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FOIGHA BATTERY ENERGY STORAGE SYSTEM

Outline Emergency Response Plan

CAIRN RISK CONSULTING
Reducing risk for a sustainable future

Document Information

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1.0	Draft for comments	26/06/26	Shali Pavithran	Murray Urquhart	Samie Parkar
2.0	Final for Issue	07/07/26	Shali Pavithran	Murray Urquhart	Murray Urquhart

Acronyms & Abbreviations

AC	Alternating Current
AEGL	Acute Exposure Guideline Level
ALARP	As Low As Reasonably Practicable
BayWa	BayWa r.e. Ireland Ltd
BESS	Battery Energy Storage System
BMS	Battery Management System
BMU	Battery Management Unit
BSC	Battery System Controller
BSMP	Battery Safety Management Plan
CCTV	Closed-Circuit Television
CDM	Construction (Design & Management) Regulations 2015
CMU	Cluster Management Unit
CO_2	Carbon Dioxide
DC	Direct Current
ERP	Emergency Response Plan
E-stop	Emergency Stop
FACP	Fire Alarm Control Panel
FK5112	Fluorinated Ketone Fire Suppression Agent
FRS	Fire and Rescue Service
FSS	Fire Safety System
HV	High Voltage
L/HVRT	Low / High Voltage Ride Through
LC	Local Controller
LFP	Lithium Iron Phosphate
LV	Low Voltage
NFCC	National Fire Chiefs Council
O&M	Operation & Maintenance
OBSMP	Outline Battery Safety Management Plan
PCS	Power Conversion System
PPE	Personal Protective Equipment
PV	Photovoltaic
SCBA	Self-Contained Breathing Apparatus
TBC	To Be Confirmed
UK	United Kingdom
VSG	Virtual Synchronous Generator

HOLD Register

This is a live document as several decisions have not yet been made, or cannot be made without input from the wider project team or external parties. To facilitate the development of this plan, the below HOLDs have been identified and will be closed out during future revisions of this document.

HOLD ID	Description	Relevant section of this document
HOLD 1	Confirm the final site address, Eircode and emergency access gate coordinates to be included in the ERP.	**Section 2.1**
HOLD 2	Confirm the final ownership, operator and operational responsibilities for the Foigha BESS, including normal site attendance, operating hours, monitoring arrangements, alarm response arrangements and personnel authorised to initiate shutdown or isolation.	**Section 2.2**
HOLD 3	Confirm and update this table with final quantities, locations, and primary functions of all installed emergency safety systems at Foigha BESS site.	**Section 3.2**
HOLD 4	Confirm final evacuation arrangements, including evacuation routes, muster points, site check-in / check-out arrangements and the person or role responsible for confirming that all personnel have evacuated safely.	**Section 4.2, Section 6.2**
HOLD 5	Confirm who will have access to BMS, alarm and fire / fault signal information during an incident, how this information will be accessed, and how it will be shared with the FRS.	**Section 4.3.1**
HOLD 6	Confirm final firewater design, including tank volume, water source, hydrant flow rate, hydrant/outlet connection details, mechanical protection, signage and agreement of connection arrangements with the local FRS.	**Section 4.3.2**
HOLD 7	Confirm with the local FRS whether the proposed hydrant locations and available hose reach provide sufficient coverage across the BESS area, including whether the two hydrant locations are adequate for the final site layout.	**Section 4.3.2**
HOLD 8	Confirm the company or competent contractor responsible for assessing, sampling, treating, removing and disposing of contaminated firewater retained on site following an incident. This should include confirmation of the disposal route and any testing required before discharge, treatment or removal.	**Section 4.4**

HOLD ID	Description	Relevant section of this document
HOLD 9	Confirm final emergency contact details, including BayWa operations personnel, control room operator, Foigha emergency representative, site representative, emergency services contact details and local receptor notification process.	**Section 5.1**
HOLD 10	Confirm whether the Foigha O&M Manual, First Aid Procedure and Electrical Safety Procedure will be produced for the Foigha BESS and available before operation. These documents should be referenced in the ERP once available.	**Section 6.1**
HOLD 11	Complete BESS toxic plume dispersion modelling to confirm whether nearby receptors may need to evacuate or shelter in place during a BESS incident. The ERP should be updated to define receptor notification arrangements.	**Section 6.2**
HOLD 12	Develop and finalise the Foigha BESS training and drill programme before operation. This should include technical training requirements, ERP familiarisation, local FRS familiarisation, personnel to be trained, drill frequency, drill records, lessons learned and action tracking.	**Section 7**
HOLD 13	Confirm the testing frequency for systems relied upon to prevent, detect or respond to emergency conditions. And agree the final frequencies with Sungrow, BayWa, the operator and relevant equipment suppliers.	**Section 7**
HOLD 14	Confirm the final installed configuration of the Foigha BESS, including the number and arrangement of battery containers, PCS units and auxiliary transformer stations. The ERP should be updated before operation so that emergency responders have accurate information on the final BESS layout and installed equipment.	**Section 2.3**

Table of Contents

1 Introduction

1.1 Background

This Outline Emergency Response Plan (ERP) sets out the emergency response arrangements for the battery energy storage system (BESS) at the Foigha Solar Farm development in Co. Longford. The ERP focuses on foreseeable emergency scenarios associated with the BESS, including medical emergency, thermal runaway or fire and external fire incidents.

1.2 Purpose

The purpose of this ERP is to provide the emergency response arrangements at BayWa's Foigha BESS site in relation to incidents occurring at the BESS portion of the facility.

This document defines individual responsibilities of key personnel and the appropriate actions to be taken to protect people, property and the environment, so as to limit negative consequences of an event and to enable recovery from an emergency as quickly as possible should it occur. This document also outlines the process for alerting the emergency services, relevant site personnel and other parties required to support the immediate emergency response.

This document is an outline ERP and provides a template for the detailed operational ERP that will be developed prior to commencement of operations of the Foigha BESS. The full details of the final site design, operational arrangements, emergency contacts, personnel roles, training requirements and drill schedule, will therefore be reviewed and updated as the design progresses and before commencement of operations. Further information required for the detailed operational ERP is listed in the **HOLD Register**.

1.3 Scope

An emergency is an incident which is likely to have adverse effects on people, plant and/or the environment. Prompt action is required to control and correct the occurrence and return operations to a safe condition. This plan has been developed for the identification of foreseeable emergencies and the specific response to each of these including:

- First Aid – Medical Emergencies
- Thermal runaway and Fire Incident
- External Site Fire

This ERP will focus solely on the hazards associated with the BESS section of the Foigha site. It is expected that separate emergency response arrangement will be developed for the solar farm and wider site. These arrangements should be aligned with this ERP to ensure a coordinated response across the full Foigha development.

