters from the BESS. According to the BESS Consequence Analysis (EDF, 2023), all potential risks associated with the Site have been evaluated and

NFCC Information Requirements	Planning Application Details
	determined to fall within tolerable thresholds for safety and environmental impact.
21. Site conditions (Sites should be maintained in order that, in the event of fire, the risk of propagation between units is reduced.)	The BESS will be operated and maintained by skilled personnel to ensure optimal performance and functionality at all times. Maintenance activities will be conducted at least twice a year, consisting of: • Major Maintenance Periods: Comprehensive inspections of all system components, including the Battery Management System (BMS), fire suppression systems, and cooling equipment, to ensure proper functionality and compliance with safety standards. • Minor Maintenance Periods: Routine visual inspections, system diagnostics, and the rectification of non-critical issues to maintain operational reliability. All maintenance activities will adhere strictly to site safety rules and be carried out in accordance with the Original Equipment Manufacturer (OEM) guidelines. Risk assessments will precede all work to ensure the safety of personnel and equipment. **Site Safety and Fire Prevention Measures** • The areas surrounding the BESS equipment will be finished with gravel and regularly maintained to remain clear of vegetation or materials that could contribute to the spread of fire. • The proposed vegetation screening has been set back by a minimum of 10 meters from the BESS, in alignment with NFCC (2022) guidance. This setback minimizes the risk of fire propagation and enhances site safety. By adhering to these measures, the BESS will operate safely and efficiently, ensuring its long-term reliability and compliance with industry best practices.
22. Water supplies	The Site will feature a 230 m^3 water tank, designed to deliver a flow rate of 1,900 liters per minute (lpm) for a duration of 2 hours, in accordance with NFCC (2022) guidance. The water supply system will be developed in consultation with Lincolnshire Fire and Rescue Service (LFRS) to ensure compliance with operational requirements. Key considerations include: • Collaboration with LFRS: LFRS will provide input to determine the placement of outlets and connection points, ensuring effective

NFCC Information Requirements	Planning Application Details
	access during emergencies. Following installation, LFRS will assume responsibility for ownership, operation, and maintenance of the water supply system. • Strategic Tank Placement: The water tank has been strategically located to ensure suitable emergency access and is positioned upwind of the BESS compound to minimize risks associated with exposure to smoke or hazardous gases during a fire event. • Weatherproof Enclosures: All related equipment will be housed in enclosures with an IP55 rating, providing protection against dust ingress and water jets, ensuring reliability in adverse environmental conditions. These measures ensure that the water supply system is accessible, reliable, and fully aligned with emergency response and operational needs.
23. Signage	The Site will feature appropriate signage designed in compliance with relevant Electrical Regulations to ensure clarity and accessibility for both the general public and emergency services. The control room's 24/7 emergency telephone number will be prominently displayed for contact in case of emergencies. **Signage Details** The signage will include the following information: • Relevant hazards posed by the BESS. • The specific technology associated with the BESS. • Information about the suppression systems installed. • Emergency contact details, available 24/7. **Signage Specifications** • Signs placed on the exterior of buildings or enclosures will be sized to ensure they are legible at night from a distance of 30 meters or from the Site boundary, whichever is nearer. • Signage placement and size will prioritize visibility and usability for emergency responders and other stakeholders. **Regulatory Compliance** Where the total quantity of dangerous substances on-site exceeds 25 tonnes, compliance with the Dangerous Substances (Notification and Marking of Sites) Regulations

NFCC Information Requirements	Planning Application Details
	1990 (NAMOS) will be considered and implemented as necessary. These measures ensure that the Site's signage is effective, informative, and compliant with regulatory requirements, supporting safe and efficient operations.
24. Emergency Plans	Comprehensive Risk Management Plans will be developed to address potential incidents and ensure preparedness across all stages of the project. These plans include Emergency Response Plans (ERPs) tailored to both the construction and operational phases. **Construction Phase Emergency Response Plan** The appointed principal contractor will draft a Construction Phase Emergency Response Plan (ERP) before construction begins. This plan will outline the procedures and key steps to be followed in the event of an incident, focusing on mitigating risks and ensuring safety during construction activities. **Operational Emergency Response Plan** Upon project completion, an Operational ERP will be developed, containing all critical information and resources required to manage an incident. Key elements of the plan include: • Hazard Identification: Early identification and assessment of potential hazards. • Contact Information: A directory of key services and personnel • Command, Control, and Communication (C3): A clearly defined command and control structure based on the UK civil response framework, incorporating bronze (operational), silver (tactical), and gold (strategic) levels of management. The Operational ERP will align with: • UK Emergency Services JESIP Principles: Ensuring interoperability among responding services. • HMG Emergency Preparedness Guidance: Compliance with government standards for emergency planning. • HSE and EA Standards: Meeting health, safety, and environmental requirements for emergency response.

NFCC Information Requirements	Planning Application Details
	This plan will be shared with Lincolnshire Fire and Rescue Service (LFRS) to ensure coordination but will not be made publicly available for safety and security reasons. **Additional Risk Management Plans** In addition to the ERP, the principal contractor will draft other Risk Management Plans to address: • Health and Safety (H&S). • Environmental considerations. • Quality assurance. • Traffic management. These plans collectively ensure a robust framework for managing risks, minimizing impacts, and protecting personnel, the environment, and surrounding communities throughout the project lifecycle.
25. Environmental Impacts	See section 4.4.3.
26. Recovery	In the aftermath of any incident, a comprehensive investigation and report will be conducted. This process will include input and feedback from the Original Equipment Manufacturer (OEM) and will focus on: • Root Cause Analysis (RCA): Identifying the underlying causes of the incident to prevent recurrence. • Lessons Learned: Documenting insights and recommendations to improve safety measures, operational protocols, and emergency response plans. A full description of the recovery process, including the safe disposal of damaged equipment, will be prepared before the commencement of construction. This ensures that all recovery activities are planned, managed, and executed in accordance with industry standards and best practices.

