Outline Fire Risk Statement Management Plan

Machaire BESS

Ref	05511-9387667

Revision History

Issue	Date	Name	Latest changes
01	26/12/2025	Martin O’Connor	First Created

Contents

1 Introduction

This document forms the Machaire BESS Outline Fire Risk Statement Management Plan. The document indicates how the project has been developed to address fire risk in several ways. It contains key mitigation measures against the risk of fire ignition and propagation within the battery energy storage system (BESS) site.

Battery technology and associated understanding of fire risk is continually evolving within the industry. As such, this document sets out key principles and mitigation measures based on the current understanding of battery fire risk but does not include a detailed Fire Risk Management Plan. A detailed Fire Risk Management Plan would be developed during detailed design, following battery selection.

2 Project Description

2.1 General project information

Renewable Energy Systems Ltd (RES) is developing a BESS facility near Rasharkin Substation, designed to operate at up to 100MW. The BESS will consist of 112 no. battery storage enclosures (BSEs), power conversion systems (PCSs), transformers, electrical infrastructure, foundations, access track, crane hardstanding, and spares storage containers. The grid connection will be via an onsite 110kV substation.

2.2 Battery selection

The proposed battery technology for the development is anticipated to be lithium iron phosphate (LFP). LFP has better thermal stability and enters thermal runaway at higher temperatures compared to some other battery chemistries. This is demonstrated by the UL 9540A test results of RES' preferred battery system which show that, at a unit level following deliberate initiation of thermal runaway:

- No flaming outside the initiating battery rack was observed.
- Surface temperatures of modules within the target battery rack adjacent to the initiating battery rack do not exceed the temperature at which thermally initiated cell venting occurs.
- Wall surface temperature rise does not exceed 97°C above ambient.
- Explosion hazards were not observed during the test.

Data from UL9540A testing can also be used to inform detailed design of the site and safety systems.

Each BSE has a footprint of approximately 6.1 x 2.4m. The exact battery form factor and capacity will be determined during detail design phase and would be documented within the detailed Fire Risk Management Plan.

3 Design Factors

3.1 RES Internal BESS safety best practice principles

Based on available standards, construction and operation experience, RES has developed internal best practice to manage the safety of battery energy storage systems. A document summary of these principles can be found in Appendix A.

3.2 Fire response strategy

It is the intention that the site would be self-sufficient during a potential battery-based fire event and would not require fire service intervention to prevent fire spread or any other significant risks to people or property. Key principles of the NFCC Grid Scale Battery Energy Storage System planning – Guidance for FRS, 2023 (“the NFCC Guidance”) are addressed through the mitigations identified within this report, as these pertain to the fire risk management strategy set out below.

The overarching fire risk management strategy would adopt the following controls:

1. Implement measures that result in a very low risk of fire ignition and any suitable environment for sustaining fire.
2. Implement measures that result in a very low risk of fire propagation and spread within a fire source (e.g. BSE).
3. Ensure fire spread between significant elements of the project is not expected, through application of design standards and use of calculations / modelling as necessary.
4. Include adequate provisions to allow the fire service to monitor a fire event, intervening only if there is a failure of the controls above.

Due to the risks associated with lithium-ion fires, transformer fires, and high-power equipment, there are significant safety benefits to minimising fire service intervention and consequential firefighter hazard exposure.

During detailed design, following battery product selection, a project specific Fire Risk Management Plan will be developed, in liaison with the Fire Service and with due consideration of the NFCC Guidance. This Fire Risk Management Plan will include:

- A fire risk appraisal that details how the fire response strategy above will be achieved, including the identification and design of any further mitigations required to achieve the strategy above.
- An emergency response plan.

3.3 Mitigation Measures

The following points define the key preliminary design mitigations against the risk of fire ignition and propagation within the BESS site.

3.3.1 Equipment spacing

The site has been developed to include adequate spacing between the battery storage enclosure (BSE) to mitigate against the risk of fire spread in the event of a fire within one BSE. The site layout aligns with applicable NFPA 855 spacing criteria as well as the spacing recommendations outlined in FM Global Property Loss Prevention Datasheet 5-33 (Interim revision July 2023). The layout allows minimum distance of 3m between pairs of battery enclosures and any other infrastructure.

3.3.2 Protection systems

Each BSE will have a dedicated fire protection system, comprising flammable gas detection and venting, fire detection and alarm, and an automatic fire suppression system. Additionally, key battery health and environment parameters will be continuously monitored with alarms sent to a control centre. Automatic electrical disconnection will be enacted by the battery management system should operational temperature, current or voltage limits be breached. There will be levels of alarms prior to protection limits which warn the operator of proximity to safe operating limits. BSEs will be fitted with deflagration venting and explosion protection appropriate to the hazard.

3.3.3 Access to battery storage enclosure

All BSEs will be accessed via external doors only, i.e. no internal corridor to eliminate the risk of people being inside an enclosure during a fire or thermal runaway gas venting incident.

3.3.4 Location of BESS facility

The location of the facility has been selected considering the distances from existing nearby premises. There are no premises nearby site, with the nearest one to site to be more than 150m in distance. A distance of at least 20m is achieved between BSEs and the site boundary, in line with NFPA 855 (2023),

3.3.5 Access for emergency services

The fenced BESS compound has wide access routes throughout the site, allowing the fire service to respond effectively in an incident. Additionally, one site entrance splits into two separate access points, providing an alternative approach if wind direction and smoke make one route challenging. The distance between the track split point and the nearest battery is approximately 220m, making the probability low that, in the unlikely event of a fire, visibility would be obstructed by dense fumes.

Turning locations for emergency response vehicles are available within the site hardstanding and at the main entrance gates. See Appendix F for site layout, including accesses and turning points.

Vehicular access to allow the emergency services to safely reach the development during design flood conditions has been considered and achieved.

3.3.6 Water Supply

It is intended that an onsite water supply would not be required to achieve the fire response strategy outlined in 3.1. However, if agreed as necessary in development of the Fire Risk Management Plan, a supply of 1,900 litres per minute for at least 2 hours in line with the NFCC Guidance could potentially be achieved through an existing hydrant located approximately 365 metres from site or provision of a piped hydrant, sourcing the water from the existing water main running alongside Magheraboy Road. While an existing hydrant or a proposed piped hydrant solution is considered a potential option, further assessment would be needed to confirm if the required water supply could be achieved through this approach. Should the assessment determine that these solutions would not be viable, provision has been made for potential water tank locations. The existing potential water and the provisioned allowed areas can be found in Appendix F.