This ERP only covers the operational phase of the BESS site. Any activities related to construction and commissioning are considered managed under the Principal Contractor responsibility, as required by Construction (Design and Management) Regulations 2015.

1.4 Document Control and Continual Improvement

This document is required to be kept up to date to ensure it contains accurate and current information for the emergency responders during an emergency, as well as accounting for any lessons learned. This document will be reviewed and updated annually by BayWa, as well as following any drills or incidents to incorporate lessons learned.

An initial Fire Rescue Service Drill shall be conducted to ensure the rescue services are familiar with the site and any lessons learned or observations will be used to update this document.

While updating this document, BayWa shall revisit the design in light of new regulations,

standards, and guidance to ensure that there is nothing more that can practicably be done to further reduce risk to people during emergency response operations. It may not be practicable to completely reconfigure the design to align fully with new guidelines, but BayWa shall perform an assessment of whether it is reasonably practicable to implement any new risk reduction measures.

2 Foigha Site Overview

2.1 Location

The Foigha Energy Storage project, as shown in **Figure 1**, is located within the wider Foigha Solar Farm development in Co. Longford, Ireland.

Site address: **[HOLD 1]**

The R392 is located to the north/north-east of the BESS area and the L1135 Cornacarta local road is located to the west.

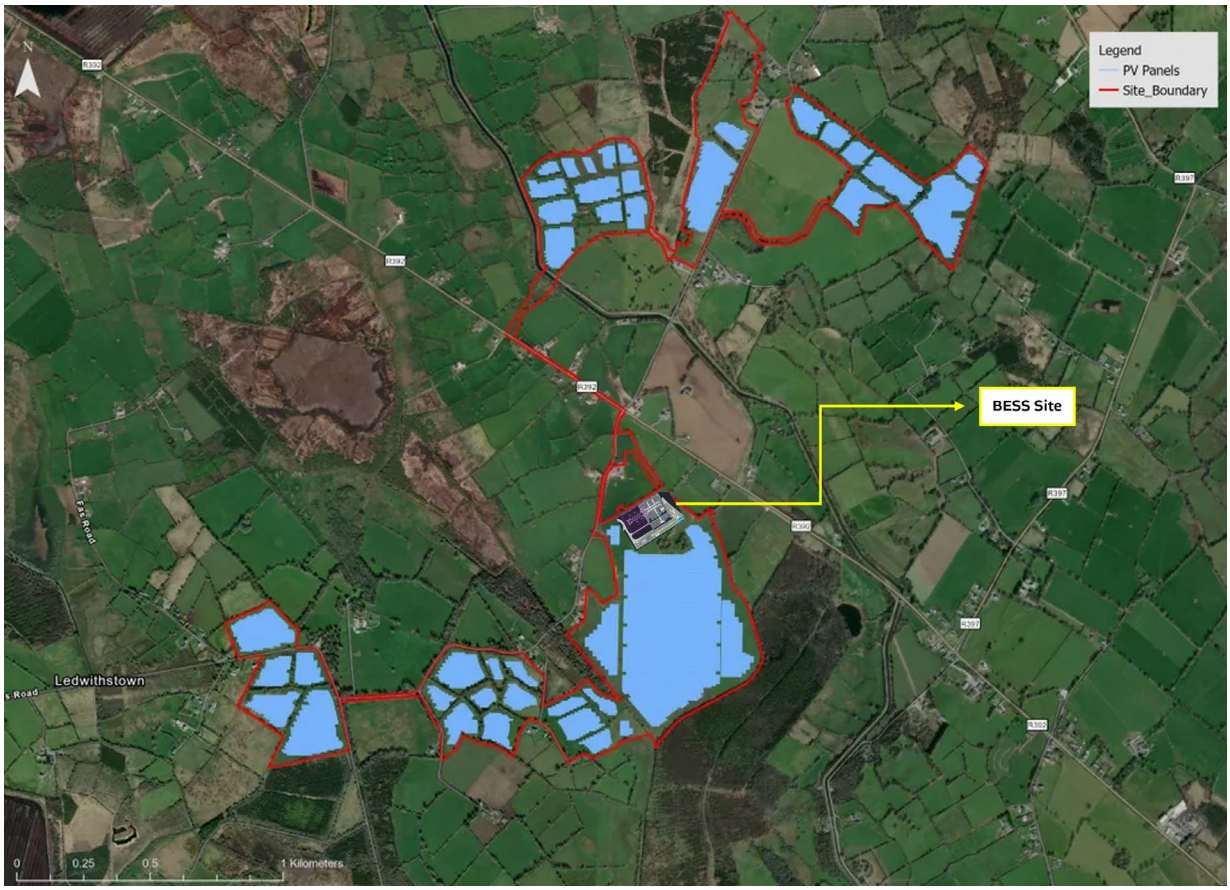


Figure 1: Foigha Location Plan

2.2 Ownership and Operational Details

Foigha Solar Farm Limited, a subsidiary of BayWa r.e. Ireland Ltd, is progressing the Foigha project. The final ownership, operator and operational responsibilities for the BESS will be confirmed before the site enters operation. **[HOLD 2]**

2.3 Site layout

The Foigha BESS is located within the wider Foigha Solar Farm development area as shown in **Figure 2**. The BESS area includes battery containers, Power Conversion Systems (PCS) units, auxiliary transformer stations, internal access roads and associated electrical infrastructure. The final installed configuration, number of battery containers, PCS units and auxiliary transformer stations should be confirmed as the Foigha design develops. **[HOLD 14]**

