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Outline Battery Safety Management Plan - Radcliffe BESS

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1. Executive Summary

- 1.1 Battery Energy Storage System (BESS) fire safety management is constantly improving, both by way of reduced combustion risk and improved emergency response planning from operators and Fire and Rescue Services (FRS).
- 1.2 BESS facilities are fitted with remote and automatic systems for fire detection, alarms, emergency shut off, venting and fire suppression. New BESS facilities are also designed to contain fires to individual units and prevent cascading thermal events to other containers. As a result, safety related incidents involving BESS facilities are rare in the UK.
- 1.3 This Outline Battery Safety Management Plan (OBSMP) has been developed to support the planning stage of the Radcliffe BESS, assisting Bury Council with their consideration of fire and safety related matters pertaining to the facility.
- 1.4 The OBSMP includes an Outline Emergency Response Plan (OERP) which has been prepared to outline how site operators and first responders will respond to a fire related emergency response, consistent with the NFCC Grid Scale BESS Planning – Guidance for FRS document, dated Nov 2022¹. The plan will be further developed at the pre-commencement stage of the project to deal with broader emergency response scenarios, reflective of occupational health and safety standards found in any industrial type workplace.
- 1.5 The site layout and design has been informed by pre-application consultation undertaken with Greater Manchester Fire and Rescue Service (FRS) and formal written advice received in September 2024 (**Appendix 1**). The advice raised no objection to the proposal, subject to compliance with advice relating to access road standards, provision of an on-site static water tank supply for firefighting purposes, separation between units and vegetation, and emergency/risk management. Further Greater Manchester FRS consultee advice, issued to Bury Council during their consideration of the planning application has also been considered in the preparation of the OBSMP.
- 1.6 The OBSMP, including OERP confirms, that the design, layout and outline emergency response procedure for Radcliffe BESS are consistent with the relevant planning guidance, including the NFCC Grid Scale Battery Energy Storage System Planning Guidance for FRS document, Approved Document B Volume 2 for buildings other than dwellings², and the draft NFCC planning guidance, which was subject to public consultation in August 2024³.

¹ NFCC Grid Scale BESS Planning – Guidance for FRS dated Nov 2022.

² Approved Document B (fire safety) volume 2: Buildings other than dwellings, 2019 edition incorporating 2020, 2022 and 2025 amendments collated with 2026 and 2029 amendments.

³ NFCC [Draft Guidance on Grid Scale Battery Energy Storage Systems](#) (BESS) dated July 2024.



Abbreviations

ARC	Alarm Receiving Centre
BESS	Battery Energy Storage System
BMS	Battery Management System
BS	British Standard
CCTV	Closed Circuit Television
CO	Carbon Monoxide
ERP	Emergency Response Plan
ERP	Emergency Response Plan
EN	European Standards
EES	Electrical Energy Storage Systems
FDSS	Fire Detection and Suppression System
FACP	Fire Alarm Control Panel
FH	Fire Hydrant
IEC	International Electrotechnical Commission
ISO	International Organisation of Standardisation
LIB-BESS	Lithium-Ion Battery Energy Storage System
LCA	Low Carbon Alliance
LFP	Lithium Iron Phosphate
NEC	National Electrical Code
NFCC	National Fire Chiefs Council
NFPA	National Fire Prevention Association
OBSMP	Outline Battery Safety Management Plan
OERP	Outline Emergency Response Plan
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
TR	Thermal Runaway
UK	United Kingdom
UKSI	United Kingdom Statutory Instrument



2. Introduction

- 2.1 This OBSMP has been developed to support the planning application stage of the Radcliffe BESS facility, assisting Bury Council with their consideration of fire safety related matters pertaining to the BESS.
- 2.2 The OBSMP outlines the hazards and risks associated with the Radcliffe BESS facility and recommends strategies to mitigate these risks. The primary response to managing risks is the implementation of preventative measures. However, even with the implementation of best practice preventative measures, there remains a residual risk of battery failure. Therefore, within this document, an OERP has been prepared to establish the emergency response procedures to be carried out by site operators and first responders.
- 2.3 It is proposed that a further detailed Battery Safety Management Plan be prepared at the pre-commencement stage, when the BESS specification is chosen and when the relevant emergency site contacts and the like are known. The battery specification has not been selected at this stage as the technology is constantly improving and may change between now and the time of installation. A detailed BSMP can be secured by planning condition.
- 2.4 The detailed Battery Safety Management Plan will be prepared in consultation with Manchester FRS and will support their own obligations to gather information about fire risks in their area, in accordance with arrangements required under section 7(2)(d) of the Fire and Rescue Services Act (2004). Consultation will also be undertaken with Bury Council and other relevant agencies.



3. Site Description

- 3.1 The application site, located on land to the east of Shore Top Farm, Kearsley Road, Radcliffe, Manchester, is an irregular shaped parcel, measuring approximately 1.39ha in size. The land is situated within a green wedge between Radcliffe, Kearsley, and Outwood.
- 3.2 The site is 850m south west of Radcliffe and 5.5km to the south west of Bury.
- 3.3 The Radcliffe Primary Substation is located 70m to the north of the site. Open grazing land lies to the south and west. Outwood Country Park immediately adjoins the site to the east and consists of dense woodland with footpaths.
- 3.4 The site slopes gently on land situated at approximately 85-90m AOD. The compound area slopes from 90.5m AOD in the southeast to 88.54 in the northwest.
- 3.5 Operational and emergency vehicle access to the site is from Ringley Road West (A667) at the sites southern extent.
- 3.6 The nearest residential receptor is located in a farm house (Yew Tree Farm), approximately 240m to the south the BESS compound area. A row of dwellings is located on Wood Street 320m to the south.
- 3.7 A high voltage (132kv) overhead line crosses the northwestern corner of the site.



4. Proposal

4.1 The proposed development is for a Battery Energy Storage System (BESS) facility comprising the following key components:

- 13 battery containers.
- 2 transformers/invertors
- 1 DNO substation.
- 1 Customer substation.
- 1 Storage container.
- 2.4m high gates and fencing.
- New landscape planting.
- Operational maintenance access via Ringley Road West.
- Construction Access via Wood Street.
- Underground cable connection to the Radcliffe Primary substation to the north.

4.2 A site layout plan for the BESS facility is provided at **Appendix 2**.

4.3 The site will predominately be unmanned, with operational maintenance visits likely to occur twice monthly for planned maintenance and periodic performance checks. Due to the site being predominately unmanned, remote monitoring will be undertaken 24/7, 365 days a year.

4.4 The BESS facility will be equipped with a Fire Alarm Control Panel (FACP), heat, smoke and gas detection with an explosion-proof ventilation system. The BESS cabinets will be fitted with either a dry pipe or aerosol-based suppression system.

5. Legislative and Policy Framework

- 5.1 The relevant policy guidance for the planning stage of a BESS facility is the NFCC Grid Scale Battery Energy Storage System Planning Guidance for FRS document, dated 2022, and Approved Document B Volume 2 for buildings other than dwellings under The Building Regulations 2010. However, it should be noted Approved Document B provides broad guidance for all buildings (other than dwellings) and does not account for the specific fire risks associated with BESS facilities. Therefore, while much of the guidance between the two documents are the same, preference should be given to the NFCC guidance to the extent of any inconsistency.
- 5.2 Additionally, in August 2024 the NFCC consulted on new draft planning guidance, intended to replace the existing 2022 version. However, this new guidance has not yet been adopted and no timeline to do so has been released. Notwithstanding, the new guidance provides additional up to date and useful information not included in the extant 2022 document and therefore has been considered throughout this OBSMP.
- 5.3 The 2022 NFCC Planning Guidance encourages site operators to develop emergency plans and share these with the FRS. The following specific guidance is provided:
- 5.4 **A Risk Management Plan** should be developed by the operator, which provides advice in relation to potential emergency response implications including:
- The hazards and risks at and to the facility and their proposed management.
 - Any safety issues for firefighters responding to emergencies at the facility.
 - Safe access to and within the facility for emergency vehicles and responders, including to key site infrastructure and fire protection systems.
 - The adequacy of proposed fire detection and suppression systems.
 - Natural and built infrastructure and on-site processes that may impact or delay effective emergency response.
- 5.5 **An Emergency Response Plan** should be developed to facilitate effective and safe emergency response and should include:
- How the fire service will be alerted.
 - A facility description, including infrastructure details, operations, number of personnel, and operating hours.
 - A site plan depicting key infrastructure: site access points and internal roads; firefighting facilities; drainage; and neighbouring properties.
 - Details of emergency resources, including fire detection and suppression systems and equipment; gas detection; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment; first aid.
 - Up-to-date contact details for facility personnel, and any relevant off-site personnel.
 - A list of dangerous goods stored on site.

- Site evacuation procedures.
- Emergency procedures for all credible hazards and risks, including building, infrastructure and vehicle fire, grassfire and bushfire.