4.4.3 Environmental Impacts

The environmental impacts of the BESS are addressed in a comprehensive suite of documents submitted in support of the planning application. These documents ensure that all potential environmental effects are thoroughly assessed and mitigated where necessary.

BESS Consequence Analysis

A BESS Consequence Analysis (EDF, 2023) was conducted to evaluate the potential extent of harmful effects arising from a cell venting event, including:

- Toxic release of gases.
- Thermal radiation resulting from fire.
- Overpressure caused by an explosion.

The analysis considered public health criteria and reference levels to define areas of potential influence, assessing where human health could be affected by exposure to impacts such as thermal runaway. The findings concluded that, even in the worst credible scenarios, no relevant risk thresholds would be breached at the nearest occupied buildings or publicly accessible areas.

Supporting Strategies

As part of this planning application, a SuDS Strategy and a Fire Water Management Strategy will be submitted. These strategies will ensure proper handling and containment of firewater runoff and other drainage concerns, mitigating any environmental risks during an emergency.

Integration with Emergency Response Planning

Environmental considerations will be incorporated into the Emergency Response Plan (ERP) for both the construction and operational phases. This ensures that environmental safeguards are maintained throughout the project lifecycle, addressing potential impacts and outlining appropriate mitigation measures.

5 CONSTRUCTION

5.1 INCIDENT MANAGEMENT AND RESPONSE PLANNING

The appointed principal contractor will prepare a comprehensive Emergency Management Plan (EMP) prior to the start of construction. This plan will outline detailed procedures for managing incidents and specify the key steps to be taken during an emergency, ensuring preparedness from the onset of the project.

Emergency Response Plan (ERP)

Upon completion of construction, an Emergency Response Plan (ERP) will be developed. The ERP will contain all essential information and resources required to respond effectively to an incident. While this document will be shared with Lincolnshire Fire and Rescue Service (LFRS) to ensure coordination, it will not be made publicly available for security and safety reasons.

Key elements of the ERP include:

- Hazard Identification:

  Procedures to detect and assess potential hazards early.

- Contact Information:

  A directory of key services and personnel critical to emergency response.

- Command, Control, and Communication (C3):

  A clearly defined structure based on the bronze (operational), silver (tactical), and gold (strategic) command hierarchy to streamline decision-making and communication during incidents.

Alignment with Standards and Best Practices

The ERP will align with the latest UK civil response procedures and incorporate the principles of the Joint Emergency Service Interoperability Programme (JESIP) to facilitate seamless collaboration among emergency services. Additionally, the plan will comply with:

- HMG Emergency Preparedness Guidance: Ensuring adherence to government standards for emergency management.
- Health and Safety Executive (HSE) Requirements: Addressing workplace safety protocols.
- Environment Agency (EA) Standards: Mitigating environmental impacts during emergencies.

By integrating these frameworks, the ERP ensures a structured, efficient, and comprehensive response to potential incidents, minimizing impacts on personnel, the Site, and the surrounding community.

5.2 CONSTRUCTION

The construction of the BESS will adhere to UK legislation and align with industry best practices, ensuring compliance with regulatory requirements and the highest standards of safety and quality.

5.3 BESS TRANSPORTATION

The BESS will undergo factory testing prior to delivery, in accordance with supplier requirements and relevant guidance, to ensure system integrity and compliance with performance and safety standards.

The BESS will be transported to the Site adhering to applicable regulations for handling and logistics.

Transportation of the BESS will comply with all relevant legislation and guidance for the transportation of dangerous goods, ensuring safety and regulatory compliance throughout the process.

5.4 INSTALLATION

The installation of the Battery Energy Storage System (BESS) equipment will be carried out in strict accordance with supplier instructions and relevant industry guidance. The process will include comprehensive equipment testing to ensure functionality and compliance with safety standards.

Where necessary, the installation will be overseen by the equipment manufacturer, providing additional assurance of proper assembly and operation.

6 OPERATION

6.1 OPERATIONAL RESPONSIBILITIES

Before the commencement of the operational phase of the development, an operational team will be appointed. This team will be responsible for the management, maintenance, and monitoring of the Battery Energy Storage System (BESS) in strict accordance with the OBSMP, Emergency Response Plan (ERP), and Risk Management Plan.

As part of the preparation, Lincolnshire Fire and Rescue Service (LFRS) will be notified of the operational arrangements, including key contacts within the operational team, to ensure effective communication and coordination during any incidents.

6.2 BESS MANAGEMENT SYSTEM

The BESS will be managed in accordance with the measures outlined in Table 1, which include:

- Fire Detection Systems: Early identification of fire risks.
- Fire Suppression Systems: Automated systems to contain and extinguish fires.
- On-Site Water Supplies: Adequate water storage for firefighting purposes.
- Smoke and Fire Detection Systems: Integrated sensors for early warning.
- Gas and Electrolyte Vapour Detection Systems: Continuous monitoring for hazardous emissions.
- Temperature Management and Cooling Systems: Ensures optimal operating temperatures.
- Ventilation Systems: Prevents the accumulation of flammable gases.