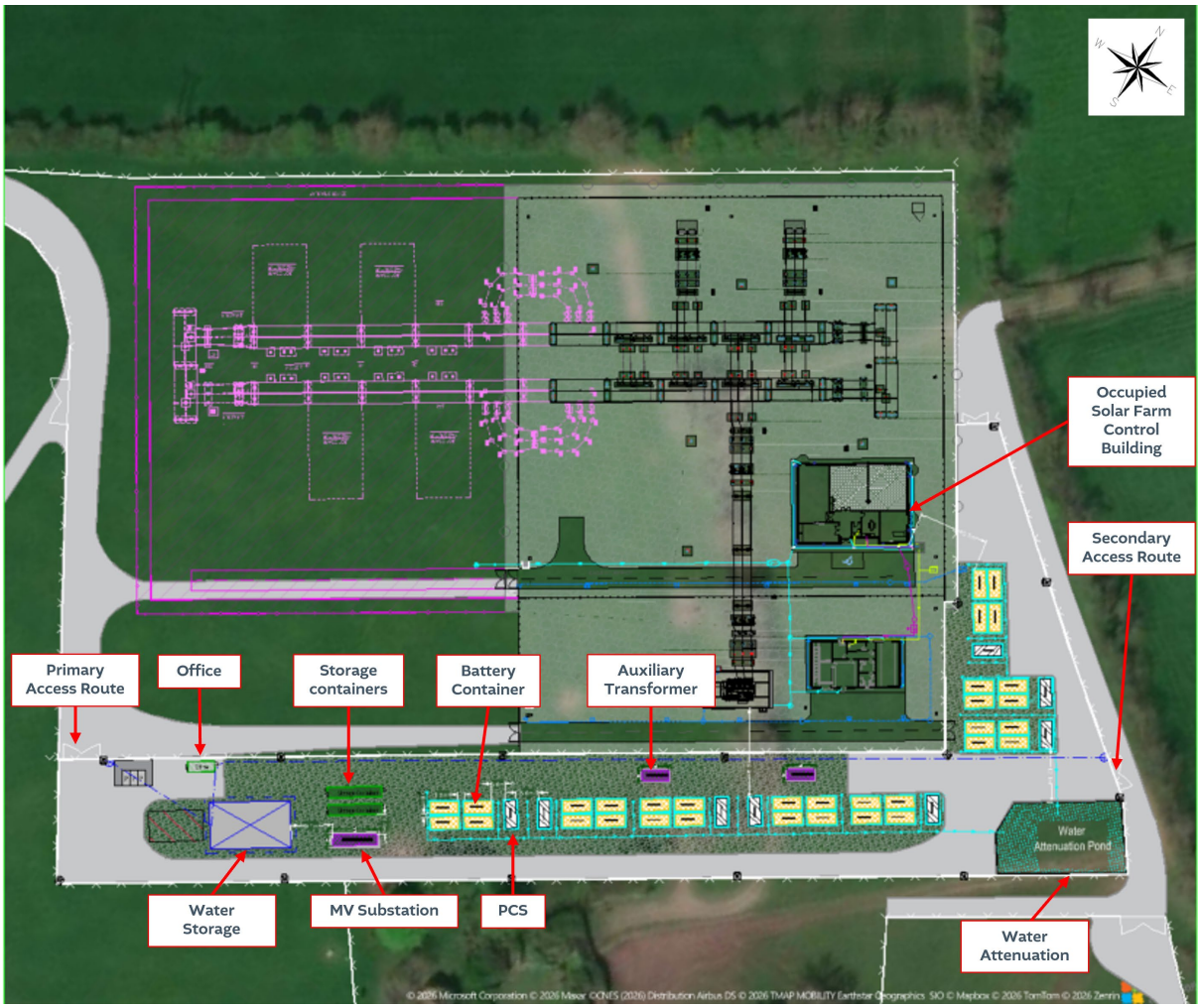


Figure 2: Foigha BESS Layout

Receptors within 1 km of the Foigha BESS are shown in **Figure 3**. The receptors have been grouped where several properties are located close together. The distances shown in **Table 1** represent the shortest distance from the nearest battery container to a property within each group.

Table 1: Receptors within 1 km of Foigha BESS

Receptor	Approx. distance from nearest battery (m)	Downwind of prevailing wind direction?
Residential Properties 1	296	No
Residential Properties 2	634	No
Residential Properties 3	856	No
Residential Properties 4	247	No
Residential Properties 5	499	No
Residential Properties 6	634	No
Residential Properties 7	716	No
Residential Properties 8	831	No
Residential Properties 9	174	Yes
Residential Properties 10	268	Yes

Receptor	Approx. distance from nearest battery (m)	Downwind of prevailing wind direction?
Residential Properties 11	581	No
Farm Buildings 1	248	No
Farm Buildings 2	760	No
Foigha Bar & Restaurant	386	No
Main Road – R392	188	Yes