- 5.6 This OBSMP has been prepared in response to the above guidance to provide certainty to Bury Council that effective emergence response and risk management procedures can be implemented at the Radcliffe BESS facility. A further, further detailed Battery Safety Management Plan will be prepared at the pre-commencement stage.
- 5.7 The exact battery specification has not been chosen at this time, and will be selected at the pre-commencement stage, closer to the time of installation. This approach is necessary due to the constant improvement to BESS technology, which may see the technology change between the time of writing this report and construction. For this reason, the precise nature of the product certification and compliance are unknown. However, battery models investigated for the Radcliffe BESS are compliant with the following standards outlined in **Table 1** below.

Table 1: Battery Safety Standards

Classification		Standards
System	Design Regulations	• NEC – National Electrical Code® • IEEE C84.1 – Standard Preferred Voltage Ratings for Alternating - Current Electrical Systems • IEEE 693 – Recommended Practice for Seismic Design of Substations • IEEE 1584-2018 – Guide for Performing Arc-Flash Hazard Calculations • NFPA 855 – Installation of Energy Storage Systems • NFPA 70E® – Standard for Electrical Safety in the Workplace® • NFPA 72 – National Fire Alarm and Signaling Code • IEC62933-5-2 – Safety requirements for grid-integrated EES systems - Electrochemical-based systems • AS3000 - Electrical installations “Wiring Rules”
	Product Certification	• IEC62619 – Secondary cells and batteries containing alkaline or other • non-acid electrolytes - Safety requirements for secondary lithium • cells and batteries, for use in industrial applications • IEC63056 – Secondary cells and batteries containing alkaline or other

		• non-acid electrolytes - Safety requirements for secondary lithium • cells and batteries for use in electrical energy storage systems • IEC/EN 62477-1 – Safety requirements for power electronic converter • systems and equipment - Part 1: General • IEC/EN 61000 – Electromagnetic compatibility (EMC)
Fire Safety & Protection	Design Regulation	• BS 5839-1 – Fire detection and fire alarm systems for buildings • BS 7273 -1 – Code of practice for the operation of fire protection measures • BS EN 54 Pt1- 21 – series for equipment • BS EN 15004-1:-2019 – Fixed firefighting systems. Gas extinguishing systems. Design, installation and maintenance • BS EN 15004-2:2020 – Fixed Firefighting Systems-Gas Extinguishing Systems FK-5-1-12 • BS 6266:2011 – Fire protection for electronic equipment installations– Code of practice • BS EN 12094-1:2003 – Fixed firefighting systems. Components for gas extinguishing systems Requirements and test methods for electrical automatic control and delay devices
Deflagration	Design Regulation	• BS EN 16009:2011 Flameless Explosive Venting Devices • BS EN 14373:2021 Explosion Suppression Systems • BS EN 14797:2007 Explosion venting Devices



6. Fire and Rescue Consultation

- 6.1 Pre-application consultation was initially undertaken with Greater Manchester Fire and Rescue Service (FRS) in July 2024 via email exchange and formal written advice was received in September 2024 (**Appendix 1**). The FRS advice made no objection to the proposal, subject to compliance with advice relating to access road standards, provision of an on-site static water tank supply for firefighting purpose, separation between units and vegetation, and emergency/risk management.
- 6.2 In response to FRS advice, the BESS design was reconsidered, with key changes including the addition of a secondary access track and the provision of an on-site static water supply for firefighting purposes. The revised access arrangement provides two options for fire tender vehicles to approach the site in the event that smoke affects visibility at one of the access points. The on-site water tank was provided due to a lack of fire hydrants within 350m of the site. The water tank is capable of providing water flow for a minimum 25 litres / second for 120 minutes, consistent with the draft 2024 FRS planning guidance.
- 6.3 To assist Bury Council's consideration of the proposal, a compliance table is provided within **Appendix 3**, confirming how the proposal complies with the guidance offered in the Greater Manchester Fire and Rescue Service advice letter received at the pre-application stage.
- 6.4 Further Greater Manchester FRS advice, issued to Bury Council during their consideration of the planning application has also been considered in the preparation of the OBSMP. The latest FRS advice is largely consistent with that received at the pre-application stage and did not necessitate any further design changes. However, the new advice reiterates and expands on the need for a battery safety management plan and so this OBSMP has been prepared accordingly.
- 6.5 The new advice also includes a new recommendation that a fire hydrant is located within 90m of the site. However, this is contrary to advice previously received from the FRS, that confirmed a static water supply located onsite would be a suitable alternative, consistent with the guidance offered in the 2022 NFCC Grid Scale Battery Energy Storage System Planning Guidance and the draft 2024 FRS Planning Guidance.
- 6.6 The recommendation for a fire hydrant to be located within 90m comes from Paragraph 16.9 of Approved Document B (fire safety) volume 2: Buildings other than dwellings, 2019, which provides broad guidance for all buildings (other than dwellings) and does not account for the specific fire risks associated with BESS facilities. Recognising this, the NFCC Planning Guidance was released in 2022 and a draft update in 2024, which both deal with fire risk management specific to BESS facilities. Both these documents confirm



that an on-site static water supply are a suitable alternative when fire hydrants are not located within 350m of a BESS site. Accordingly, an on-site water tank has been included in the design, as outlined in detail in the compliance table at **Appendix 3**.

7. Hazards and Potential Risks

- 7.1 The hazards and risk associated with BESS facilities in the event of a fire relate to the potential for high temperatures, fire, explosion, pressure build up, release of toxic gases, projectiles, electrical hazards, corrosive gases and chemical spills⁴. The potential causes of such risks include:
- Manufacturing or installation errors.
 - Damage to battery cells due to environmental effects (dust, humidity, salt water, lightning strikes etc.).
 - Electrical faults such as overcharging or deep discharge, electrical arcs.
 - Ageing and lithium dendrite formation.
 - Mechanical Impact e.g. collision.
 - External fire which spreads to the BESS.
 - Over / Under Temperatures.
 - Incidents caused by human factors during maintenance.
 - Vandalism, Cyber attacks.
- 7.2 The primary response to managing these risks is the implementation of preventative measures, including manufacturing and construction/installation standards, regular and effective maintenance routines, appropriate site selection and layout, remote monitoring, automatic detection, venting and shutdown, and security (physical and cyber).
- 7.3 Despite the implementation of best practice preventative measures, there remains a residual risk of battery failure and therefore appropriate Emergency Response procedures must be established to enable an effective response. An Outline Emergency Response Plan has been prepared at Section 8 of this report and has been informed by the hazards and risks outlined above.
- 7.4 A schedule of Dangerous goods likely to be present at the site is provided at **Appendix 4**. The exact type and quantity of materials will be confirmed in the detailed BSMP. General management principles relating to the storage, management and handling of dangerous goods include:
- Segregate incompatible classes (e.g., flammables from oxidisers, corrosives from metals).
 - Provide adequate ventilation to prevent vapour accumulation.
 - Use fire-resistant, bunded storage for liquids.
 - Clearly label all dangerous goods with UN numbers, hazard pictograms, and expiry dates.
 - Train all staff in hazard awareness and emergency procedures.

⁴ Gronland, Quant et al RISE Report 2023:117



- Carry out regular inspections for leaks, corrosion, and container integrity.
- Establish spill response procedures with appropriate kits.
- Restrict access to authorised personnel only.
- Always wear task-specific PPE (gloves, goggles, face shield, flame-resistant clothing as appropriate).
- Use mechanical aids to avoid manual handling injuries when moving heavy battery modules.
- De-energise and isolate electrical systems before maintenance.

7.5 An up-to-date Dangerous Goods Register will be maintained for the life of the development along with Safety Data Sheets (SDS) on-site and in the control room.



8. Outline Emergency Response Plan

- 8.1 The following Outline Emergency Response Plan (ERP) has been developed to support the planning application phase of the Radcliffe BESS project. The final version of the ERP will be developed in more detail with further consultation from relevant stakeholders at the pre-commencement stage of the project.
- 8.2 The purpose of the ERP is to present the necessary information required by the BESS operating personnel responding to a fire incident at the site, in a readily available and easy to read format. The guide will also be used by first responders, including Greater Manchester Fire Services to coordinate their response with the practices to be implemented by the BESS operating personnel. The ERP has been prepared specifically to address fire related emergency response, consistent with the 2022 NFCC Planning Guidance. The plan will be further developed at the pre-commencement stage to deal with broader emergency response scenarios reflective of operational health and safety standards found in any industrial type workplace.
- 8.3 The main objectives of the Outline ERP for Radcliffe BESS are to:
- Contain and control an incident to minimise the effects, and to limit damage to persons, the environment and property.
 - Identify the key organisations and operator staff and their respective roles when responding to an incident.
 - Communicate the necessary information to the emergency services and authorities concerned in the area.
 - Provide information on the risks and hazards presented on site, alongside detail of risk management, detection, mitigation and response measures in place.

I. Emergency Contact Details

- 8.4 Access to key emergency contact details is essential to effective and timely emergency response. The following emergency contact details relevant to the site are summarised Table 2 below. A number of key contacts are yet to be identified and will be nominated in the final plan.