4 Operational Factors

As well as mitigations to make the site inherently safer by design and the inclusion of active and passive controls, operational mitigations will be implemented to manage fire risk. This section states the operational factors which will be considered in the detailed Fire Risk Management Plan.

4.1 Hazard Identification and Mitigation Analysis

During detailed design, project and equipment specific hazards will be identified. Actions taken to mitigate those hazards will also be identified and residual risks will be communicated as part of the emergency response plan.

4.2 Hazardous Material

Any hazardous materials stored at the BESS facility will be fully justified and detailed in the emergency response plan. This will detail the location, description, quantity and appropriate precautions.

4.3 Emergency Response Plan

The Emergency Response Plan will be developed iteratively in line with the project specific Fire Risk Management Plan. It will outline how the operator will respond to incident and accident scenarios on site including clear guidance for first responder organisations.

4.4 Safety Management Structure

The BESS safety management structure is yet to be fully defined but will include a formal top-down management structure that has the authority and responsibility to make decisions in design, procurement, construction and operation that places safety and environmental risk at forefront.

4.5 Staff Competence

The Fire Risk Management Plan will ensure that all personnel who have responsibility for safety or activities which could impact the surrounding environment are competent to discharge those responsibilities.

5 Consequence Assessment

Although the probability of a thermal run-away event is low, such an incident would present several hazards to the surrounding area. This section aims to assess the potential impact of these hazards, with the aim of demonstrating a low risk to the public.

5.1 COMAH Applicability

As per the analysis laid out in Appendix B there is no reasonably foreseeable scenario where the quantity of hazardous substances on site, either in normal operation or in the event of a thermal-runaway incident, would exceed the limits laid out in the COMAH 2015 regulations for dangerous substances present on site.

5.2 Toxic Cloud Assessment

In the event of a thermal run-away incident hydrogen fluoride gas will be produced, if released this gas will form a cloud surrounding the enclosure that presents a toxicity hazard. Based on analysis[1], looking at a 5MWh containerised solution, in line with the anticipated equipment used in this project, an offset of 45m to the SLOT boundary (HSE's suggested limit for a 1% risk of fatality) is assessed and shown in Appendix C. Appendix C shows that no occupied premises are located within this radius around the BESS equipment, it is therefore anticipated that the risk to the public is low. It should be noted that this is a preliminary assessment based on representative, but generic, input data.

5.3 Explosion Over-pressure Assessment

As well as toxic gases, flammable substances such as hydrogen, carbon monoxide and methane would also be produced in a thermal run-away event. Whilst these will be partially consumed by the fire within the container there have previously been incidents where these gases have accumulated and subsequently undergone deflagration. Based on analysis[1], using a conservative estimate for the quantity of flammable gas present in the container of $50m^3$, and assuming an upper over-pressure limit of 70mbar the anticipated area of effect is a 45m radius from the BESS equipment. Appendix D shows that no occupied premises are located within this radius, it is therefore anticipated that the overall risk to the public is low. It should be noted that this is a preliminary assessment based on representative, but generic, input data.

[1] Hazard Assessment of Battery Energy Storage Systems, Atkins, Ian Lanes, Issue 01, March 2021

6 Conclusion

During the preliminary design, efforts have been made to mitigate, minimise, and prevent any fire hazard on site by incorporating specific design factors as described in this document. During detailed design and following battery product selection, a project specific fire risk appraisal will be used to verify the strategy presented in this document and an emergency response plan will be developed through liaison with the local fire service.

Appendix A RES BESS safety best practice principles

RES BESS safety best practice principles

Author	Geoff Elston
Date	16/12/2024
Ref	ENG01-9033728

Revision History

Issue	Date	Name	Latest changes
01	06 December 2024	Geoff Elston	First created
02	12 December 2024	Geoff Elston	Correction to title block date quick part

Contents

1 Introduction

This document sets out RES internal best practice for risk mitigation in BESS design.

Based on available standards, construction and operation experience, RES has developed internal best practice to manage the safety of battery energy storage systems.

It is important to be aware of hazards general to the power industry *and* specific to battery energy storage systems.

The key hazards for battery storage projects are:

- Thermal runaway - caused by mechanical or electrical abuse, or internal faults such as lithium plating of cells, resulting in spontaneous internal short circuits.
- High DC fault currents - Short circuit currents from banks of batteries can be in the range of 100kA – 150kA or more.
- Live working - The source of charge of a battery can never be completely isolated.

It is equally important to understand that these inherent hazards can all be controlled through appropriate design and operation procedures and RES is actively collaborating with both BSI/IEC and EPRI in the development of standards and best practice guidance.

2 Hazard mitigation analysis, risk mitigation & layers of protection

During detailed design RES projects undergo Hazard Mitigation Analysis (HMA), like Failure Mode and Effects Analysis or HazID, HazOP and LOPA) to identify hazards, and improve design to reduce risk.

2.1 Substitution

Lithium-ion batteries have a number of different potential chemical make ups – some of which are listed below:

- NMC – lithium nickel manganese cobalt
- NCA – lithium nickel cobalt aluminium
- LFP – lithium iron phosphate
- LMO – Lithium manganese spinel
- LTO – lithium titanate

Each chemistry has different effects on characteristics of the cell like cost, energy density, cycling life, thermal stability and specific power. NMC and LFP are the most common chemistries for stationary energy storage and while both have intrinsic hazards it is easier to make LFP cells safer as:

- They have greater thermal stability, going into thermal runaway at higher temperatures
- Produce less oxygen during electrolyte breakdown, reducing the risk of combustion

Following the hierarchy of control RES substitutes less thermally stable li-ion chemistries like NMC, for the more thermally stable LFP

2.2 Engineering controls

Design methods to address these hazards identified by the HMA can include:

- Protection and control layers through the system, rack and module Battery Management Systems and rack level contactors and fusing.
- Coordination of DC protection between the batteries and PCS including appropriate insulation monitoring and arc-flash assessment
- Ingress Protection rating to match the local installation environment
- Site design to mitigate any external hazards (i.e. vehicle collision, lightning strike, rodent damage)
- NFPA 855 and IEC 62933 safety design standards in conjunction with UL9540A test methods and results should be followed to design storage systems to mitigate effects of fire and explosion.
- Explosion prevention and control (such as active deflagration prevention control or passive deflagration venting), used as an additional measure to mitigate effects of explosive atmospheres in battery containers.