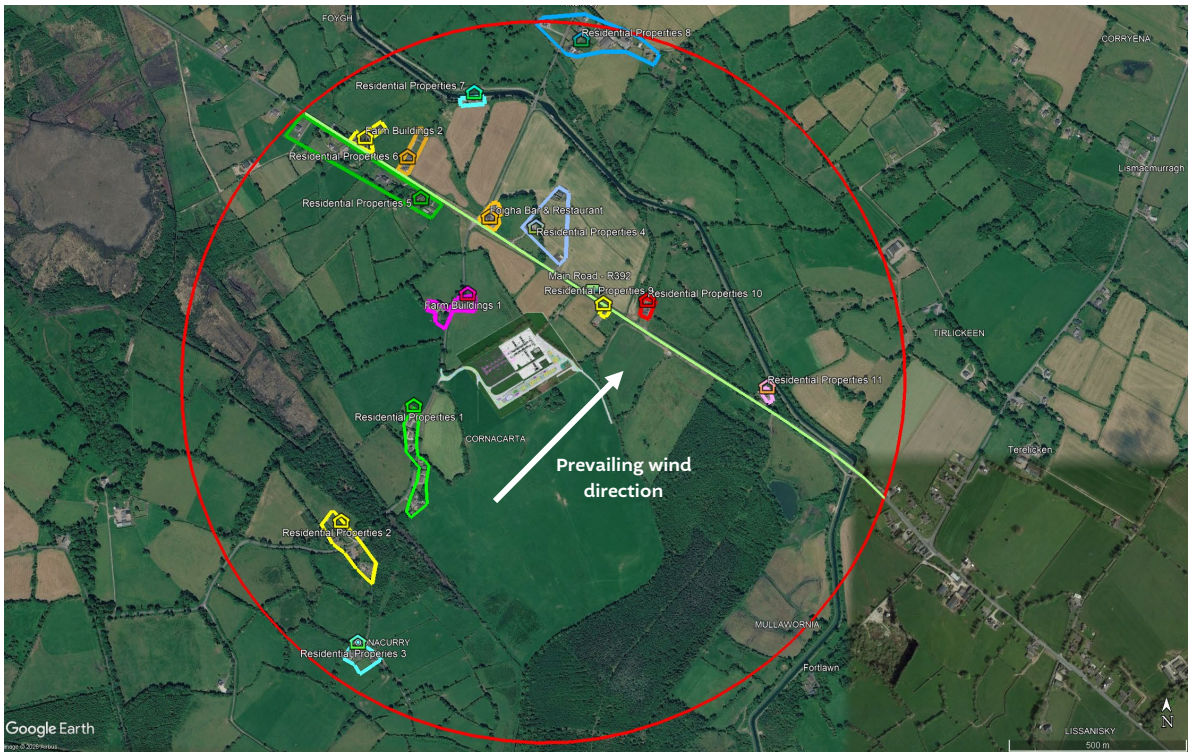


Figure 3: Receptors within 1 km of Foigha BESS

3 BESS Hazards

The main hazards introduced by BESS are associated with **thermal runaway**. As illustrated in **Figure 4**, thermal runaway may be initiated by thermal, electrical, mechanical, environmental stresses, or by cell/system faults: the abuse triggers exothermic reactions, producing large volumes of gas and heat. Eventually, the heat is produced faster than it can dissipate and the exothermic reactions become self-sustaining and the cell is in uncontrolled positive thermal feedback - "thermal runaway". The gases typically include up to 50% hydrogen, c.a. 20% carbon monoxide, carbon dioxide, methane and propene, as well as toxic chemicals. The cell can then heat up adjacent cells and send them into thermal runaway – a cascade effect called "thermal propagation". The gases inside the cells will vent to the outside taking with them droplets of the organic electrolyte to form a "vapour cloud", with the following consequences:

- **Fire**, including localised fire within a unit and fire spread to adjacent equipment or vegetation;
- **Explosion**, where flammable gases accumulate and ignite, resulting in overpressure and explosion hazards;
- **Smoke/toxic gas dispersion**, which may affect nearby personnel, emergency responders, neighbouring receptors and the wider environment; and
- **Toxic liquid release**, including contaminated firewater or other run-off affecting surrounding land and watercourses.

Figure 4 provides a summary of the main BESS hazard pathways and potential consequences.

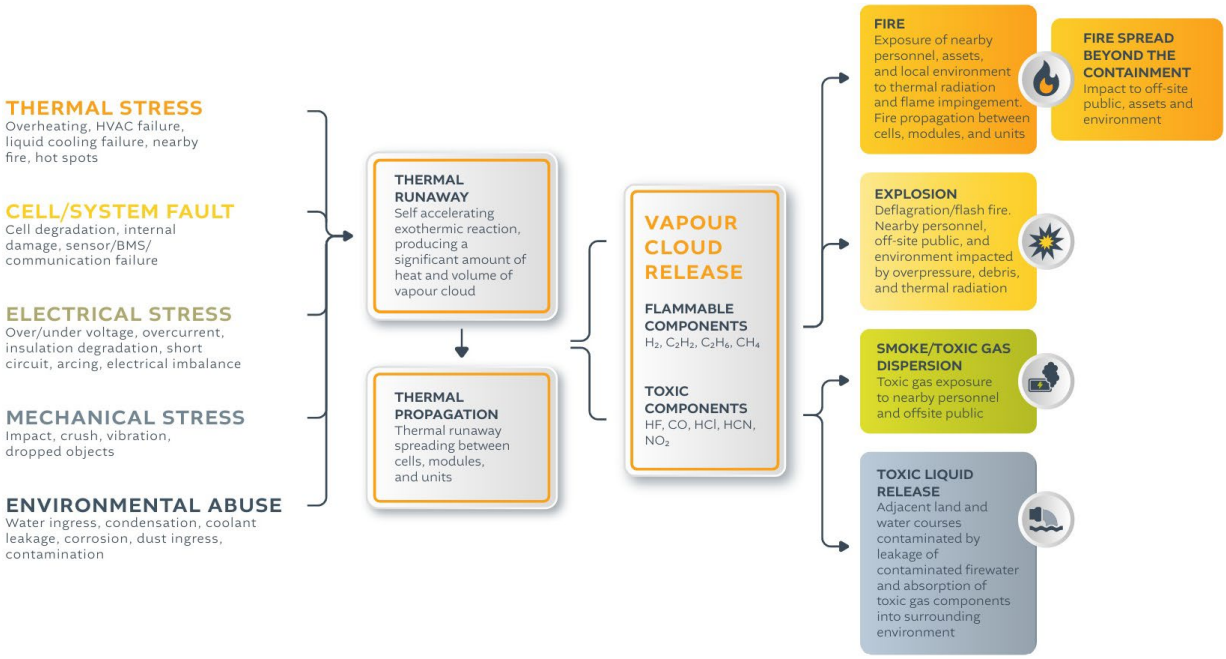


Figure 4: BESS Hazard Pathway

The other significant hazard associated with batteries is electrocution. This can be caused by the same issues highlighted against Electrical Stress above, as well as factors such as improper isolation prior to working on equipment and access to BESS containers by unauthorised personnel.

3.1 Battery Specification

The battery system proposed for the Foigha BESS is the Sungrow PowerTitan 2.0 Liquid Cooled Energy Storage System, one of Sungrow's ST5015UX model series, shown in **Figure 5**. The PowerTitan 2.0 is a containerised lithium iron phosphate (LFP) (a subset of lithium-ion batteries) battery system intended for grid-scale energy storage applications.

Figure 5: Sungrow PowerTitan 2.0 BESS

The PowerTitan 2.0 system uses intelligent liquid cooling to support battery temperature control and system performance.

Battery monitoring and protection are provided through the PowerTitan 2.0 Battery Management System (BMS), which consists of three layers: Battery Management Unit (BMU), Cluster Management Unit (CMU) and Battery System Controller (BSC). The BMS monitors cell voltage, system voltage, cell temperature, ambient temperature and current, with cell voltage sampling periods of up to 100 ms and cell temperature sampling periods of 1 second at BMU level [8].

Each PowerTitan 2.0 battery container includes integrated fire and gas safety systems [9]. The standard package includes:

- Smoke detection
- Heat detection
- Flammable gas detection
- Fire alarm control panel
- FK5112 fire suppression
- Sounder beacon
- Alarm bell
- Warning signage
- Extinguishant abort button
- Emergency ventilation system
- Pressure relief port

- Manual/automatic switching and emergency starting device.

Sungrow also offers optional sprinkler protection, aerosol suppression and explosion vent panels. These optional systems shall only be treated as part of the Foigha battery design when confirmed in the final installed configuration.

The PCS units of the Foigha BESS are to be the Sungrow SC210HX model. The SC210HX is a liquid-cooled, transformer-less PCS with a maximum DC voltage of 1500 V, a DC operating range of 1000 V to 1500 V, nominal AC voltage of 690 V, IP66 protection and grid support functions including active and reactive power control, voltage and frequency support, L/HVRT, VSG and FRT capability.