- Exhaust Systems: Designed for efficient gas removal.
- Deflagration Venting Systems: Mitigates explosions by controlling pressure release.
- Thermal Monitoring: Tracks temperature variations to pre-empt potential issues.
- Isolation Systems: Protects against electrical hazards.
- Emergency Shutdown Systems: Rapid system shutdown to prevent escalation of incidents.
- Ground Fault Protection: Detects and addresses electrical grounding issues.
- Overcharge Safety Devices: Prevents battery overcharging.
- Weather Monitoring Systems: Tracks external conditions that may impact operations.
- Testing: Regular performance checks to ensure functionality.
- Continuous Remote Monitoring: Real-time surveillance of BESS units and associated electrical systems.

These measures collectively enhance the safety and risk management of the BESS by mitigating potential hazards and ensuring swift and effective responses to abnormal events or incidents.

6.3 SECURITY

The BESS will be housed within a secure, fenced compound, designed to restrict unauthorized access and ensure site safety. The compound will be clearly marked with signage identifying potential hazards and outlining key safety information.

Signage Features

- Clear display of key contact details, including the control room's emergency telephone number, for quick access in case of an incident.
- Compliance with relevant Electrical Regulations to ensure legibility and effective communication.

Cybersecurity Measures

Where applicable, the system will adhere to relevant cybersecurity standards and guidance, ensuring that digital security is a fundamental aspect of the system's design. These measures aim to protect critical infrastructure from unauthorized access or cyber threats.

By integrating physical and cyber security measures, the BESS is designed to provide a robust framework for safety and operational resilience.

6.4 MAINTENANCE

The BESS will be maintained by trained personnel to ensure optimal performance, safety, and compliance with operational standards. Maintenance activities will follow a structured schedule, incorporating both routine and comprehensive inspections.

Maintenance Schedule

- Routine Maintenance:

  Conducted biannually, focusing on visual inspections, system diagnostics, and addressing non-critical issues.

- Comprehensive Maintenance:

  Performed annually, covering all key system components, including the Battery Management System (BMS), fire suppression systems, cooling systems, and electrical infrastructure.

Operational Protocols

- Maintenance will be carried out in accordance with the Original Equipment Manufacturer (OEM) guidelines and site-specific safety rules.

- Risk assessments will precede all maintenance tasks to ensure the safety of personnel and equipment.
- Critical systems, such as fire detection and suppression, will remain operational during maintenance whenever possible. Temporary deactivation will only occur for the minimum time required, with appropriate safeguards in place.

Site Safety Measures

- The areas surrounding the BESS will be kept free of vegetation and materials that could pose a fire risk.
- Gravel surfacing will be maintained around the equipment to further mitigate fire hazards.
- The proposed vegetation screening will be maintained at a minimum setback of 10 meters from the BESS, in line with the NFCC (2022) guidance.

These measures ensure that the BESS remains safe, functional, and compliant throughout its operational lifecycle.

7 DECOMMISSIONING

At the end of the operational period, the BESS will be decommissioned in accordance with the relevant legislation and guidance in effect at that time. The safety protocols and procedures outlined in the OBSMP for construction and installation will be adhered to during the decommissioning phase to ensure safety and compliance.

Waste Mitigation and Management

The decommissioning process will align with the waste mitigation hierarchy, prioritizing:

- Reduction: Minimizing waste generation where feasible.
- Reuse: Identifying opportunities for repurposing components, such as batteries, for second-life applications.
- Recycling: Ensuring that recyclable materials are processed responsibly to recover valuable resources.
- Disposal: Managing non-recyclable waste in compliance with applicable environmental and safety standards.

By following these principles, the decommissioning process will minimize environmental impacts while ensuring adherence to the most current regulations and best practices.

8 FIRE & RESCUE SERVICE CONSULTATION

8.1 LINCOLNSHIRE FIRE AND RESCUE SERVICE

Consultation with Lincolnshire Fire and Rescue Service (LFRS) was conducted via email and a virtual meeting on 29th January 2024. The meeting included a presentation of slides (attached in Appendix A) and covered the topics outlined in Section 1.1 of this Outline Battery Safety Management Plan (OBSMP).

Key Action Points

During the meeting, the following action points were identified for the developer:

- Submission of a BSMP:

  A comprehensive Battery Safety Management Plan was to be submitted with the planning application.

- Fire Detection, Suppression, and Gas Monitoring:

  Detailed information regarding these systems was to be included in the BSMP.

- Water Supply:

  The inclusion of a water tank or an alternative water supply was to be integrated into the Site layout.

- Turning Heads:

  Information on turning heads for emergency vehicles was to be provided within the BSMP.

Follow-Up and Resolution

Following the meeting, LFRS did not raise any concerns regarding the development. The action points identified have been addressed in this document, including the requested details on gas monitoring, which are presented in Table 1. This consultation process has ensured alignment with LFRS requirements and reinforced the safety measures integrated into the development.

9 CONCLUSION

This Battery Safety Management Plan (BSMP) outlines the comprehensive design approach and safety measures implemented for the Battery Energy Storage System (BESS) at Walpole. It provides a detailed framework to ensure the system is constructed, operated, and maintained in a manner that prioritizes safety, compliance, and environmental protection.

Key aspects of the BSMP include adherence to National Fire Chiefs Council (NFCC) guidance and other relevant industry standards. These measures have been carefully designed to minimize risks to nearby sensitive receptors, mitigate potential hazards, and ensure robust risk management throughout the project lifecycle. The plan also incorporates specific measures for fire detection, suppression, gas monitoring, and emergency access, which collectively enhance the safety and operational resilience of the system.