The design of RES' BESS adopt the following layers of protection against failure as standard, to reduce the risk of hazards impacting people and environment:

- Module level monitoring of voltage and temperature via a local battery management system (BMS).
- A secondary BMS at the rack/string level to monitor module operation and allow automatic disconnection of electrical contacts.
- Monitoring of battery storage enclosure environment and/or cell temperature ensuring system stability using RES' proprietary Energy Management System, RESolve.
- A flammable gas detection system capable of warning of an explosive atmosphere present in the system and activating forced ventilation.

In the event these layers of protection fail, fire suppression can reduce the impact of those failures. Design should be informed by Fire Risk Assessment and can include:

- A fire detection system equipped with smoke and heat detectors able to rapidly alert system operators.
- A fire suppression system capable of mitigating fires in the unit not caused by thermal run-away (note: oxygen is not required for thermal run-away to propagate)
- A system to allow application of water in the event of a thermal run-away event to help absorb the heat generated, such as dry type sprinkler systems. Though there are risks associated with fire service intervention in a fire due to the chemicals produced and water may be best used to further reduce the risk of propagation outside of the initiating enclosure.
- Deflagration venting in the form of blast panels to mitigate the effects of an explosion should an explosive atmosphere form.

All of the above conform with NFPA 855 and IEC 62933 safety design standards informed by UL9540A test data to ensure the site is designed appropriately to mitigate effects of fire.

2.3 Administrative controls

It is important to have robust operating procedures and to engage with the local emergency services to ensure that they are aware of the hazards, and the protection and control features of the BESS. RES projects development includes:

- Ensuring appropriate signage as per NFPA 855, which includes but is not limited to:
    - Energy storage system identification sign, including type of technology, any special hazards, emergency contact information and suppression system type installed.
    - Location of all electrical power disconnectors.
- Hosting regular site visits by local emergency services to familiarise themselves with the installation.
- A premises information box positioned at a safe distance from the energy storage location and should contain the following information:

  - Plans of the site.
  - Description of the site and buildings.
  - Information regarding the use of the site and significant risks.
  - Details of key personnel and emergency contact details.
  - Evacuation strategy within the local area.
  - Construction and layout including emergency access points and isolation systems.
  - Details of fire safety systems, alarms and suppression systems.
- An Emergency Response Plan developed with the local Emergency Responders including clear instruction that Emergency responders should not enter or open containers once alight.

Appendix B COMAH Applicability Assessment

28/01/2025

Hazardous Substances Consent and COMAH Applicability Assessment

Author	Martin O'Connor
Date	04/02/2025
Ref	ENG01-9389999

Issue	Date	Name	Latest changes
1	28/01/2025	Martin O'Connor	First Issue

1 COMAH Classification

The classification of a site under COMAH regulations is based on the quantity of a given hazardous substance present, these hazardous substances follow the definition laid out in The Classification, Labelling and Packaging (CLP) regulations implemented by the European Union. However, as per the Guidance on Requirements for Substances in Articles [1], referenced in the Introductory Guidance on the CLP Regulation [2], a lithium ion battery cell should be considered an article, not a substance and is therefore not covered by CLP regulations.

A thermal run-away, and subsequent toxic gas release, is a rare event and should not be considered the basis for an "Intended release of substances from articles" requiring regulation of the substance released. For the purpose of this document such a scenario is considered to assess whether a reasonably foreseeable release of toxic gas would exceed the limits of the COMAH regulations. As per publicly available MSDS for hydrogen fluoride [3] it should be treated as a category I toxic substance and therefore as per COMAH regulations [4] there should be no more than 5 tonnes present on site at any time.

Available literature based on physical testing of LFP battery cell fires suggests an upper limit on hydrogen fluoride generated in a thermal runaway event of 200g/kWh [5]. Applying this proportionality factor to the current offering of RES's preferred supplier, a 20ft container rated to 5MWh, this suggests a potential for 1 tonne of hydrogen fluoride being produced in the event of a thermal run-away event affecting all cells within a container. Therefore COMAH regulations should only be applied if a credible scenario can be found where all cells within 5 containers will combust simultaneously.

2 Mitigations

2.1 Control System

All battery containers are equipped with multiple levels of control to keep cells operating within a safe operating range, including monitoring of individual cell temperatures and voltages to protect against electrical abuse in normal operation. Being a containerised system the cells are also protected from physical abuse, the other major initiator of thermal runaway. This ensures that the risk of a thermal runaway in normal operation is low, and will be primarily due to defects introduced at the cell manufacturing stage, which are minimised via quality control requirements and supplier selection. Therefore the chance of a cell going into runaway independently is significantly reduced.

2.2 Physical Propagation Testing

As part of the UL9540 certification process a physical test, where thermal runaway was induced in a single module by externally heating a cell within it using a resistive heater, controlled to a rate of between 4°C & 7°C a minute. This module is installed in a rack positioned next to other populated racks, representative of installation in a battery storage enclosure. This test is conducted to prove that the system has been appropriately designed to prevent the propagation of a thermal run-away event within a battery storage enclosure. The unit level UL9540A test reports of RES preferred suppliers advise that in the event of a thermal run-away event initiated at a single module, this would not propagate to either neighbouring modules in the same rack, or to modules in neighbouring racks, the full performance criteria for this test are:

- Target BESS temperature less than cell surface temperature at gas venting, and meets heat flux limits for means of egress.
- Temperature increase of target walls less than 97°C (175°F)

- No explosion hazards exhibited by product.
- No flaming beyond outer dimensions of BESS unit (indoor, wall mount)

It is therefore considered very unlikely that even in the event of a thermal runaway the whole container would be affected and would most likely be confined to a single module.

2.3 Fire Propagation Resistance

RES best practice specifies each battery storage enclosure shall be fitted with FD90 fire-resistant doors, meaning that in the event of a thermal run-away incident heat-flux generated would be significantly reduced beyond the initiating container. The 3m separation distance between adjacent rows of containers, as per RES standard layout guidelines, will ensure that any heat leaving the container will be further reduced and unlikely to affect the cells within the neighbouring container given the better thermal stability of LFP cells compared to other lithium chemistries.

Where spacing between two containers is reduced below 3m to achieve improved energy density via a “back-to-back” configuration these multiple containers may be assessed as a single unit in a fire event. In this scenarios the maximum release volume from a single thermal run-away event should be considered as 2 tonnes.