Table 2: Emergency Contact Details

Organisation	Contact Details	Role
Alarm Receiving Centre (ARC)	TBC	Notify emergency services and Operational Control Centre of incident.
Asset Manager Control Centre	TBC	Notify emergency services and sensitive receptors.
Key Holder	TBC	Attend site and allow entry to the First Responders.
Site Manger	TBC	Attend site and assist FRS.
Greater Manchester Fire and Rescue Service	999 for emergencies or 0800 555 815 non-emergency.	Incident command, implementing a controlled burn and monitoring.
Greater Manchester Police	999 for emergencies or 101 for non-emergency.	Traffic control restriction of public entry and other support.
North West Ambulance Service	999	Emergency medical assistance.
Greater Manchester Resilience Unit	0161 778 7000 contingencies.agma@manchester.gov.uk	Consultee for strategic advice and preparation of the detailed BSMP.
National Grid Control Centre	0800 404090	Respond to incident and enact their own emergency response measures, as required.
Local Electricity: Electricity Northwest	0800 195 4141	Respond to incident and enact their own emergency response measures, as required.

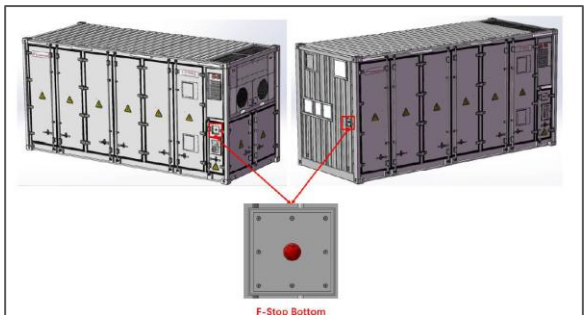


Bury Council	0161 253 6606 (24-hour contact)	Respond to incident and enact their own emergency response measures, as required and Consultee for strategic advice and preparation of the detailed BSMP.
United Utilities	0345 672 3723 (24-hour contact)	Respond to incident and enact their own emergency response measures, as required.

II. Key Site Information

- 8.5 Key site information relevant to emergency responders are presented in Table 3 below. The information will form part of a quick reference guide to be used by site operators and emergency responders, assisting them to locate the site and key resources/features.

Table 3: Site Information

Address	Land to the east of Shore Top Farm, Kearsley Road, Radcliffe, M26 1FA.
What.Three.Words Compound Location	talked.yoga.senses
What.Three.Words Ringley Road W Access Point	volume.wakes.lucky
Battery Technology	TBC – The final contractors and suppliers have not yet been selected. However, the battery system is expected to use Lithium-ion cell technology.
Emergency Stop Button	TBC – Expected to be located on the front and side of each battery container, as illustrated in the image below. 
Fire Fighting Equipment	Automatic dry pipe or aerosol-based suppression system. On-site water tank capable of holding 203m³ (203,000 litres) and discharging a minimum 25 litres / second for 120 minutes.
First Aid Equipment	Defibrillator. First Aid Kit. Burns Kit. Eye Wash Kit. Electrical Rescue Kit.
Environmental Protection	Spill containment equipment.



- 8.6 Further site information will be sign-posted across the site area in visible locations to aid emergency responders. Signage will be installed on the outside of each BESS unit identity clearly identify the presence of a BESS system and broader safety signage will be installed in accordance with Health and Safety (Safety Signs and Signals) Regulations 1996. Signage should also include details of:
- Relevant hazards posed.
 - The type of technology associated with the BESS.
 - Any suppression system fitted.
 - 24/7 Emergency contact information signs on the exterior of a building or enclosure.
- 8.7 Emergency responders will be provided with a detailed site plan confirming the layout of the facility, fixed plant locations, access routes, water supplies, drainage systems, hazardous material storage, waste storage, location of spill kits and any other site-specific considerations identified during the final detailed design of the facility⁵. The detailed site plan will be prepared at the pre-commencement stage when the aforementioned details are confirmed, including their exact location on site.
- 8.8 A detailed sensitive receptor map will be produced at the pre-commencement stage to identify all sensitive receptors within a 1km radius of the site that could be affected by a fire event. An Outline Sensitive Receptor Map (**Appendix 5**) has been prepared outlining the relevant receptors⁵, including:
- Schools, hospitals, nursing and care homes.
 - Residential areas.
 - Workplaces.
 - Protected habitats including Sites of Special Scientific Interest (SSSI) and Ancient Woodlands.
 - Watercourses and reservoirs.
 - Roads, pylons and utilities immediately adjacent the site.
- 8.9 The Outline Sensitive Receptor Map confirms there are no schools, hospitals, nursing or care homes within 1km of the site. Several Public footpaths intersect or are located near the site. However, the King George V playing fields which would be used by school children is approximately 750m east from the site. There are a number of workplaces and houses mapped within 1km of the site. Ashclough SSSI is located approximately 1km to the west of the site and two areas of Ancient Woodland to the south. Outwood Country Park is located immediately to the east. Watercourses, ponds and reservoirs have also been mapped, with notable features including the River Irwell 240m to the north and Shore Top Reservoir 750m to the northwest. There are no known, boreholes, wells and springs supplying water for human consumption within 1km of the site. A high voltage powerline

⁵ NFCC [Draft Guidance on Grid Scale Battery Energy Storage Systems](#) (BESS) dated July 2024.

crosses the northeast corner of the site but avoids the compound area. The map also shows the prevailing wind direction, which is from the south.

III. Site Access

- 8.10 Access arrangements are shown in the site layout plan shown in Figure 1 below and **Appendix 2**. Emergency access to the site will be from Ringley Road West, from here the maintenance access track follows northeast adjacent Yew Tree Farm before turning north and traversing across the field on dedicated site access tracks. Responders should be mindful that the maintenance access track is shared with Shore Top Farm and Yew Tree Farm and is also a public right of way. The approach towards the facility forks off in two directions, one to the west and the other to the east of the compound, enabling alternate options in the event smoke reduced visibility at one of the access points⁶.
- 8.11 The site will ordinarily be locked and gated and therefore attendance by operational staff will be required to assist emergency responder access. However, it is expected that emergency responders will be equipped with the tools needed to force entry into the site if they are first in attendance.

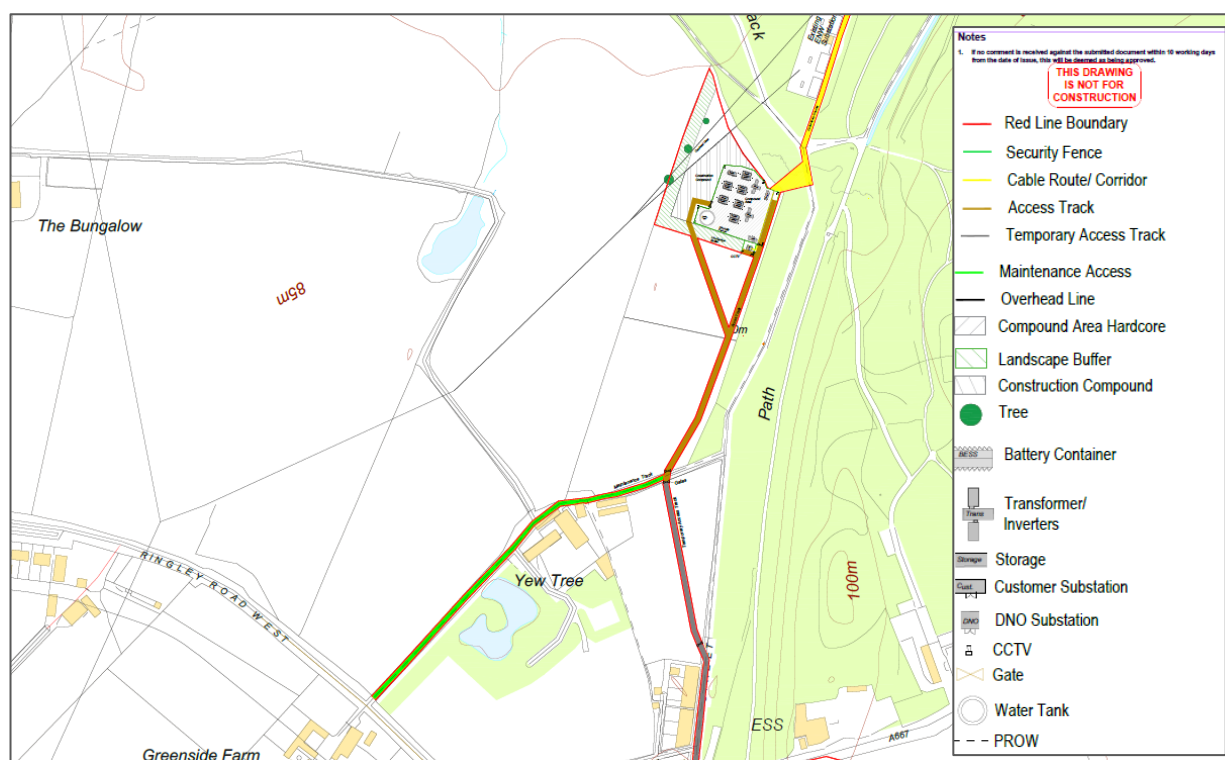


Figure 1: Site Layout Plan

⁶ Approved Document B (fire safety) volume 2: Buildings other than dwellings, 2019 edition incorporating 2020 and 2022 amendments.