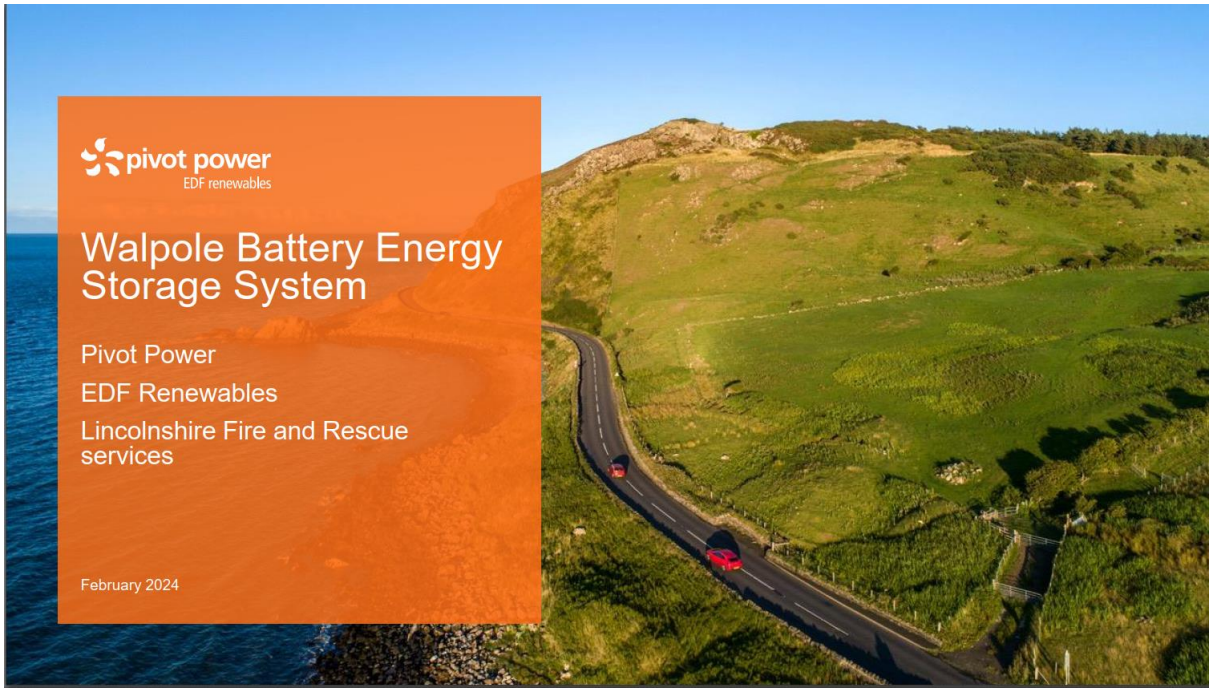
The Emergency Response Plan (ERP), to be developed prior to the operational phase, will address all potential environmental and safety impacts likely to occur during the lifetime of the BESS. This ERP will include site-specific emergency protocols, command and control structures, and hazard mitigation strategies, ensuring the safety of personnel, emergency responders, and the surrounding community. The ERP will be finalized in collaboration with Lincolnshire Fire and Rescue Service (LFRS) and other relevant stakeholders, further strengthening preparedness and response capabilities.

By integrating best practices, rigorous testing standards, and proactive consultation with LFRS, this OBSMP demonstrates the Applicant’s commitment to developing a safe, reliable, and environmentally responsible energy storage solution. The measures outlined in this document ensure compliance with regulatory requirements while addressing the unique challenges posed by the development and operation of a modern BESS.

This OBSMP will continue to evolve to incorporate advancements in technology and best practices, ensuring that the Walpole BESS remains a benchmark for safety and operational excellence.

APPENDIX A - LINCOLNSHIRE FIRE AND RESCUE SERVICE CONSULTATION

The following slides were presented to the representative from the Lincolnshire Fire and Rescue Service.