For the purposes of this ERP, it is assumed the Sungrow PowerTitan 2.0 ST5015UX will be installed at the Foigha BESS. The final installed configuration, number of battery containers, total installed capacity, optional safety systems and project specific control logic should be confirmed as the Foigha design develops.

3.2 Emergency Safety Systems and Response Measures

The following safety systems and response measures are located at the Foigha site:

Table 2: Relied Upon Emergency Systems [9] [HOLD 3]

Safety System and Response Measures	Quantity	General Location	Primary Function
Communication device - Mobile Phone	One per Operator / Site team member	Taken to site by operators	Primary means of contacting the control room operator and raising an emergency scenario.
E-stop	TBC	PCS / BESS equipment locations, as applicable	Allows emergency stop or isolation of relevant equipment.
Remote monitoring/ control room notification	TBC	Control room	Receives alarms and supports remote escalation during a BESS fault or emergency.
Battery Management System (BMS)	Integrated with each BESS container	BESS container / Remote interface	Monitors battery condition and supports alarm, fault detection, shutdown and protection functions.
PCS isolation	TBC	PCS units / associated electrical equipment	Allows isolation of power conversion equipment.
Battery System Auxiliary AC Isolation	TBC	BESS auxiliary AC distribution	Allows isolation of auxiliary AC supply to BESS support systems.
Fire Alarm Control Panel (FACP)	1 per BESS container	BESS containers	Receives fire and gas detection signals and initiates alarm / protection actions.
Smoke detectors	3 per BESS container; TBC for HX	BESS cabinet; PCS compartment for HX	Detects smoke and supports early warning of fire or abnormal conditions.

Safety System and Response Measures	Quantity	General Location	Primary Function
	container		
Heat detectors	2 per BESS container	BESS containers	Detects elevated temperature and supports fire alarm / suppression logic.
Flammable gas detectors	1 per BESS container	BESS containers	Detects flammable gas accumulation and supports alarm and ventilation activation.
Emergency ventilation system *	1 air inlet and 1 outlet device per BESS container	BESS containers	Explosion prevention by reducing flammable gas accumulation within the enclosure (**Figure 6**).
FK5112 fire suppression system **	1 per BESS container	BESS containers	Provides container-level fire suppression following confirmed fire detection logic. *Note: Following deployment of FK5112, visible flames may be suppressed, but thermal runaway and off-gassing may continue, increasing risk of explosion. Maintain a safe distance from the affected battery even if no flames are visible.*
Alarm bell / sounder beacon	TBC	BESS containers	Provides local audible/visual warning during alarm conditions.
Warning signs / alarm indicators	TBC	BESS containers	Provides warning of fire suppression discharge, gas release or other hazard conditions.
Explosion vent panels	TBC / optional	BESS containers	Relieves internal pressure, flames, debris upwards during a deflagration event, away from responders at the ground level (**Figure 7**).
CCTV	TBC	Located spaced out along the Solar and BESS Perimeter fence	To monitor the site security.
First Aid	TBC	Taken to site by operators	To administer first aid for minor injuries.
PPE – General (TBC)	All personnel bring quantity per individual to site – no access to site without PPE	Brought to site, located on persons or in vehicle – parked along access road – always taken	General PPE taken for any visit to the site. Provides protection against mechanical, electrical, fire and toxic exposure hazards, reducing potential injury severity during incident response.

* Each battery container includes an emergency ventilation system, comprising a side mounted

air inlet louvre and a roof mounted exhaust fan and louvre, as shown in **Figure 6**. During a battery fault, gas alarm or thermal runaway event, responders should avoid positioning themselves downwind of the roof mounted exhaust outlet of the affected container.

** The FK5112 clean agent fire suppression system may suppress visible flames within the container. However, it does not stop thermal runaway or off-gassing from damaged battery cells. Where FK5112 discharge has occurred, emergency responders should treat the affected container as potentially hazardous even if no flames are visible. Flammable gases may remain or continue to accumulate inside the container, creating a potential explosion/deflagration risk. Responders should not open or approach the affected container unless directed by the FRS in consultation with technical support.

Figure 6: PowerTitan 2.0 BESS Emergency Ventilation

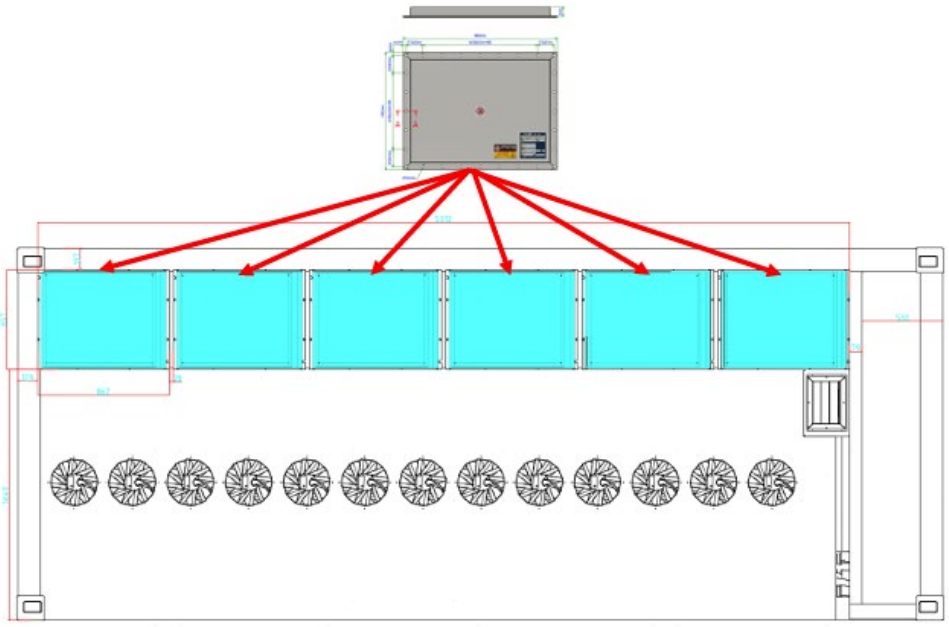


Figure 7: PowerTitan 2.0 BESS Deflagration Panel Layout

3.3 Fire and Fault Control Logic

The PowerTitan 2.0 FSS Design includes fire signal and fault signal control logic for the battery container [9], as summarised below:

1. The fire signal control logic shown in **Figure 8**, identifies the escalation from detector activation to Level 1 alarm, Level 2 alarm/emergency start, local alarm activation, FK5112 suppression discharge, BSC signal feedback and battery container stop/system power-off actions.
2. The fault signal control logic shown in **Figure 9**, identifies how fault signals from the ventilation system, flammable gas detector and FACP are transmitted to the BSC, with onward communication to the LC and station FACP/Emergency Plan.