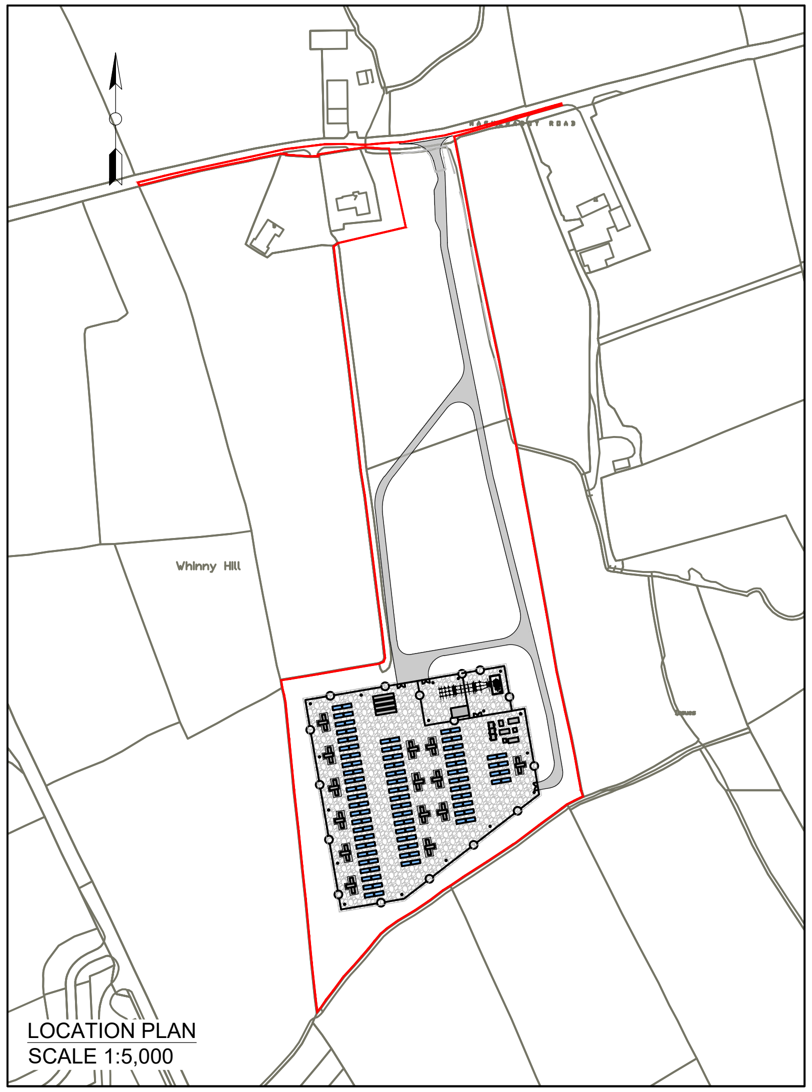
3 Conclusion

As per the information supplied above 5 battery storage containers (or 3 units in a back-to-back configuration) would need to undergo thermal run-away, with all cells within each container being affected, to generate the quantity of hydrogen fluoride gas required to make COMAH regulations applicable. Based on the multiple layers of protection summarised in section 2 this is not deemed a credible scenario and therefore COMAH regulations should not apply for projects utilising the proposed system configuration.

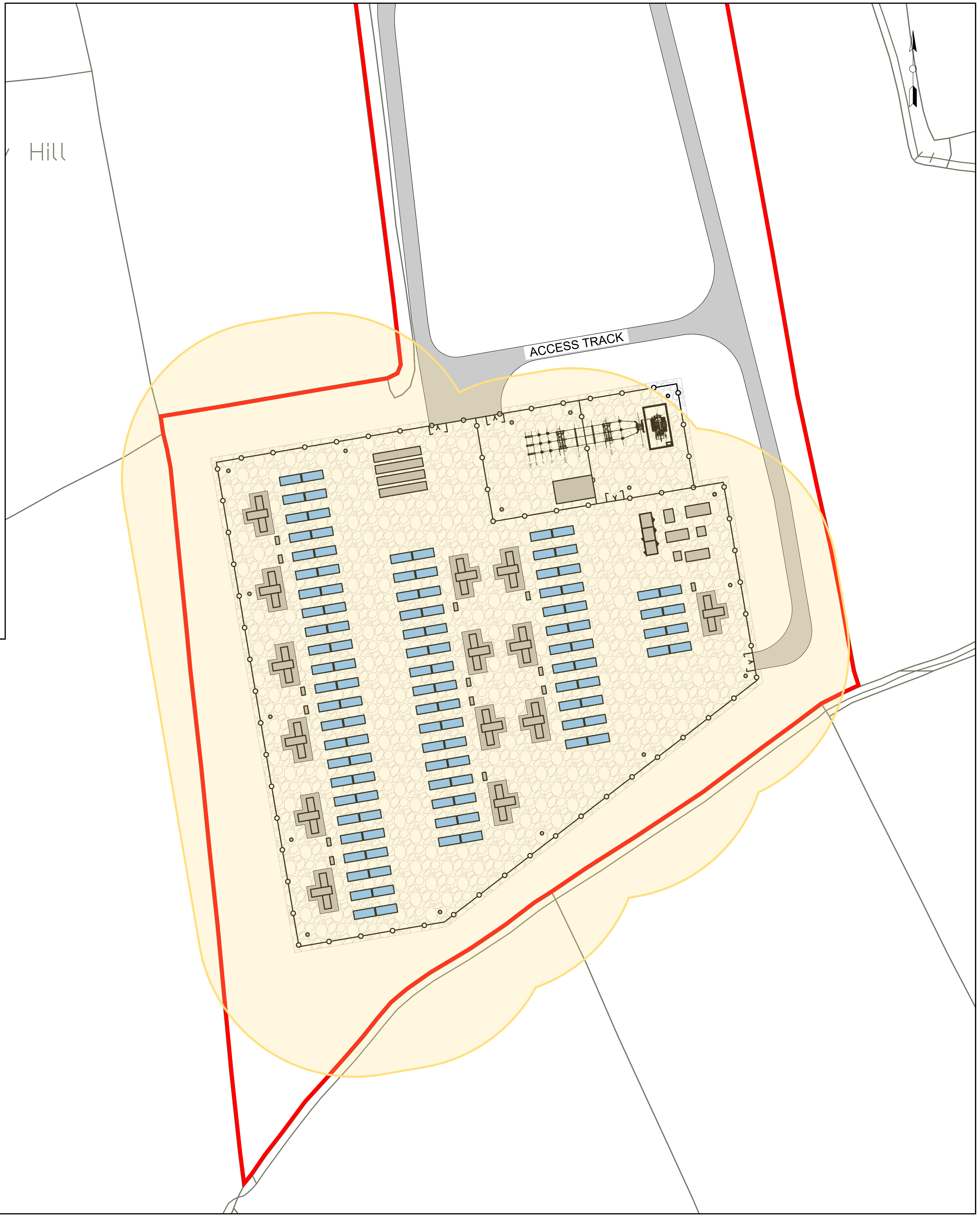
4 References

Number	Title	Source
1	Guidance on Requirements for Substances in Articles	ECHA, Version 4.0, June 2017
2	Introductory Guidance on the CLP Regulations	ECHA, Version 3.0, January 2019
3	Safety Datasheet – Hydrogen Fluoride	Airgas, Version 0.05, November 2018
4	The Control of Major Accident Hazards Regulations	HSE, 3rd Edition, June 2015
5	Toxic Fluoride Gas Emissions from Lithium-ion Battery Fires	Scientific Reports, F. Larsson et al. Volume 7, Art. Nr. 10018, August 2017