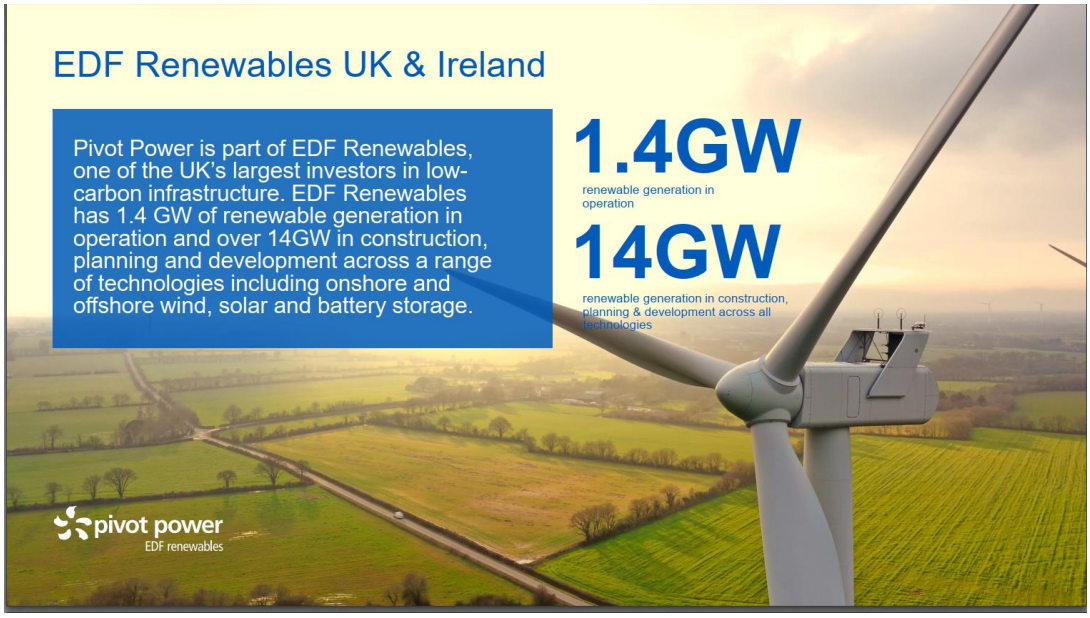
Objectives

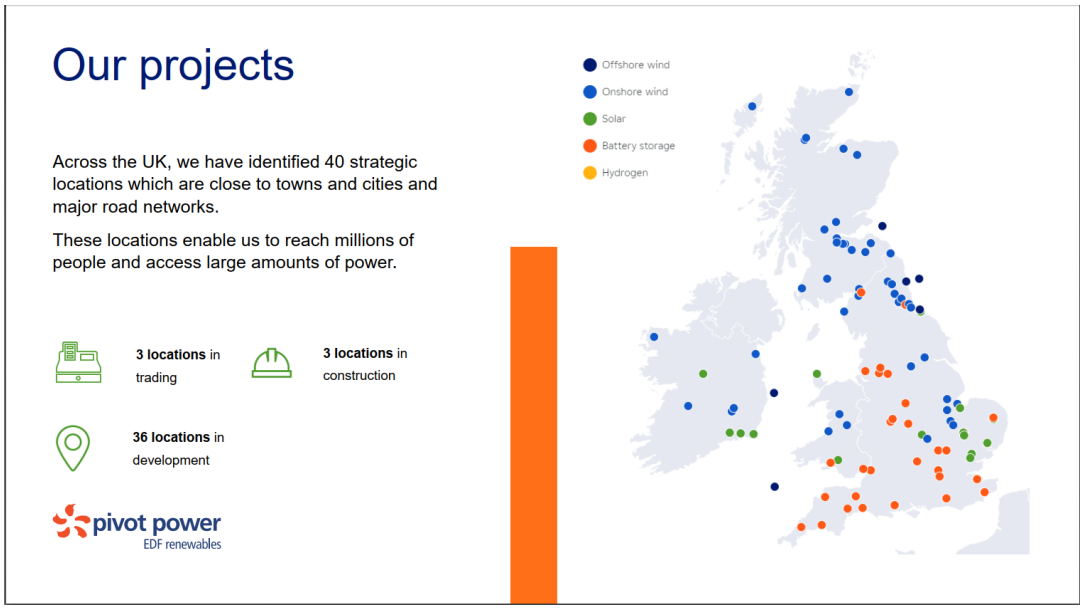
- Introduction
- EDF-R BESS projects : Fire Safety considerations
- Improvements/Suggestions
- Local Planning Authority

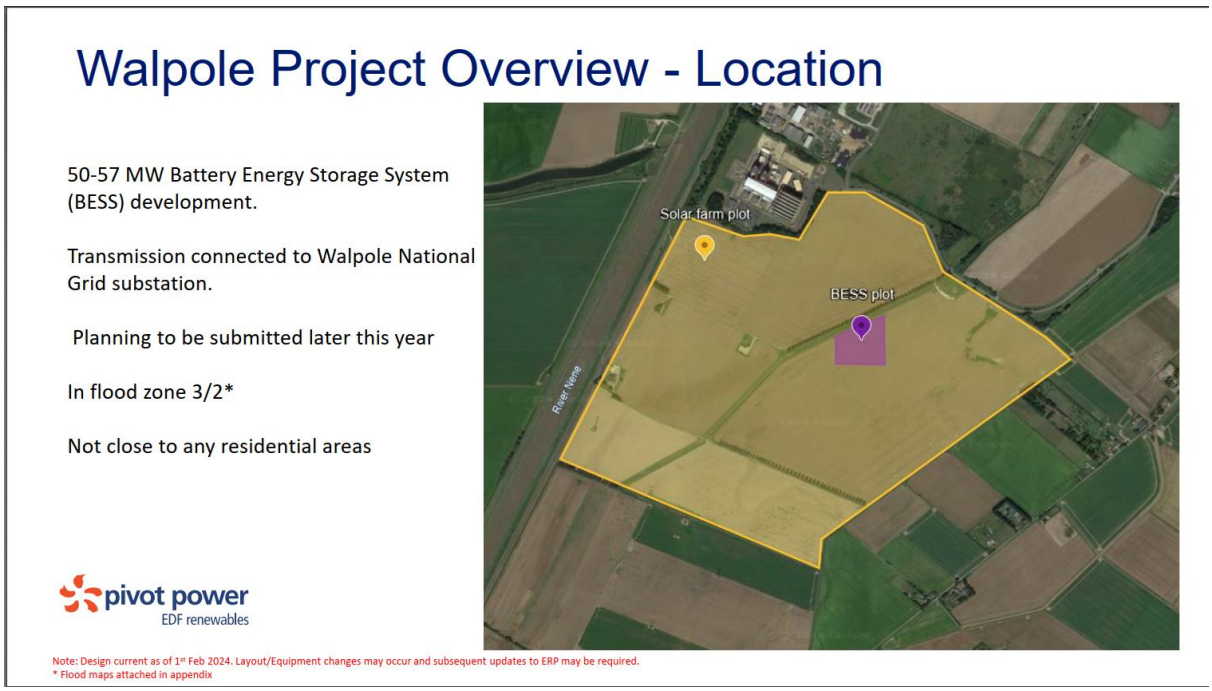
Note:
Everything discussed during the presentation should be considered confidential