The control logic should be used by operators and emergency responders to understand the meaning of FSS alarms and the expected automatic system response during a BESS incident. The final alarm response actions, shutdown sequence, remote monitoring interface and station FACP interface will be confirmed for the final Foigha BESS configuration. **[HOLD 5]**

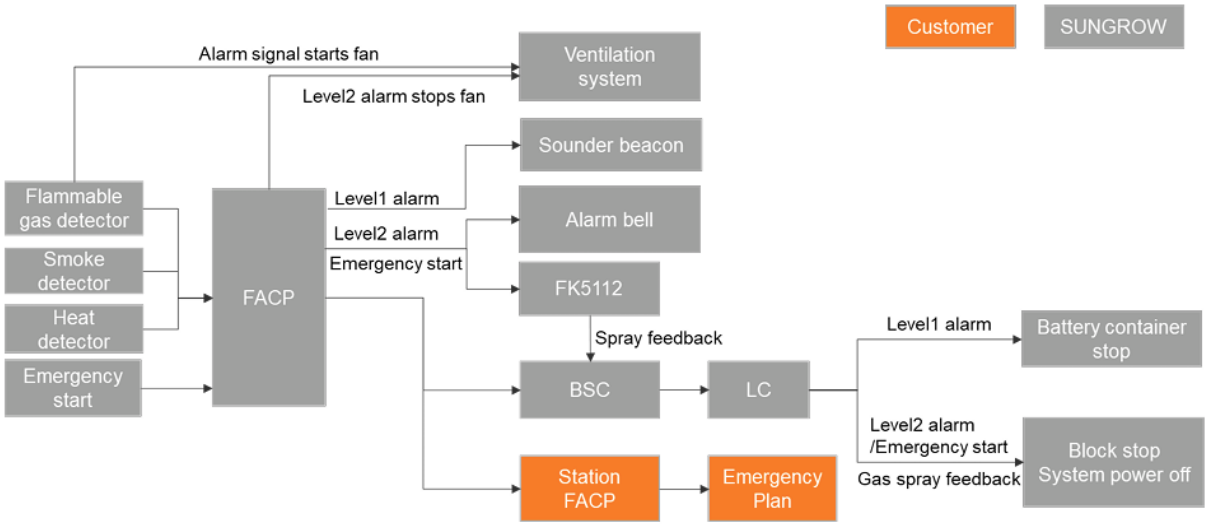


Figure 8: Fire signal control logic (standard version)

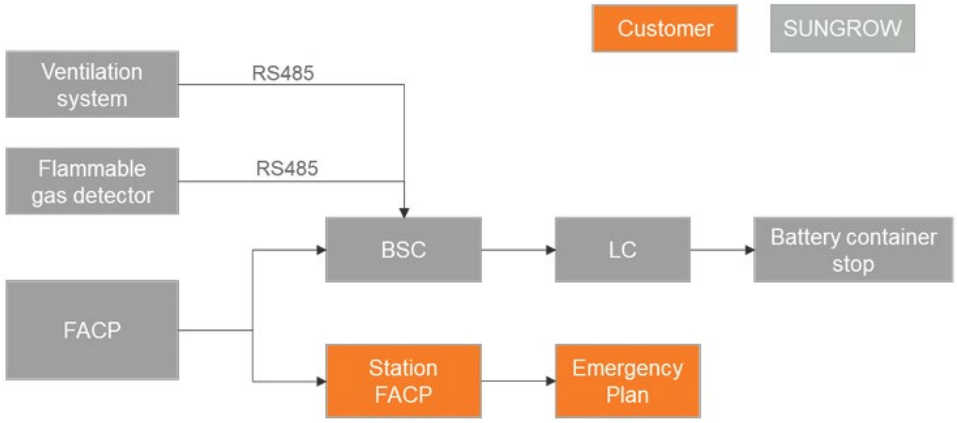


Figure 9: Fault signal control logic

4 Emergency Response Overview

4.1 Site access

The site is in a rural agricultural setting, with the R392 located to the north / north-east of the BESS area and the L1135 Cornacarta local road located to the west of the site.

The BESS compound will be accessed through the wider solar farm access track network. Internal access roads are provided around the BESS containers, PCS equipment, auxiliary transformer stations and associated electrical infrastructure to support emergency response access.

As shown in **Figure 11**, two emergency approach routes are identified for the BESS compound:

- Primary access from the west via the L1135 Cornacarta local road and internal access tracks; and
- Secondary access via the internal access route around the southern side of the solar farm, entering the BESS area from the east.

This arrangement supports emergency response by providing alternative approach routes to the BESS area. This is important where wind, smoke or vapour conditions make one approach route unsuitable during a BESS fire/thermal runaway event. The wind rose for Foigha, Longford, presented in **Figure 10**, indicates that the prevailing winds are predominantly from the south-west, with additional frequent winds from the west.

Based on the prevailing wind direction, approach from the north / north-west along the R392 and then via the L1135 Cornacarta local road may provide a more favourable approach route under typical wind conditions. However, the actual approach route will be determined by the Fire and Rescue Service at the time of the incident, taking account of the observed wind direction, smoke or vapour movement and road/access conditions.