V. Suppression Systems

- 8.14 The primary role of a fire suppression system in a BESS is to prevent a fire in the ancillary electrical equipment spreading to the battery modules. It may have a limited effect to protect the BESS from an external fire spreading to it, as any suppression, regardless of type, will have little effect on a thermal event within the battery cell. It is important to note that the recommended method of fire control in a lithium battery thermal runaway event should not involve extinguishing attempts using water. Rather, a controlled burn method is preferred, with water cooling of surrounding structures to prevent fire spread. This approach reflects contemporary design standards for BESS facilities which prevent fire spread, even when units are located close together.
- 8.15 The BESS cabinets will be fitted with either a dry pipe or aerosol-based suppression system, which can be activated automatically or remotely. The final suppression system is yet to be chosen but will be compliant with the following British Standards:
- BS EN 12094-1:2003 – Fixed firefighting systems. Components for gas extinguishing systems Requirements and test methods for electrical automatic control and delay devices.
 - BS 7273 -1 – Code of practice for the operation of fire protection Measures.
 - BS 5839-1 – Fire detection and fire alarm systems for buildings.
 - BS EN 15004-1:2019 – Fixed firefighting systems. Gas extinguishing systems. Design, installation and maintenance.
 - BS EN 15004-2:2020 – Fixed Firefighting Systems-Gas Extinguishing Systems FK-5-1-12.
 - BS 6266:2011 – Fire protection for electronic equipment installations– Code of practice.

VI. Detection and Monitoring

- 8.16 An effective and appropriate method of early detection of a fault within the batteries is an essential feature to enable quick and effective response to an emergency.
- 8.17 The BESS will be fitted with heat, smoke and gas detection. This is coupled with automatic or remote emergency shut off, fire suppression and venting capabilities. The detection systems will be compliant with 'BS 5839-1 – Fire detection and fire alarm systems for buildings' and 'BS EN 12094-1:2003 – Fixed firefighting systems Components for gas extinguishing systems Requirements and test methods for electrical automatic control and delay devices'.
- 8.18 External audible and visual warning devices could also be fitted to allow first responders to identify and understand the warning and aid their decision making and response plan.



VII. Deflagration Protection

- 8.19 BESS facilities carry an unlikely but possible risk of explosion where preventative measures fail. For this reason, BESS containers are fitted with explosion protection or deflagration venting. As outlined in the detection and monitoring section above the BESS facility will be fitted with gas detection and automatic/remote activated ventilation to mitigate this risk. When the combustible gas concentration is equal to or higher than 25% LEL (Lower explosive limit), an alarm will be raised and trigger the / ventilation system to exhaust gas. If the combustible gas concentration rises above 50% LEL, a second alarm will be triggered and automatically shutdown the system⁷.
- 8.20 The fitted deflagration systems will be compliant with 'BS EN 16009:2011 Flameless Explosive Venting Devices', 'BS EN 14373:2021 Explosion Suppression Systems', 'BS EN 14797:2007 Explosion venting Devices' and NFPA 855 – Installation of Energy Storage Systems.
- 8.21 It is recommended that an explosion / deflagration strategy is included within the final detailed Emergency Response plan, to be prepared at the pre-commencement stage. This will allow the specifications of the selected battery to be taken into consideration, including any specific explosion protection and deflagration venting controls.

VIII. Fire Water Management

- 8.22 Surface water runoff of firefighting water will be directed to a holding pond located to the southwest of the compound, as shown in the outline site drainage strategy at **Appendix 6**. The water will be held in the pond to prevent runoff of fire water into nearby water courses. This water will also be available for re-use during the fire event, if required.
- 8.23 Upon resolution of the incident, the water will be tested to confirm if any contamination is present. If contamination is found within the water, a tanker will remove the water for disposal in a safe manner. This process will be repeated until tests come back at acceptable levels.
- 8.24 A detailed site drainage strategy will be prepared at the pre-commencement stage, providing a further opportunity to include further surface water runoff water quality treatment and fire water runoff controls.

⁷ BS EN 16009:2011 Flameless Explosive Venting Devices; BS EN 14373:2021 Explosion Suppression Systems; BS EN 14797:2007 Explosion venting Devices.

IX. Emergency Response Actions - BESS Container Fire

8.25 In the event of a BESS container fire, the following key actions will be taken to detect and manage the risk, support emergency services and undertake the necessary recovery actions.

8.26 Detection & Alert

- Automated systems detect abnormal conditions:
 - Fire detection (aspirating smoke, heat, CO).
 - Gas detection (flammable / toxic gases).
 - Battery management system (BMS) alarms (overheating, voltage anomalies).
 - Immediately sends alarms to the 24/7 control room.
- Remote Monitoring Control Room:
 - Operator classifies severity: minor fault, critical fault, or fire/thermal runaway.
- On-site operator detects abnormality (if present):
 - Visible flames, smoke or overheating.
 - Abnormal reading or measurement.
 - Operator classifies severity: minor fault, critical fault, or fire/thermal runaway.

8.27 Initial Response

- Control room operator:
 - Confirm alarm via CCTV (if installed) or system diagnostics.
 - Isolate systems remotely: open breakers, shut down affected battery racks/containers, engage emergency stop systems.
 - Notify emergency services:
 - Call Greater Manchester Fire & Rescue Service.
 - Provide site address & access instructions.
 - Notify asset manager.
- On-site operator (if present):
 - Stop work immediately.
 - Activate nearest emergency stop (if safe to do so).
 - Raise alarm to alert all staff on site.
 - Notify Control Room.
 - Call Emergency Services (999) and provide site details.
 - Evacuate to designated muster point upwind of hazard and account for personnel.

8.28 Key Holder Mobilisation (if on-site operator not present)

- On-call key holder/site manager dispatched to site.
- On arrival:
 - Meet emergency services at the gate.
 - Unlock and secure access for Fire & Rescue.
 - Remain on standby outside the hazard zone.

8.29 Emergency Services Response

- Fire & Rescue Service takes Incident Command.
- Site access is restricted – only authorised personnel permitted.
- Control room and/key holder/operator provides:
 - Site layout map with hazards and shut-off points.
 - Sensitive receptor map.
 - Battery datasheets (chemistry, hazards).
 - Run-off containment details.
- Firefighting approach is expected to adopt a controlled burn method with cooling of adjacent equipment to prevent spread and monitoring until the fire burns out.

8.30 Post-Incident Handover

- Fire & Rescue maintains site control until:
 - Incident is declared over.
 - Hazards are neutralised.
- Formal handover:
 - Site returned to site manager or delegated representative.
 - Fire & Rescue leaves the scene.

8.31 Recovery Actions

- Specialist inspection by electrical & chemical engineers.
- Battery disposal & environmental remediation by licensed contractors.
- Incident report completed and Emergency Response Plan updated.
- System restart only after formal safety clearance.
- Ongoing engagement with impacted neighbours.

X. Unmanned Site Emergency Response Action Plan

8.32 The above listed actions cover scenarios both where the site is manned and unmanned during a fire event. The site will be predominately unmanned, with operational maintenance visits likely to occur twice monthly. Should an emergency event occur whilst operators are not attending the site, the Unmanned Emergency Response Action Plan shown in Figure 3 summarises the specific steps to be taken in this scenario.