pivot power
EDF renewables

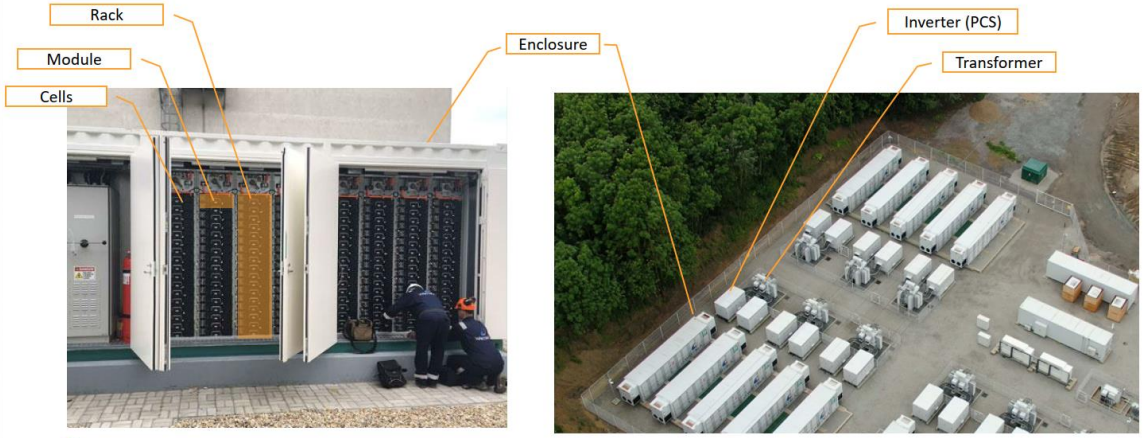



EDF Renewables UK & Ireland
Pivot Power is part of EDF Renewables, one of the UK's largest investors in low-carbon infrastructure. EDF Renewables has 1.4 GW of renewable generation in operation and over 14GW in construction, planning and development across a range of technologies including onshore and offshore wind, solar and battery storage.
1.4GW
renewable generation in operation
14GW
renewable generation in construction, planning & development across all technologies
pivot power
EDF renewables


Our projects
Across the UK, we have identified 40 strategic locations which are close to towns and cities and major road networks.
These locations enable us to reach millions of people and access large amounts of power.
3 locations in trading
3 locations in construction
36 locations in development
pivot power
EDF renewables
Offshore wind
Onshore wind
Solar
Battery storage
Hydrogen


Walpole Project Overview - Location
50-57 MW Battery Energy Storage System (BESS) development.
Transmission connected to Walpole National Grid substation.
Planning to be submitted later this year
In flood zone 3/2*
Not close to any residential areas
Solar farm plot
BESS plot
River Nene
pivot power
EDF renewables
Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.
* Flood maps attached in appendix

Main BESS System Components



pivot power
EDF renewables

Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Fire Risk in Lithium-Ion Batteries

3 main fire risks identified associated with Lithium-Ion batteries:

Electrolyte Fire Risk (class B)
- Electrolyte is a flammable substance if spilled
- Only possible in event of mechanical damage
- Careful handling of equipment and inspection

Electrical Fire Risk (class C)
- ESS contains energized electrical equipment
- Proper design guidelines (NEC, IEC etc), appropriately rated equipment and use of insulation/touch safe covers

Thermal Runaway (class D)



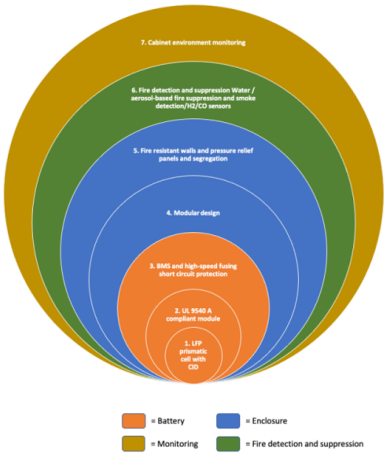
*Simulated CGI from fire response rehearsal

pivot power
EDF renewables

Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Equipment - Layered Fire System Philosophy

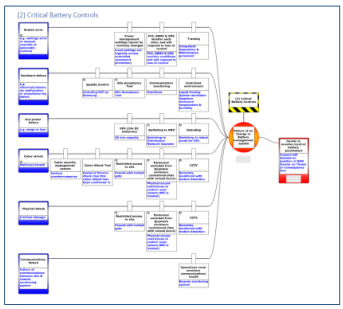
1. Battery cells designed with current interrupting device (CID) to automatically electrically isolate the cell.
2. Procure battery modules and racks complaint with rigorous UL9540A testing.
3. Battery Management System (BMS) which constantly monitors for abnormalities and will automatically stop the operation of related section of ESS. BMS cannot be overridden. Interfaces protected with high-speed fusing for short circuits.
4. Enclosure walls have minimum 60-minute fire rating, giving 120-minute barrier between battery enclosures. Pressure relief plates on roof and additional separations clearances considered between each bank (3.3m).
5. Deflagration panel
6. Fire alarm panel with heat sensor, H2, and CO sensor. Aerosol based fire suppression system (Stat-X) activates to prevent propagation of electrical fires.
7. Enclosure environment is continuously monitored and 24/7 control room is alerted if abnormal temperatures and/or humidity detected.



pivot power
EDF renewables

Note: Design current as of 8th August 2023. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

EDF & Pivot Power have project safety at core of work culture



- Risk Assessment throughout lifetime of project (procurement, design, construction and operation)
- Battery cells procurement part of EDF-R World qualification process to ensure only top tier battery cells are procured. Involves desktop review and factory audit to ensure quality management.
- Bow-Tie analysis
- All fire detection and prevention systems installed on site are commissioned, inspected and maintained by UK certified fire engineers (accredited by BAFE, SSAIB, IFEDA).
- Early engagement with local fire authorities and preparation of an Emergency Response Plan before site goes into operation.
- EDF-Renewables follows industry latest good practices to mitigate any lithium-ion fire risk and addresses lessons learnt from incidents observed around the world.