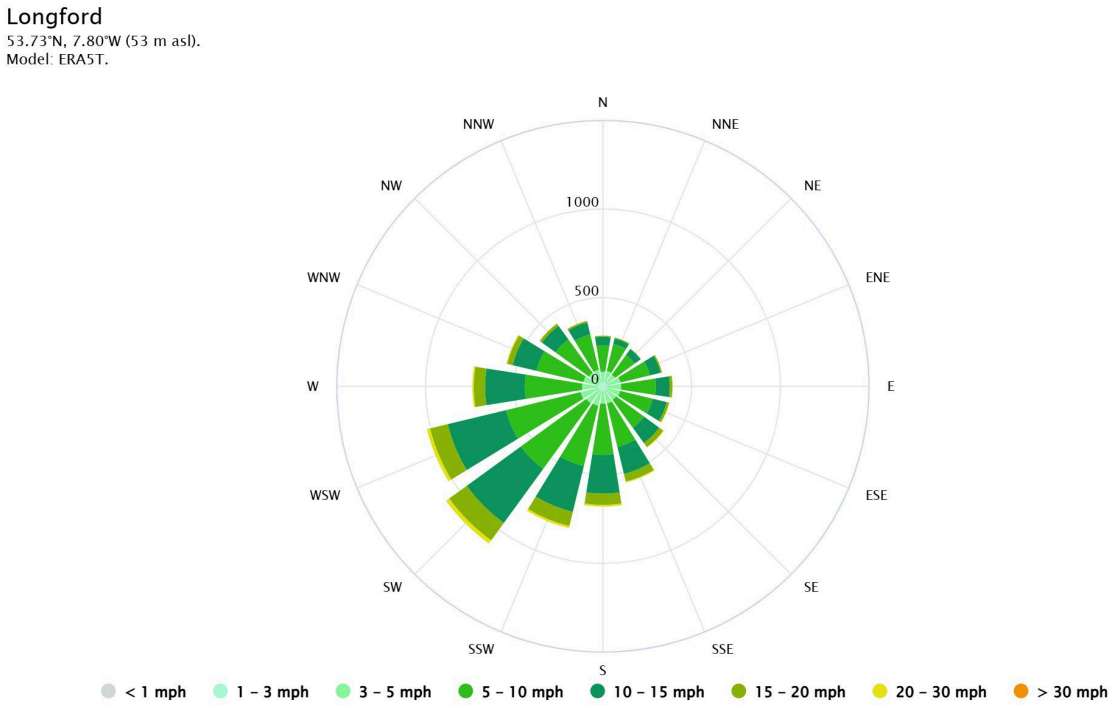


Figure 10: Wind Rose data, Longford [12]