Appendix C Toxic Cloud Assessment



LOCATION PLAN
SCALE 1:5,000



SITE LAYOUT
SCALE 1:1,250

KEY:

- DEVELOPMENT BOUNDARY (OUTSIDE OF LINE DENOTES BOUNDARY)
- PALISADE, WELDMESH OR ACOUSTIC FENCE
- BATTERY STORAGE ENCLOSURE
- OTHER BESS INFRASTRUCTURE
- GRAVEL OR ASPHALT FINISH TO SUIT DETAILED EARTHING DESIGN
- HYDROGEN FLUORIDE TOXICITY LIMIT 45m

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH REF. [1].
2. ASSESSMENT IS BASED ON DISPERSION MODELLING OF HF GAS RELEASE OF 1,000kg, OVER A PERIOD OF 30 MINUTES.
3. EXTENT OF BOUNDARY BASED ON SLOT LEVELS, AS DEFINED BY HSE, AND ASSUMING AN EXPOSURE DURATION OF 30 MINUTES (400ppm).
4. NO TOPOGRAPHIC FEATURES HAVE BEEN FACTORED INTO THIS ASSESSMENT.
5. ALTHOUGH BASIS OF ASSESSMENT IS REPRESENTATIVE OF THE PROPOSED BESS SYSTEM, THIS ANALYSIS SHOULD BE TREATED PRELIMINARY.

REFERENCES:

[1] INFRASTRUCTURE LAYOUT - 05511-RES-LAY-DR-PT-001

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
1	BM	DR	CH	2025-02-28	FIRST ISSUE

PURPOSE: PLANNING	COORDINATES: TM65 IRISH GRID
SCALE: AS SHOWN @A3	DATUM: N/A
LAYOUT DRAWING: N/A	T-LAYOUT NO: N/A

PROJECT TITLE
MACHAIRE ENERGY STORAGE

DRAWING TITLE
POTENTIAL TOXIC GAS CLOUD EXTENTS

RES DRAWING NUMBER	REV
05511-RES-LAY-DR-PE-003	1

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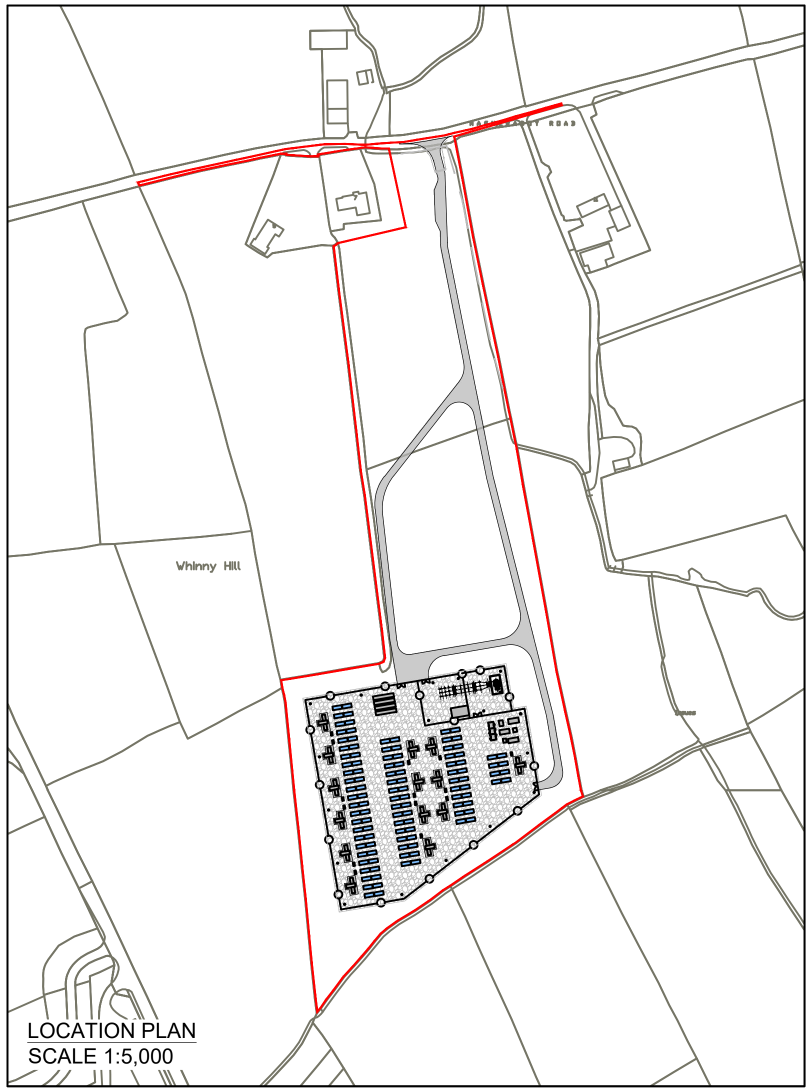
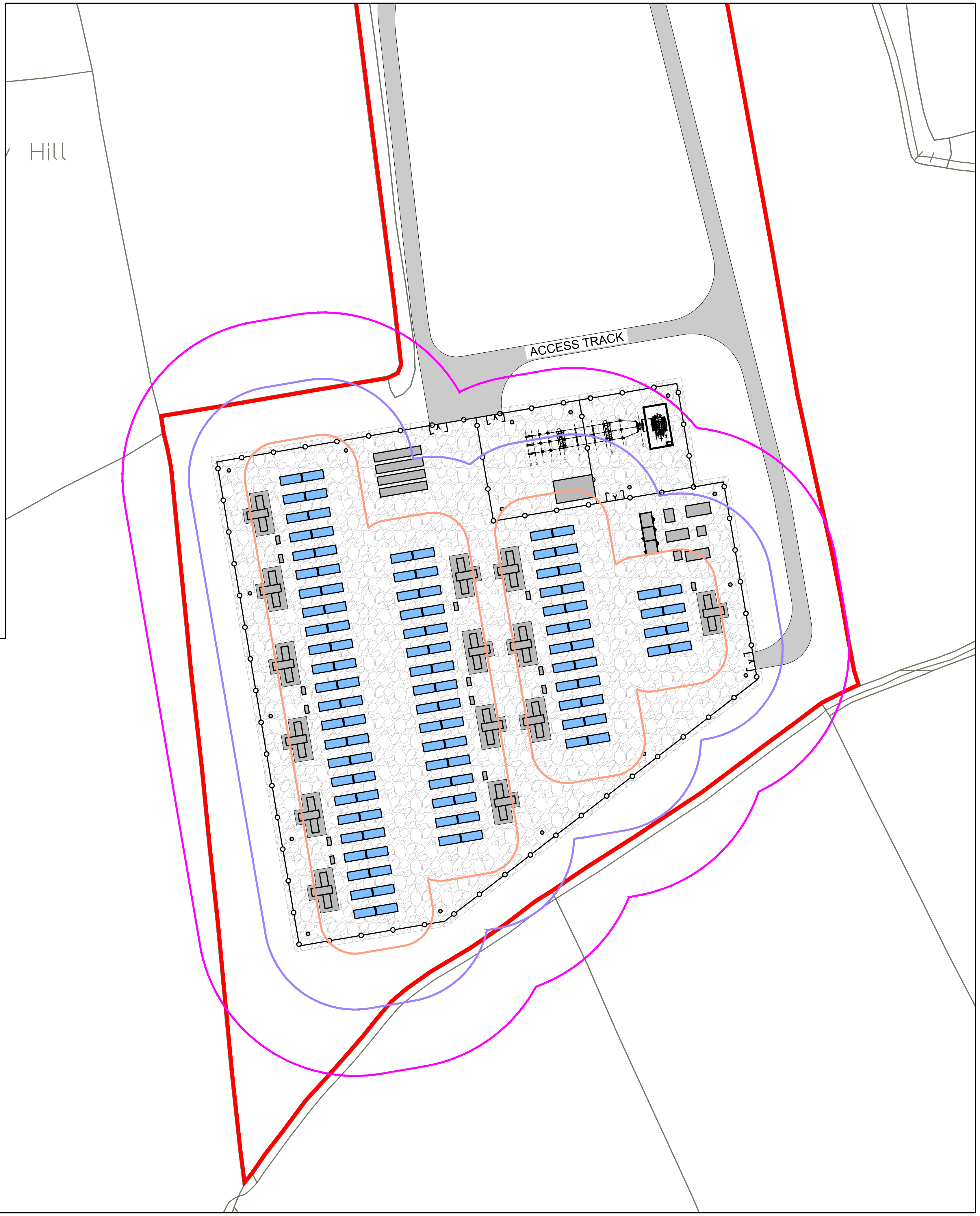
Appendix D Blast Over-pressure Assessment