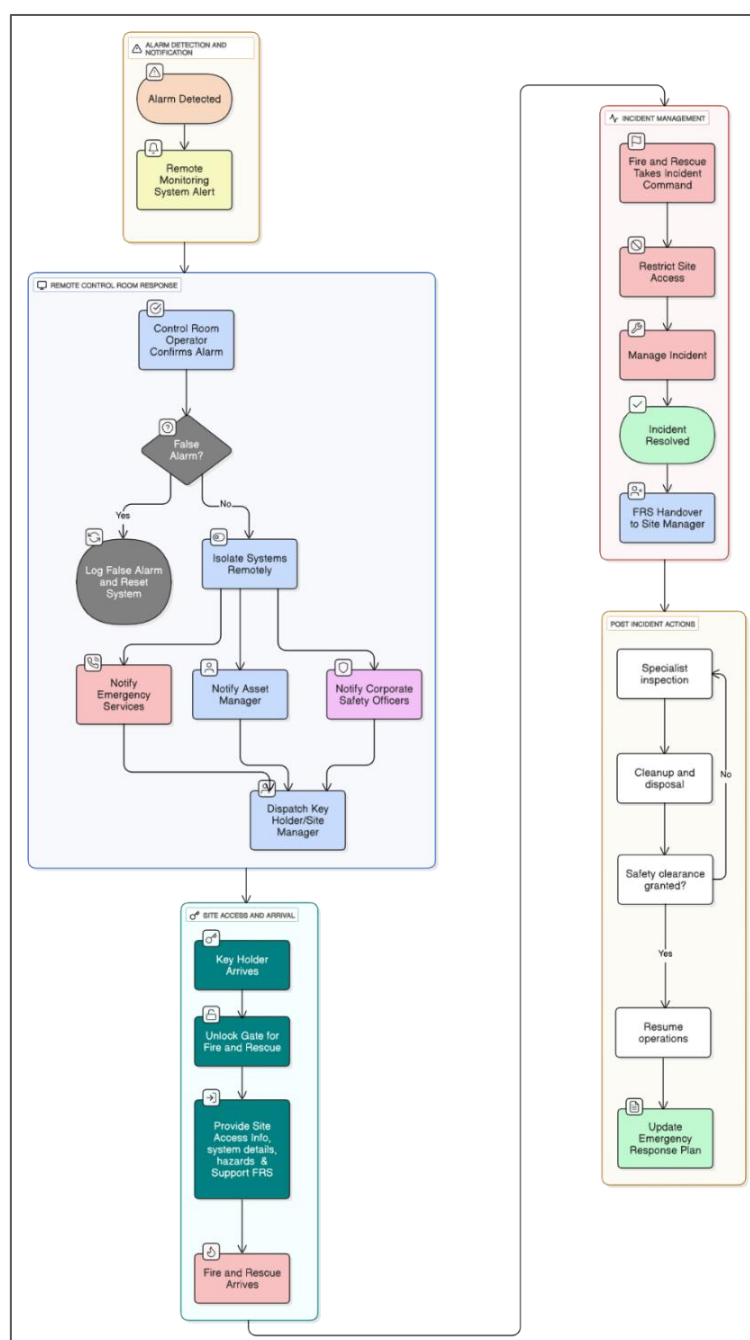


Figure 3: Unmanned Emergency Response Action Plan

XI. Manned Site Emergency Response Action Plan

8.33 As mentioned above, the site will predominately be unmanned, with operational maintenance visits likely to occur twice monthly. Notwithstanding, the site may be manned in the event of an emergency incident and so the Manned Emergency Response Action Plan shown in Figure 4 below summarises the steps to be taken in this scenario.

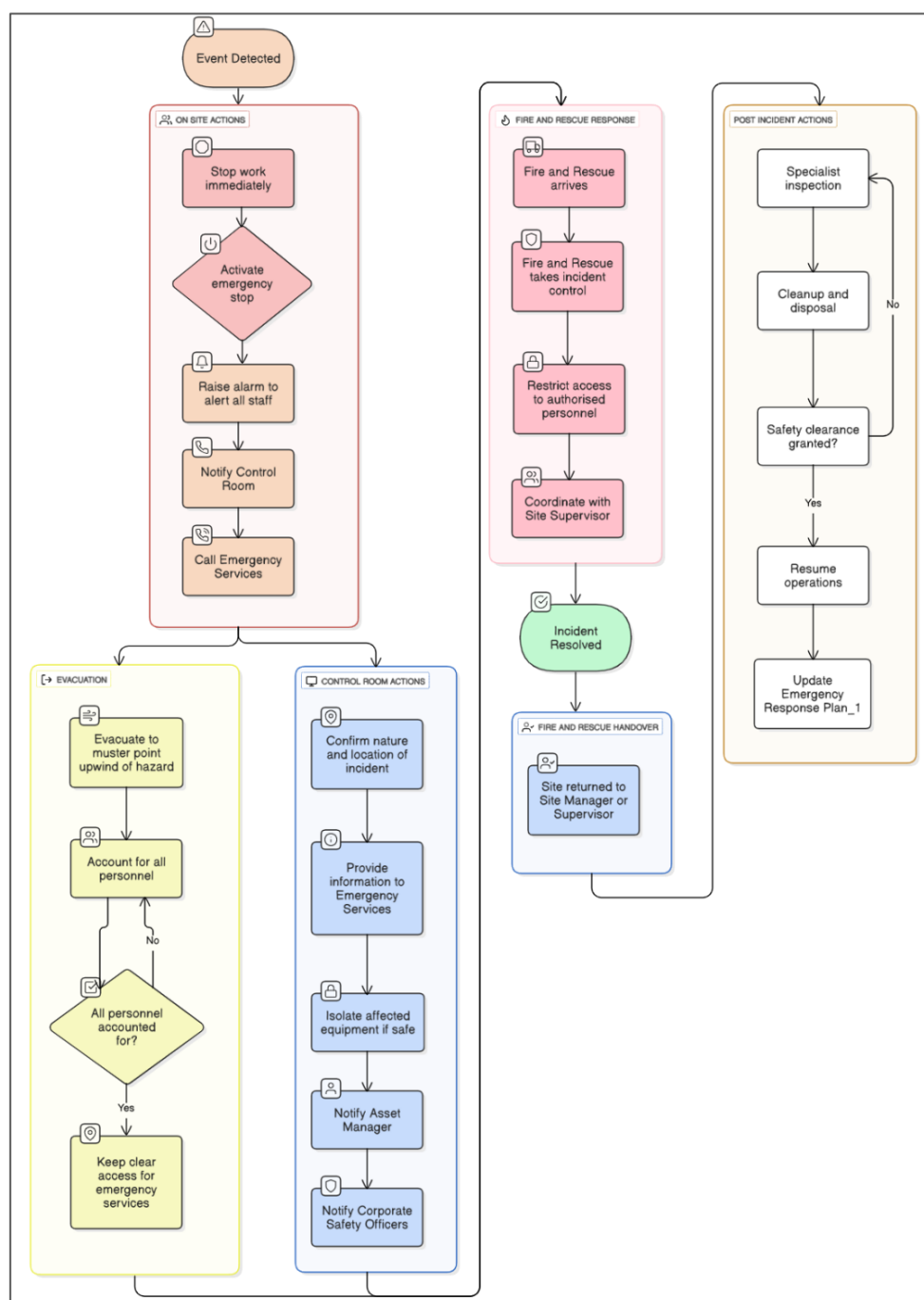


Figure 4: Unmanned Emergency Response Action Plan



9. Conclusion

- 9.1 This OBSMP has outlined the hazards and risks associated with the Radcliffe BESS Facility and recommended strategies to mitigate these risks. The primary response to managing risks is the implementation of preventative measures, including manufacturing and construction/installation standards, regular and effective maintenance routines, appropriate site selection and layout, remote monitoring and use of automatic detection and shutdown and security (physical and cyber). However, despite the implementation of best practice preventative measures, there remains a residual risk of battery failure. Therefore, an OERP has been prepared to establish the emergency response procedures to be carried out by site operators and first responders, ensuring the contain and control of the incident to minimise the effects, and to limit damage to persons, the environment and property.
- 9.2 The OBSMP, including OERP confirms that the design, layout and outline emergency response procedure for Radcliffe BESS are consistent with the NFCC Grid Scale Battery Energy Storage System Planning Guidance for FRS document, Approved Document B Volume 2 for buildings other than dwellings under The Building Regulations 2010 and the draft NFCC planning guidance, which was subject to public consultation in August 2024.
- 9.3 It is proposed that a further detailed Battery Safety Management Plan be prepared at the pre-commencement stage, when the BESS specification is chosen and when the relevant emergency site contacts and the like are known. The detailed Battery Safety Management Plan will be prepared in consultation with Manchester FRS, Bury Council and other agencies deemed relevant. This can be secured via planning condition.



Appendix 1: Greater Manchester FRS Pre-Application Consultation Letter



Your Reference N/A

Our Reference N/A

Contact Dave Morris
morridw@manchesterfire.gov.uk

Chief Fire Officer
Dave Russel, BSc, MIFireE

Greater Manchester Fire and Rescue
Service
146 Bolton Road
Swinton
Manchester
M27 8US

Tel: 0161 736 5866
www.manchesterfire.gov.uk

Proposed BESS site
Shore Top Farm
Off Wood Street
Ringley Road West.

For the attention of Claudia Dietz

17th September 2024

Dear Claudia,

Planning Application No:	N/A
Address:	Shore Top Farm Off Wood Street Ringley Road West
Proposal:	BESS site Shore Top Farm

The following is a pre planning consultation, and **not a full planning response** hence the following advice is somewhat generalised utilising the information currently available.

The information provided below is taken from the NFCC Grid Scale Battery Energy Storage System Planning Guidance for FRS document, and Approved Document B Volume 2.

With your planning application, please provide as much information as you are able in relation to items listed below and within System Design 1-12 of the current NFCC document.

The Fire Service requires vehicular access for a fire appliance to within 45m of **all** points on site.

Access roads on and to the site should be a minimum width of 4.5m and capable of carrying a minimum of 12.5 tonnes. Additionally, if the access road is more than 20m long a turning circle, hammerhead, or other turning point for fire appliances will be required. The maximum length of any cul-de-sac network should be 250 m.