pivot power
EDF renewables

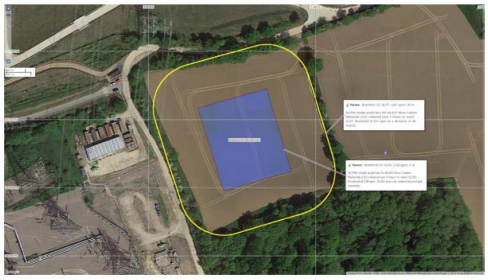
Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Plume Study – TBC at Walpole

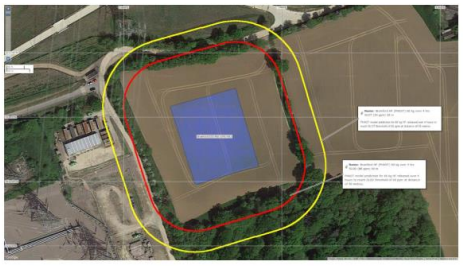
Partnered with third-party expert (PSI) we generate plume model of toxic and flammable gas release during event. Source data from UL9540 results (CATL battery cells).

Focused on most dangerous gasses:
- Carbon Monoxide (most toxic)
- Hydrogen (most flammable/explosive)
  - Hydrogen Fluoride (HF) as by-product of cell infrastructure
- Ethylene (most flammable material heavier than air at STP)

Worst case scenario considered, with prolonged release of gas over 4 hours.
SLOT and SLOD values per HSE guidance







pivot power
EDF renewables

Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Emergency Response Plan

- Aligns with current UK civil response procedures using the bronze (operational), silver (tactical) and gold (strategic) command and control structure
- Incorporates the UK emergency service JESIP principles
- Complies with HMG Emergency Preparedness and Response Guidance
- Complies with HSE and EA standards for Emergency Response
- Details a Command, Control and Communication structure for the BESS.
- Provides checklists for all key roles.
- Provides incident specific checklists.
- Provides logging and information management processes for incident management and thereby an accountable decision-making process
- Can be shared with members of the Local Resilience Forum (LRF) for comment
- Local responders are invited to exercise the ERP alongside EDF staff
- EDF Renewables managers are trained in the ERP content, emergency response principles and the command and control structure

pivot power
EDF renewables

Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Emergency Response Plan

- 24/7 control room responsible to monitor equipment and run ERP
- Local and remote emergency push buttons to isolate site electrical sources
- Enter into agreement with local FD on ERP



*Simulated CGI from fire response rehearsal

pivot power
EDF renewables

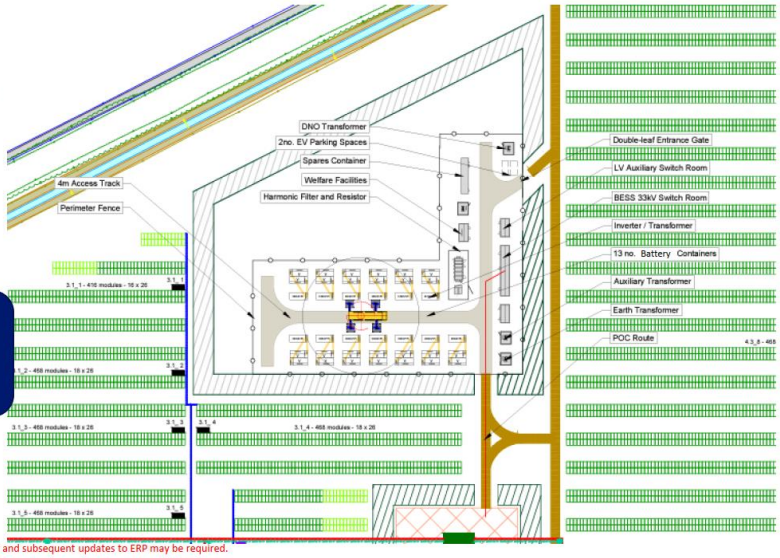
Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Walpole Project Overview – Layout Considerations

Key Points:

- Provisions made for turning of large trucks.
- Spacing maintained between the blocks.
- Placed as far away as possible from the stream.

Residential property ~700m distance from BESS array
Increased BESS separation clearance (NFPA 855)
TX and BESS separation clearance (IEC)



pivot power
EDF renewables

Note: Design current as of 1st Feb 2024. Layout/Equipment changes may occur and subsequent updates to ERP may be required.

Thank you

Pivot Power
Cardinal Place
80 Victoria Street
London
SW1E 5JL
https://www.edf-re.uk/what-we-do/battery-storage/



Action points following the presentation:

RE: EDF-RE: Walpole BESS development

Sushitha Reddy Yellola
To Stephen Meldrum (LFR); Daniel.moss@lincolnshire.gov.uk
Cc Katie Emmitt

Reply | Reply All | Forward | ...
Mon 05/02/2024 12:39

Internal (C1)

WAL-EDFR-TCL-DRG-P001-A - Site Layout_V2.pdf 345 KB
WAL-EDFR-TCL-DRG-P001-E - Site Layout_V1.pdf 1 MB
WAL-PP-TCL-PRE-1-Walpole-LFRS-FINAL.pdf 2 MB

Hi Both,

Thank you so much for your time today and apologies for the nervousness, must be all the coffee.

Please see the presentation attached and the key actions mentioned below.
Let me know if this covers the requirements or if you have any other comments.

For EDF:

1. BSMP capturing the requirements from the NFCC guidelines, NFPA 855 and or FM global.
2. BSMP to detail the fire detection and suppression systems within the enclosure.
3. Water tank or some form of water supply to be provided to the sites and included in the site layout.
4. Information on the access roads and turning heads to be included in the BSMP.