LOCATION PLAN
SCALE 1:5,000



SITE LAYOUT
SCALE 1:1,250

KEY:

- DEVELOPMENT BOUNDARY (OUTSIDE OF LINE DENOTES BOUNDARY)
- PALISADE, WELDMESH OR ACOUSTIC FENCE
- BATTERY STORAGE ENCLOSURE
- OTHER BESS INFRASTRUCTURE
- GRAVEL OR ASPHALT FINISH TO SUIT DETAILED EARTHING DESIGN

OVER-PRESSURE ASSESSMENT KEY

	OVER-PRESSURE (mbar)	DISTANCE (m)
(orange)	600	10
(purple)	140	26
(magenta)	70	45

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH REF. [1].
2. CONTOURS BASED ON A TNO MULTI-ENERGY MODEL WITH A TYPICAL IGNITION STRENGHT OF 7, AND AN ESTIMATED VAPOUR CLOUD VOLUME OF 50m³.
3. NO, EQUIPMENT MITIGATIONS, SITE SPECIFIC MITIGATIONS, OR TOPOGRAPHIC FEATURES HAVE BEEN FACTORED INTO THE ASSESSMENT.
4. ALTHOUGH BASIS OF ASSESSMENT IS REPRESENTATIVE OF THE PROPOSED BESS SYSTEM, THIS ANALYSIS SHOULD BE TREATED PRELIMINARY.

REFERENCES:

[1] INFRASTRUCTURE LAYOUT - 05511-RES-LAY-DR-PT-001

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
1	BM	DR	CH	2025-02-28	FIRST ISSUE

PURPOSE: PLANNING	COORDINATES: TM65 IRISH GRID
SCALE: AS SHOWN @A3	DATUM: N/A
LAYOUT DRAWING: N/A	T-LAYOUT NO: N/A

PROJECT TITLE
MACHAIRE ENERGY STORAGE

DRAWING TITLE
POTENTIAL BLAST OVER-PRESSURE INTENSITY CONTOURS

RES DRAWING NUMBER	REV
05511-RES-LAY-DR-PE-004	1

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Appendix E NFCC Recommendations Cross-Referenced to the BESS Layout and Design

Criterion	NFCC 2022 Guidance Recommendation	Design factors / mitigations	Impact of Draft 2024 NFCC BESS Guidance
1	Access - Minimum of two separate access points to the site	One site entrance, splitting to two site access points approximately 220 metres before the site, providing an alternative option for approaching site if the combination of wind direction and smoke made one direction particularly onerous. Available wind data indicates that the predominant wind direction in the area is from the south. To mitigate the risk of both routes being obscured by smoke during adverse conditions in the event of a fire, the track split has been positioned as far north as feasible, while also considering other site constraints. This placement enhances safety by reducing the potential impact of smoke on visibility and access during emergency situations.	No change
2	Roads/hard standing capable of accommodating fire service vehicles in all weather conditions. As such there should be not extreme grades.	The proposed access tracks connecting the site entrances to the public road have been designed with a typical width of approximately 4.5m, incorporating wider sections at bends to facilitate safe vehicle manoeuvring. The gradient of the access track is very low without any concerns. All site access tracks, and BESS internal compound corridors have been designed to accommodate	No change