Access to site should include:

- At least 2 separate access points to the site to account for opposite wind conditions/direction.
- Roads/hard standing capable of accommodating fire service vehicles in all weather conditions. As such there should be no extremes of grade.
- A perimeter road or roads with passing places suitable for fire service vehicles.
- Road networks on sites must enable unobstructed access to all areas of the facility.
- Turning circles, passing places etc size to be advised by FRS depending on fleet.

As a minimum, it is recommended that hydrant supplies for boundary cooling purposes should be located close to BESS containers. There should be a hydrant capable of providing a minimum of 1900 litres per minute for at least 2 hours as close as practicable to the units. The current nearest hydrant is plate number 37002014, located opposite 110 Ringley Road West, junction of Wood Street, **this is in excess of 350m of the proposed site, meaning that further hydrants or an alternative water provision will be required.**

Any provided/proposed-on site water tanks need to be clearly signed, clearly visible and always accessible.

Consideration and provisions of adequate water supplies to support any proposed/provided suppression systems.

A standard minimum spacing between units of 6 metres is suggested unless suitable design features can be introduced to reduce that spacing. If reducing distances a clear, evidence based, case for the reduction should be shown, this maybe reduced with the provision of suppression systems and information from an engineer /expert detailing the rationale for the reduction on distance.

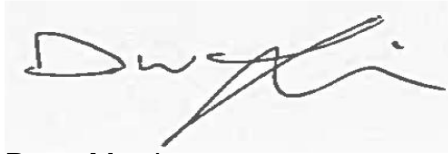
It is recommended that any combustible vegetation within 10m of the units is cleared and kept clear.

Provide any site specifics emergency response and risk management plans, detailing advice in relation to emergency response implications, giving as much information as possible with regards site contacts/specialists etc.

Due to the proposed location of this site it is strongly recommended that you liaise with the following agencies, Electricity North West, United Utilities, The Environment Agency, this is not an exhaustive list.

Please don't hesitate to contact me if I can be of any further assistance.

Yours sincerely

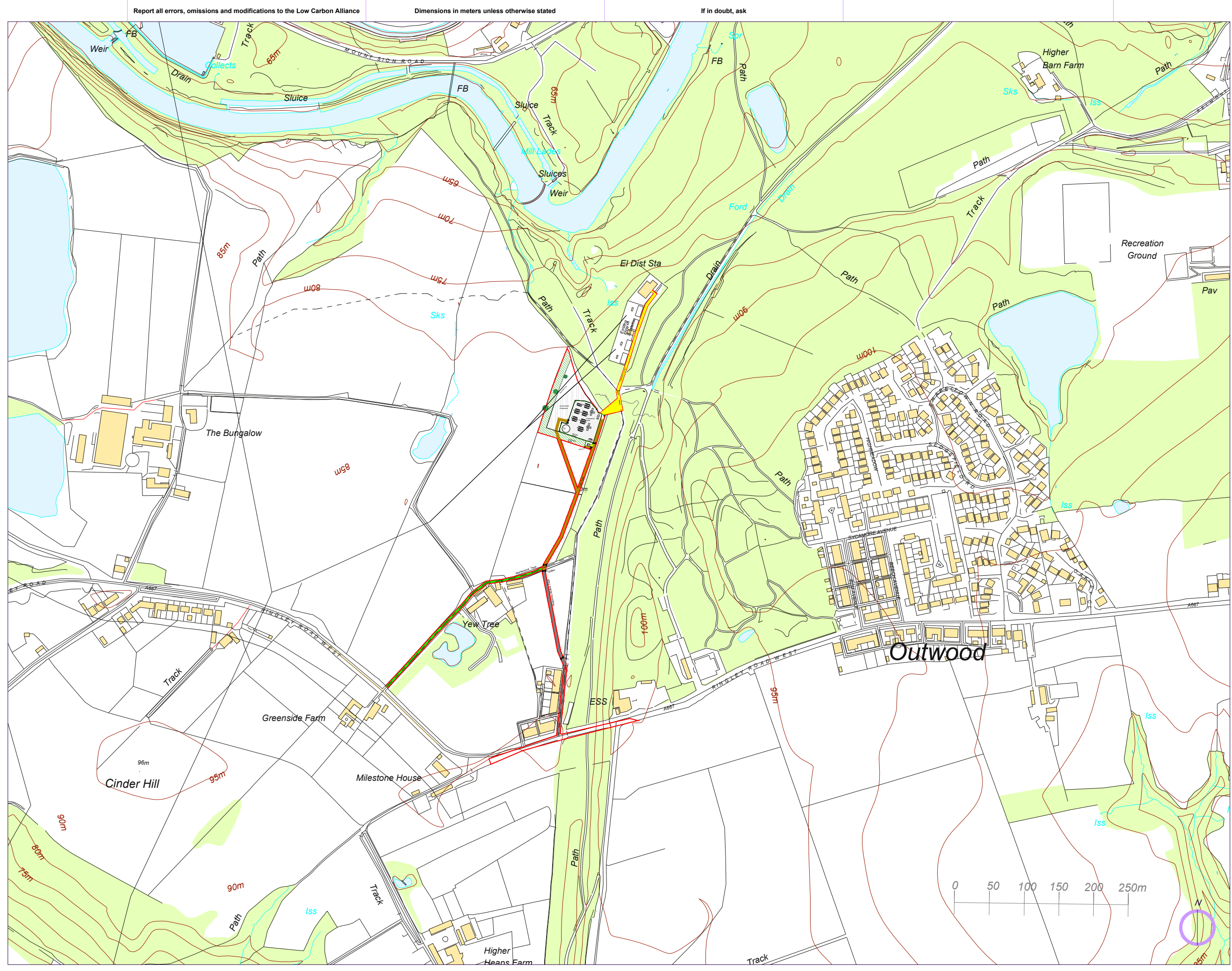
A handwritten signature in black ink, appearing to read 'Dave Morris', with a stylized flourish at the end.

Dave Morris
Fire Safety Enforcement Officer
Greater Manchester Fire and Rescue Service

On behalf of the Greater Manchester Combined Authority



Appendix 2: Site layout Plan



Report all errors, omissions and modifications to the Low Carbon Alliance

Dimensions in meters unless otherwise stated

If in doubt, ask

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Notes

1. If no comment is received against the submitted document within 10 working days from the date of issue, this will be deemed as being approved.

THIS DRAWING IS NOT FOR CONSTRUCTION

- Red Line Boundary
- Security Fence
- Cable Route/ Corridor
- Access Track
- Temporary Access Track
- Maintenance Access
- Overhead Line
- Compound Area Hardcore
- Landscape Buffer
- Construction Compound
- Tree
- Battery Container
- Transformer/ Inverters
- Storage
- Customer Substation
- DNO Substation
- CCTV
- Gate
- Water Tank
- PROW

Drawn By	Checked By	REV	016
MSTP	PC		
Date	Approved By		
24.07.2025	PC		

PROJECT	Radcliffe BESS
TITLE	Proposed Site Layout
CLIENT	Taiyo Power & Storage Ltd.

STATUS		
Sheet No	Overall Plan	Sheet Size
ENTERSHEETNO	1	A3
Scale	Drawing Number	
1:5000	121-10003	



Appendix 3: Compliance Table - FRS Requirements



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Appendix 3: Compliance Table - FRS Requirements

No.	Requirement	Design Response
Access		
1	Vehicular access for a fire appliance to within 45m of all points on site.	The proposed access roads and compound layout facilitate access for a fire appliance within 45m of all points on site, as shown in the swept path analysis at Appendix K of the Construction Traffic Management Plan (CTMP) submitted with the application.
2	Access roads on and to the site should be a minimum width of 4.5m and capable of carrying a minimum of 12.5 tonnes.	The proposed access roads match the minimum 4.5m access width. The access roads have been designed to carry the minimum 12.5 tonne vehicle, using a 300mm sub-base and 50mm granite chipping surface layer. A cross-section plan of the access road is shown in drawing no. 121-10008, Revision 4, dated 06.08.2025, prepared by MSTP. This plan supersedes the earlier Revision 3 plan, which had incorrectly shown a 4m width. The new plan now matches the red line boundary which already had a 4.5m width.
3	If the access road is more than 20m long a turning circle, hammerhead, or other turning point for fire appliances will be required. The maximum length of any cul-de-sac network should be 250m.	The access road is more than 20m long and therefore a turning point for the fire appliance is required. Sufficient manoeuvring areas are available for a fire tender vehicle to enter the hardcore compound and turn around, as shown in the swept path analysis at Appendix K of the CTMP submitted with the application. The proposal does not include a cul-de-sac and so the 250m standard is not applicable.
4	At least 2 separate access points to the site to account for opposite wind conditions/direction.	The proposal includes an access arrangement with two approaches, one from the west and another from the east, as shown in the site layout plans. The



		proposed access arrangement provides two options for fire tender vehicles in the event that smoke effects visibility on one of the access approaches.
5	Roads/hard standing capable of accommodating fire service vehicles in all weather conditions. As such there should be no extremes of grade.	The existing and proposed access track is an all-weather surface track with no steep topography. The maximum slope does not exceed 5.6% (approximately 1:18 grade).
6	A perimeter road or roads with passing places suitable for fire service vehicles.	The access road acts as a perimeter road on the southern, eastern and western sides of the compound. Areas for suitable passing of fire tender vehicles exist at several points along the access track, including a dedicated passing bay adjacent Yew Tree Farm and at any point along the field crossing.
7	Road networks on sites must enable unobstructed access to all areas of the facility.	The access road provides an unobstructed path for vehicles to access the compound, as shown in the swept path analysis at Appendix K of the CTMP submitted with the application.
8	Turning circles and passing places.	As outlined against requirement 6 above, there is a dedicated passing bay adjacent Yew Tree Farm, as well as other informal opportunities. Additionally, passing can be undertaken at any point along the field crossing. Swept Path Diagrams are included within Appendix K of the CTMP showing the turning circles of the fire tender vehicles can be accommodated within the access tracks and site compound.
Water Supply		
9	Where a fire hydrant is not available within 350m of the site, a hydrant or an alternative water provision will be required.	Advice received in the Greater Manchester Fire and Rescue Service letter at Appendix 1 confirms that there are no fire hydrants within 350m of the compound area and therefore requested an on-site water tank is provided. Accordingly, an on-site water tank capable of holding 203m ³ (203,000 litres) of water is proposed, which is in excess of the 180,000 litres specified in the 2024 consultation draft of the NFCC criteria.