For FRS:
Could you please share any local fire hydrant maps available.

I am keen on staying engaged with you and will ensure to update you once the design has been finalised.

Best Regards,
Sushitha

RE: EDF-RE: Walpole BESS development

DM Daniel Moss (LFR) <Daniel.Moss@lincolnshire.gov.uk>
To Sushitha Reddy Yellola; Stephen Meldrum (LFR)
Cc Katie Emmitt

Reply | Reply All

Internal (C1)

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Sushita, it was great to meet you and Katie today, and thank you for your time working through the initial details of the development.

We'll look to see if we can provide the hydrant data, but I would also consider contacting Anglian Water to see if they can help.

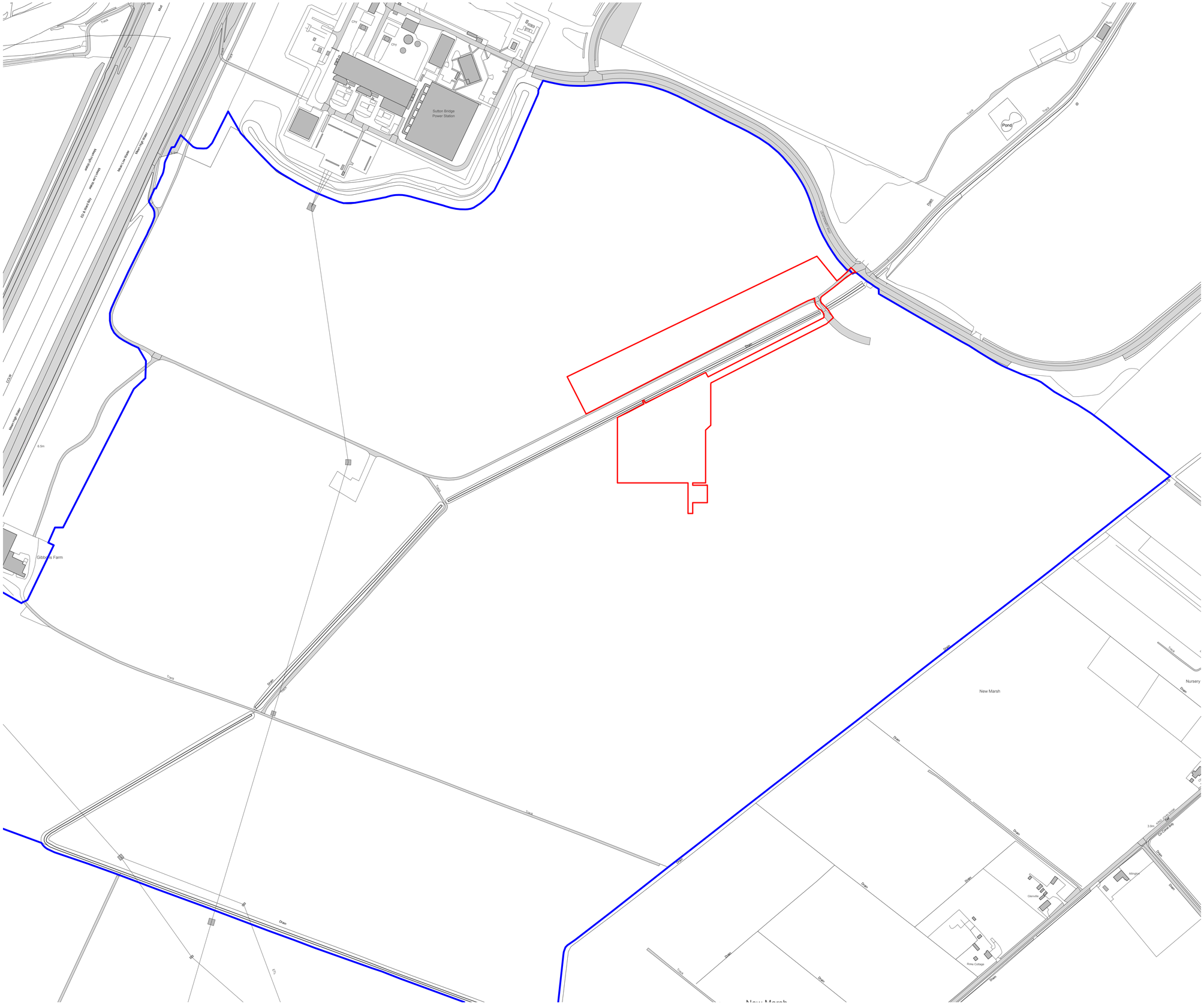
Happy to stay engaged as the development progresses, and think the actions outlined are a reflection of the meeting today.

Thank you again

Dan Moss
Area Manager Prevention & Protection
Lincolnshire Fire and Rescue
Lincolnshire County Council
Fire & Police Headquarters Deepdale Lane Nettleham

Mobile: 07824625253
Email: Daniel.Moss@Lincolnshire.gov.uk
Website: www.lincolnshire.gov.uk

APPENDIX B – SITE LOCATION PLAN



NOTES

1. All details are indicative only.

LEGEND

- PLANNING APPLICATION BOUNDARY - 3.87HA
- LAND UNDER CONTROL OF THE APPLICANT

Rev	Description	Date	Checked
02	RLB adjusted	13.11.24	SRY
01	Draft Issue	12.11.24	SRY

Drawing No.
WAL-EDFR-BESS-CIV-PLN-150.02

Project
Walpole BESS

Title
Site Location Plan

Scale	Drawn by	Checked	Date
1:2500 @A1	JL	SRY	10.09.24

W: www.edf-re.uk
A: Cardinal Place, 80 Victoria Street, London SW1E 5JL