		emergency response vehicles as per Table 13.1 from Fire Safety: Approved Document B.	
3	A perimeter road with passing place suitable for service vehicles	The BESS compound layout allows access / egress routes that pass through the compound and between electrical equipment allowing access to all BESS units as indicated in Appendix F.	No change
4	Access tracks and BESS internal compound corridors must enable unobstructed access to all areas of the facility	The BESS internal compound corridors have sufficient room allowing access to all BESS units. The site meets requirements of Approved Document B5 Vol 2 allowing all points on site to be within 45m of a fire appliance when required.	No change
5	Turning circles, passing places etc. size to be advised by FRS depending on fleet	The BESS internal compound corridors allow access to all BESS units (see Appendix F) in two different directions and allow for FRS vehicles to drive in and drive out. In case the FRS vehicles need to manoeuvre, the layout has allowed several possible turning points as indicated on Appendix F.	No change
6	Distances from BESS units to occupied buildings and site boundaries.	The proposed Battery Energy Storage System (BESS) layout has been designed to comply with the general requirement of maintaining a 25m setback from site boundaries, with most of the BESS units adhering to this standard. However, a small number of units are positioned at a minimum distance of 20m. This reduced setback is considered acceptable as the site is in a rural area where certain flexibility in setback distances is recognized. Additionally, there are no premises	Initial min distance to boundary increased to 30m **Response:** While the new guidance suggests 30m, the design remains safe, with no sensitive receptors nearby in a rural area. No impact from change in guidance.

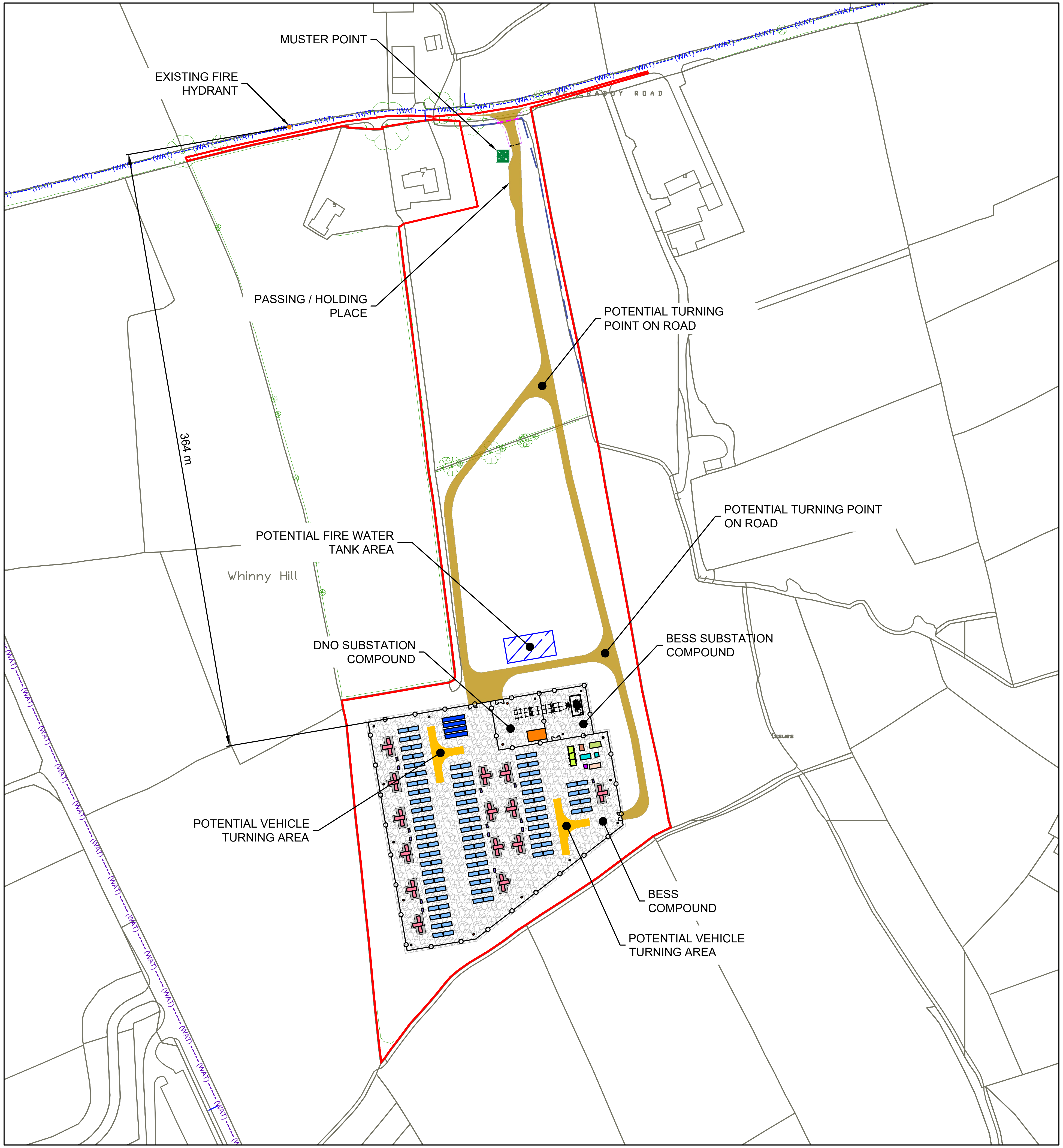
		or sensitive receptors within the 25m zone, and the reduced setback does not negatively impact neighbouring land, public access, or environmental considerations, ensuring the development remains safe and appropriate within its context. Furthermore, the land north of the boundary is likely under the applicant's control, as it is owned by the main site landowner. The nearest residential dwelling is approximately 240m away.	
7	Access between BESS units - minimum of 6.0m suggested.	The suggested 6.0m separation is based on a 2017 Issue of the FM Global Loss and Prevention Datasheet 5-33 (footnote 9 in the NFCC Guidance). This Datasheet has been revised in July 2023 and again in Jan 2024 and it now details the following items: • For containerized LIB-ESS comprised of lithium iron phosphate (LFP) cells, provide aisle separation of at least 5 ft (1.5 m) on sides that contain access panels, doors or deflagration vents. The current site layout has been developed to include 3m spacing between pairs of battery storage enclosures (BSE). This is considered adequate to mitigate against the risk of fire spread beyond the two containers in the event of a fire within one BSE. The layout allows minimum distance of 3m between battery enclosures and any other infrastructure.	1. Spacing distance of 6.0m removed. New spacing requirement is reduced to approx. 1m assuming that the BESS will be fire certified to UL9540A or equivalent. 2. BESS units are not to be vertically stacked. **Response:** The current site layout does not allow for vertical stacked BESS. No impact from change in guidance.