10	On site water tanks need to be clearly signed, clearly visible and always accessible.	The water tank is proposed to be located within the compound with a 9m clearance to the nearest battery. The location is clearly visible on approach to the site and accessible to a fire tender vehicle, as shown in the swept path analysis at Appendix K of the CTMP submitted with the application. Suitable signposting will be installed to ensure the location of the water tank is clear.
11	Consideration and provisions of adequate water supplies to support any proposed/provided suppression systems.	The BESS cabinets will be fitted with either a dry pipe or aerosol-based suppression system, neither of which require a water supply. The final suppression system is yet to be chosen but will be compliant with the following British Standards: • BS EN 12094-1:2003 – Fixed firefighting systems. Components for gas extinguishing systems Requirements and test methods for electrical automatic control and delay devices. • BS 7273 -1 – Code of practice for the operation of fire protection Measures. • BS 5839-1 – Fire detection and fire alarm systems for buildings. • BS EN 15004-1:-2019 – Fixed firefighting systems. Gas extinguishing systems. Design, installation and maintenance. • BS EN 15004-2:2020 – Fixed Firefighting Systems-Gas Extinguishing Systems FK-5-1-12. • BS 6266:2011 – Fire protection for electronic equipment installations– Code of practice.
Separation Distances		
11	A standard minimum spacing between units of 6 metres is suggested unless suitable design features can be introduced to reduce that spacing. If reducing distances a clear, evidence based, case for the reduction should	The battery units have been placed back to back, with 0.2m separation, consistent with standard industry practice and the manufacturers specifications. The manufacturer specification allows for 0m separation between battery units as the Heat Flux studies they have conducted demonstrate that fires will be contained to one unit even when placed back to back with no separation. The aim of the 6m separation requirement is



	be shown, this maybe reduced with the provision of suppression systems and information from an engineer /expert detailing the rationale for the reduction on distance.	described in the 2022 NFCC guidance as one of the primary tactics employed to prevent further unit to unit fire spread and is based on a 2017 study that is no longer reflective of the fire safety improvements that have been made since then. Since 2017, the technology has developed with new models released that don't require any separation and for this reason, the 2024 consultation draft of the NFCC criteria no longer includes the 6m requirement and instead states that an emergency response plan should demonstrate there is adequate separation between the BESS enclosures. Moreover, automatic suppression systems are provided and manoeuvring areas of 5m and 6m are still available in the areas surrounding the back to back units, allowing firefighter access. Taking into account the draft NFCC guidance and the manufacturers specifications, the 0.2m separation is deemed appropriate.
12	Any combustible vegetation within 10m of the units is cleared and kept clear.	The minimum distance between the battery units and the nearest vegetation is 10m, as shown on the Proposed Site Layout Compound Area submitted with the application (drawing 121-10002, Revision 014, dated 20.03.25, prepared by MSTP).
Emergency Response Management		
13	Provide any site specific emergency response and risk management plans, detailing advice in relation to emergency response implications, giving as much information as possible with regards to site contacts/specialists.	It is appropriate to prepare the emergency response and risk management plan at the pre-commencement stage, when the exact battery storage specification is chosen and when the relevant emergency site contacts and the like are known. The battery specification has not been selected at this stage as the technology is constantly improving and may change between now and the time of installation. The applicant would be accepting of a suitably worded condition requiring the submission of an emergency response and risk management plan. The plan will be prepared in consultation with Greater Manchester FRS and at a minimum, include the following information:



		• How the FRS will be alerted. • A facility description, including infrastructure details, operations, number of personnel and operating hours. • A site plan depicting key infrastructure: site access points and internal roads, firefighting facilities (water tanks, pumps, booster systems, fire hydrants, fire hose reels etc), drainage, and neighbouring properties. • Details of the emergency response co-ordinator including the subject matter expert for the site. • Safe access to and within the facility for emergency vehicles and responders, including to key site infrastructure and fire protection systems. • Details and explanation of warning systems and alarms on site and locations of alarm annunciators with alarm details (smoke, gas, temperature). • Hazards and potential risks at the facility and details of their proposed management. • The role of the FRS at incidents involving a fire, thermal event or fire spreading to the site. • Emergency shutoff or isolator locations. • Environmental protection measures. • Post-incident recovery procedures. • A risk management plan identifying hazards and risks specific to the facility. • Any other matters raised during consultation with the FRS.
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Appendix 4: Schedule of Dangerous Goods

Substance / Material	UN Number	Class (ADR)	Typical Use in BESS	Hazards	Storage Requirements	Handling & Management Controls
Lithium-ion battery modules & cells	UN 3480 (batteries), UN 3481 (in equipment)	Class 9 (Misc. Dangerous Goods)	Energy storage medium	Thermal runaway risk, fire, toxic vapours, explosion	Store in dedicated battery enclosures with fire detection, ventilation, and temperature control. Keep away from heat, ignition sources, and incompatible materials.	Handle using insulated tools, avoid crushing/puncturing, maintain SOC (state of charge) for long-term storage at ~30–50%, train staff in battery fire risks.



Electrolyte solution (in sealed cells – may include LiPF_6 in organic carbonate solvents)	UN 1993 (Flammable liquid, n.o.s.)	Class 3 (Flammable liquids)	Inside battery cells	Flammable, toxic on decomposition (HF , CO , CO_2)	No free storage outside of sealed cells; any bulk containers for repairs must be in flammable liquids cabinets to BS EN 14470-1.	Only handled by trained technicians, spill kits for flammable liquids available, PPE (gloves, goggles, respirators for vapour).
Synthetic ester transformer oil	UN 3082 (Environmentally hazardous liquid, n.o.s.)	Class 9	Dielectric fluid for low-voltage transformer	Low fire risk (high flash point), harmful to aquatic life	Store in sealed, labelled containers in a bunded area away from drains and ignition sources.	Store in sealed, labelled containers in a bunded area away from drains and ignition sources.
Coolants (e.g., glycol-water mix)	UN 3082 (Environmentally hazardous liquid, n.o.s.)	Class 9	Battery thermal management	Low toxicity but harmful to aquatic life	Store in labelled, sealed containers away from drains, inside bunded area.	Avoid skin/eye contact, use spill kits, dispose of waste coolant via licensed waste contractor.



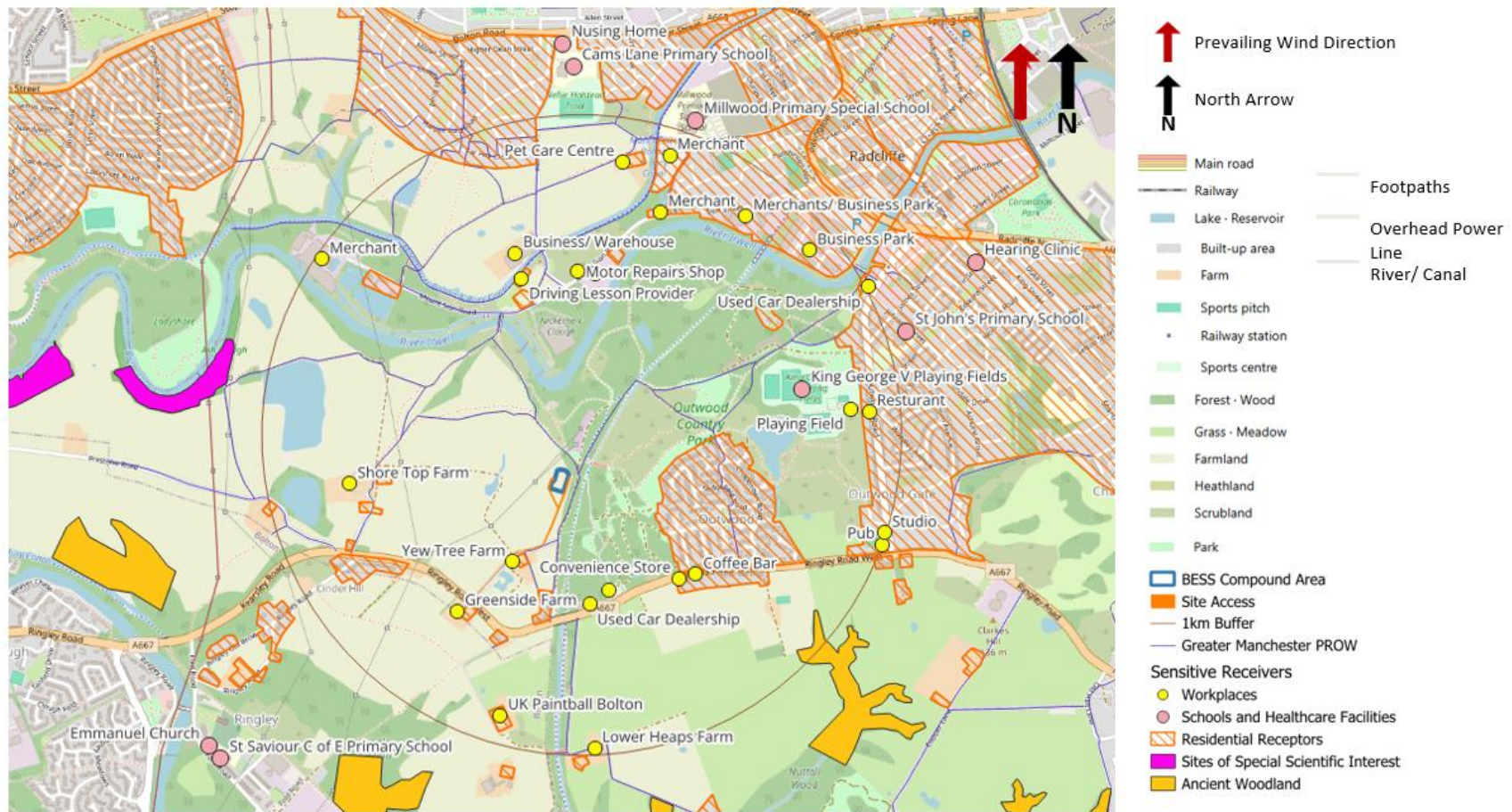
Fire suppression agents (e.g., clean agent gas cylinders – Novec™ 1230, FM-200)	UN 1044 (Fire extinguishers)	Class 2.2 (Non-flammable gas)	Fire suppression in enclosures	Stored under pressure	Store upright, secure from falling, protect from heat >50°C.	Service cylinders annually, handle per manufacturer guidelines, only trained personnel to operate/maintain.
Lead-acid batteries (if used for auxiliary systems)	UN 2794 (Wet, filled with acid)	Class 8 (Corrosive)	Backup power systems	Corrosive electrolyte, hydrogen gas release	Store in ventilated area, away from sparks/flames, on acid-resistant trays.	Wear acid-resistant PPE, neutralising agent (sodium bicarbonate) available, avoid short-circuiting terminals.
Cleaning chemicals (detergents, solvents)	Various UN numbers	Various	Maintenance	Skin/eye irritation, flammability	Store in COSHH cabinet, segregate incompatible chemicals (acids/bases, oxidisers).	Use per COSHH risk assessments, keep SDS on file, provide PPE.



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Appendix 5: Outline Sensitive Receptor Map

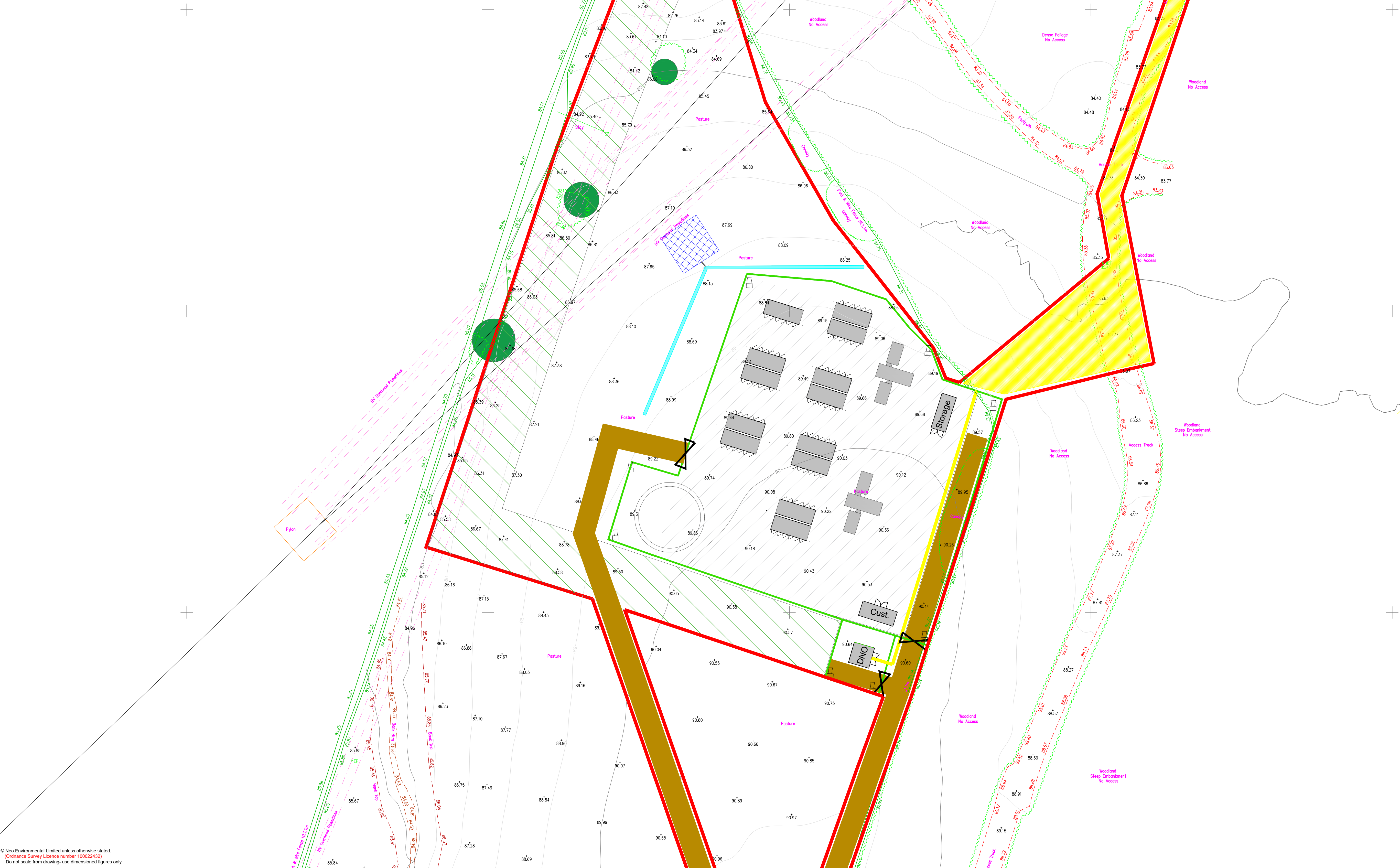
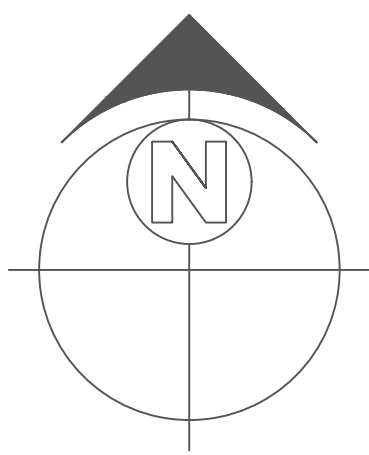
Radcliffe BESS – Sensitive Receptor Map





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Appendix 6: Outline Drainage Strategy



Key

Proposed Site Features

- Red Line Boundary
- Security Fence
- Cable Route/ Corridor
- Access Track
- Temporary Access Track
- Maintenance Access
- Overhead Line

Compound Area Hardcore

Landscape Buffer

Tree

Battery Container

Transformer/
Inverters

Storage

Customer Substation

DNO Substation

CCTV

Gate

Water Tank

SuDS Pond = 41m3

Infiltration drains

Drawn By: Jessica Ho
Address: Wright Business Centre
1 Lonmay Road
Glasgow
G33 4EL

Ver.	Date	Comments
A	03/03/2025	



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Ballymena Office: T:0282 565 0413 E: info@neo-environmental.co.uk

Project: Shore Top BESS

Client: GP Planning Consultants Ltd

Drawing: Outline SuDS Design

Project No.: NEO01445

Drawing No.: NEO01445_003I_A_Figure_4

Drawn: JH **Checked:** TS **Approved:** PN

Scale: 1:300 @ A1

Date: 03/03/2025

Revision:

A