8	Areas within 10m of BESS units to be cleared of combustible vegetation	There is no existing vegetation or proposed in the design within 10m of BESS units. All areas within 10m of BESS units are within red line boundary and under applicant's control.	No change
9	Water supply	It is intended that an onsite water supply would not be required to achieve the fire response strategy outlined in 3.1. However, if agreed as necessary in development of the Fire Risk Management Plan, a supply of 1,900 litres per minute for at least 2 hours in line with the NFCC Guidance could potentially be achieved through an existing hydrant located approximately 365 metres from site or provision of a piped hydrant sourcing the water from the existing water main running alongside Magheraboy Road. While an existing hydrant or a proposed piped hydrant solution is considered a potential option, further assessment would be needed to confirm if the required water supply could be achieved through this approach. Should the assessment determine that these solutions would not be viable, provision has been made for potential water tank locations. The existing potential water and the provisioned allowed areas can be found in Appendix F.	The current requirement is 1,900 l/min for 2 hours. The draft NFCC 2024 has a reduced requirement of 25 l/s (1500 l/m). **Response:** The current requirement is less onerous than the proposed in the draft NFCC 2024. No impact from change in guidance.
10	Signage	Signage will be positioned at the entrance to the Site, including a site layout plan and details of the key personnel.	Adherence to the dangerous substances (Notification and marking of Sites) Regulations 1990 (NAMOS) should be considered where the total quantity of dangerous substances exceeds 25 tonnes.

<table>
<tr><td></td><td></td><td></td><td> Response: It is anticipated that there will not be the need to store dangerous substance on site. Should any hazardous materials stored at the BESS facility, they will be fully justified and detailed in the emergency response plan detailing the location, description, appropriate precautions and quantity. No impact from change in guidance. </td></tr>
<tr><td>11</td><td>Emergency Plan</td><td>An ERP will be developed for the Site prior to construction that will be adopted during construction and operation phases.</td><td> 1. Identification of sensitive receptors within 1km to allow appropriate emergency planning including prevailing winds. Response: This has been completed as part of the Noise Baseline Assessment, the table below details the outcome. Note, distance given to the centre of the BESS compound.
<table>
<tr><th>Receptor</th><th>Distance (m)</th><th>Direction</th></tr>
<tr><td>H1</td><td>365</td><td>North</td></tr>
<tr><td>H2</td><td>325</td><td>Southeast</td></tr>
<tr><td>H3</td><td>263</td><td>South</td></tr>
<tr><td>H4</td><td>345</td><td>Southwest</td></tr>
<tr><td>H5</td><td>340</td><td>North</td></tr>
<tr><td>H6</td><td>359</td><td>Northwest</td></tr>
</table>
A wind rose is shown with the site layout and north direction at Appendix F. No impact from change in guidance. </td></tr>
</table>

12	Environmental Impacts	A comprehensive environmental assessment for the site has been undertaken and will be submitted with the planning application.	1. Suitable environmental protection measures should be provided. This should include systems for containing and managing water runoff. 2. Sites located in flood zones should have details of flood protection or mitigation measures. **Response:** Flood Risk and Drainage Assessment has been submitted as part of the planning application. The BESS development does not sit within flood risk areas. An adequate culvert size design has been carried out as part of the Flood Risk and Drainage Assessment to mitigate any potential flood risk from the proposed layout. No impact from change in guidance.
13	System design, construction, testing and decommissioning	Testing and decommissioning information will only be available at detailed design stage. The layout is considered compliant with this item currently.	No change
14	Deflagration Prevention and venting	Details will be available at detailed design stage, but equipment will be in line with NFPA855 which includes requirements for explosion prevention and venting. The layout is considered compliant with this item currently.	No change

Appendix F Outline Fire Risk Management Layout



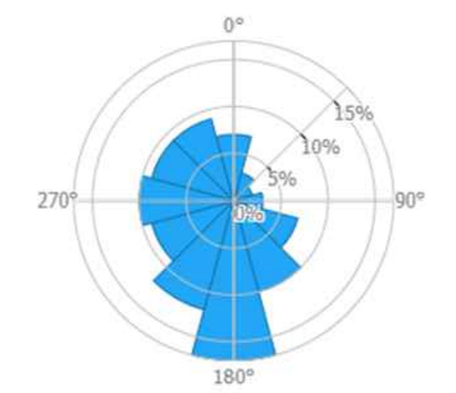
KEY:

	DEVELOPMENT BOUNDARY (OUTSIDE OF LINE DENOTES BOUNDARY)
	PALISADE WELDMESH OR ACOUSTIC FENCE
	BATTERY STORAGE ENCLOSURE (BSE)
	2 No. POWER CONVERSION SYSTEMS (PCS) WITH TWIN MV SKID AND APRON SLAB
	DNO SUBSTATION BUILDING
	BESS SUBSTATION BUILDING
	AUXILIARY TRANSFORMER
	LV SWITCHGEAR ROOM
	AGGREGATION PANEL WITH LV PILLAR
	PRE-INSERTION RESISTOR
	CAPACITOR BANK
	HARMONIC FILTER AND RESISTOR
	SPARES CONTAINER
	LIGHTING / CCTV COLUMN
	ACCESS TRACK
	SURFACE FINISH TYPICALLY COMPRISING STONE OR ASPHALT
	EXISTING TREES AND VEGETATION
	GATE
	EXISTING FENCE MODIFIED
	EXISTING DRAINAGE INFRASTRUCTURE
	WATER CHANNEL CROSSING / CULVERT
	FIRE HYDRANT (NI WATER RECORDS)
	MUSTER POINT

EXISTING BURIED UTILITIES.

(WAT)	WATER MAIN (NI WATER RECORDS)
(WAT)	2no WATER MAINS RUNNING PARALLEL (1no SEWAGE & 1no CLEAN WATER (NI WATER RECORDS)

SITE WIND FREQUENCY ROSE



NOTES:

1. EQUIPMENT DETAILS AND CONFIGURATION WITHIN THE ENERGY STORAGE COMPOUND ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN.
2. THIS DRAWING DEFINES OUTLINE FIRE RISK MANAGEMENT INFORMATION FOR THE SITE AND SHALL BE DEVELOPED AS APPROPRIATE ALONGSIDE THE PROJECT DETAILED FIRE RISK MANAGEMENT PLAN.

ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
1	BM	AP	CH	2025-02-27	FIRST ISSUE

PURPOSE: PLANNING	COORDINATES: TM65 IRISH GRID
SCALE: 1:2,500 @A3	DATUM: N/A
LAYOUT DRAWING: N/A	T-LAYOUT NO: N/A

PROJECT TITLE

MACHAIRE ENERGY STORAGE

DRAWING TITLE

OUTLINE FIRE RISK MANAGEMENT LAYOUT

RES DRAWING NUMBER	REV
05511-RES-LAY-DR-PE-005	1

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