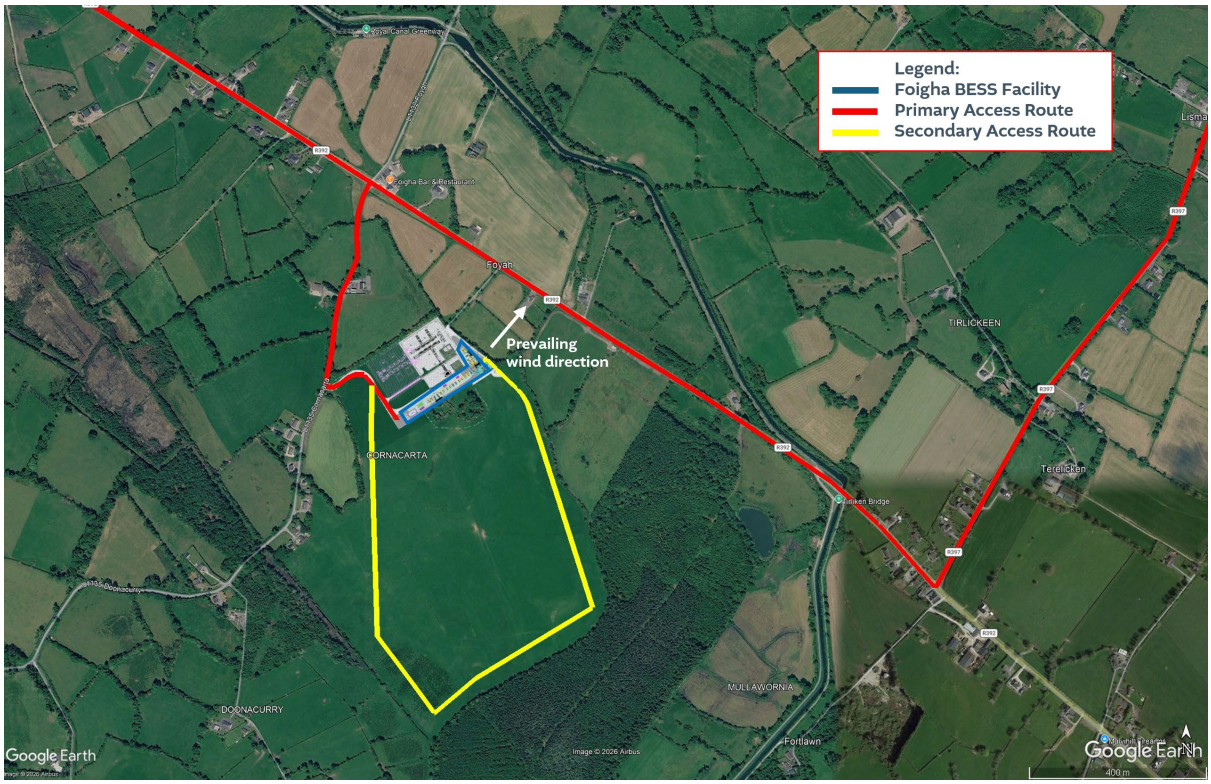


Figure 11: Primary and Secondary Emergency Access Routes

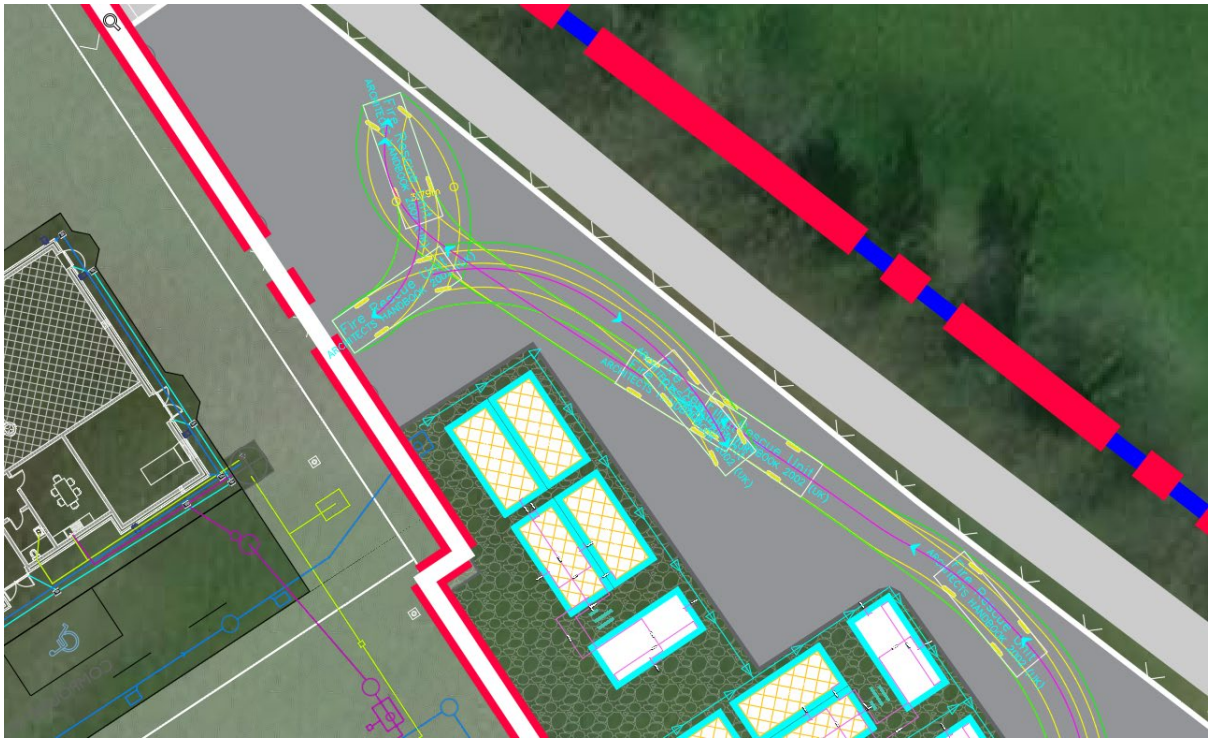


Figure 12: Fire truck turn swept path

4.2 Evacuation

An alarm shall be sounded on site to alert on-site personnel to a hazardous event, when one or more of the following conditions are detected within any of the battery containers:

- Flammable gas at 10% LEL.
- Smoke.
- Heat above the tolerable threshold.

Personnel may also be alerted to an event by the control room operator, or by observing a hazardous event that has not been detected by the battery's smoke, heat or gas detection systems. Personnel must evacuate immediately following one of the evacuation routes. **[HOLD 4]**

It is not envisaged that personnel will require any emergency equipment during an evacuation. The firefighting strategy does not include site personnel attempting to tackle a fire, so no firefighting equipment for BayWa personnel is necessary.

There shall be one person on site responsible for ensuring that everyone working on site has safely evacuated to one of the muster points. BayWa must ensure there is a suitable system in place for identifying which personnel are on site (e.g. check in/check out system at the main gate).

4.3 Firefighting

This section describes the firefighting arrangements for the Foigha BESS, including the expected response approach, firewater provision, contaminated firewater management, emergency responder access, firefighting equipment, and liaison with the local Fire and Rescue Service.

The site layout showing the firewater storage, hydrant locations and water attenuation pond is provided in **Figure 13**.

4.3.1 Firefighting strategy

The firefighting strategy for the Foigha BESS is based on a defensive response. There will be no active firefighting attempt to extinguish a BESS container that is already alight. If a thermal runaway or fire occurs within a BESS container, the affected container will be allowed to burn out, with firefighting focused on preventing escalation to adjacent BESS containers and nearby infrastructure.

This approach reflects the expected response to lithium-ion BESS fires in Guide 147 of the 2024 Emergency Response Guidebook (produced by the US Department of Transportation) [5]. Once thermal runaway is established, direct attempts to extinguish the affected container may have limited benefit because the fire can only be fully controlled if enough heat is removed from the battery cells to stop further thermal runaway. Even where visible flames are reduced, re-ignition may occur if heat remains within the affected cells or if water ingress contributes to further cell failures. Direct firefighting into the affected container may also prolong the incident and increase the volume of contaminated firewater run-off.

The main firefighting action will therefore be boundary cooling and exposure protection. Water spray will be applied to adjacent BESS containers and nearby assets to reduce heat transfer from the affected container and limit fire spread.

The expected firefighting sequence is as follows:

- **Wear appropriate Personal protective equipment (PPE)**

  FRS personnel should use appropriate PPE and respiratory protection, including self-contained breathing apparatus (SCBA), in line with FRS procedures.

- **Select the safest access route**

  The FRS will access the site using the entrance located upwind of the affected battery

where practicable. The site provides access from the east and west to account for foreseeable wind conditions (**Figure 11**).

- **Select safe position on site**

  The FRS will identify a safe location to position themselves on site. This position must be at least 30 m from the affected battery container, be upwind of the affected battery container, and allow access to a fire hydrant.

- **Check for signs of battery failure**

  The control room operator or site personnel should review available alarm and system information to establish the status of the affected BESS container. This should include checking whether smoke detection, heat detection, flammable gas detection, emergency ventilation, FK5112 suppression discharge, alarm bell / sounder beacon or shutdown signals have been activated. Indications such as visible gas, popping sounds, or suspicious odour emanating from the container can be an indication of abnormal and hazardous conditions. If FK5112 suppression has discharged, responders should be advised that visible flames may be suppressed while thermal runaway and off-gassing may continue, creating a potential explosion/deflagration risk. **[HOLD 5]**

- **Use the safest available hydrant**

  The FRS will access the firewater hydrant located upwind of the affected battery where practicable. Hydrants are located towards the eastern and western ends of the site to support this approach (**Figure 13**).

- **Confirm drainage isolation before water application**

  Before applying water, the FRS will confirm that the site drainage system has been isolated from the surroundings. This is to prevent contaminated firewater run-off from entering the surrounding environment.

- **Carry out boundary cooling from a safe distance**

  The FRS will apply water spray to adjacent BESS containers, and other assets to reduce heat transfer and prevent escalation. This will be carried out from a safe distance, at least 30 m from the affected battery where practicable, to protect responders from thermal radiation, ejecta, explosion overpressure or debris.

- **Allow the affected container to burn out**

  The affected BESS container will not be actively extinguished. It will be allowed to burn out while boundary cooling is used to prevent spread to adjacent containers and other assets.

- **Monitor for re-ignition**

  The situation will be monitored for at least 24 hours after the initial fire has subsided. Thermal imaging cameras may be used to assess the status of the affected BESS container. FRS personnel should not approach the affected battery until all parties are confident that the situation has subsided.

A representative from BayWa, the operator and/or Sungrow technical support will support the FRS during the incident where available. This support will include provision of site specific and technology specific information, including BESS status, alarm information, shutdown/isolation information, fire safety system status and relevant supplier guidance.

Section 6 defines the expected response actions for each BESS incident scenario, including site evacuation, incident assessment, boundary cooling, protection of adjacent infrastructure, use of firewater, avoidance of unsafe intervention, smoke and gas management, contaminated run-off control and post-incident monitoring.

4.3.2 Firewater Provisions

The firewater provision for Foigha is intended to support boundary cooling and exposure protection. It is not intended to support active suppression of an already alight BESS container.

The layout identifies dedicated firewater provision for the BESS area, as shown in **Figure 13**. A fire water tank volume of 200 m^3 has been provided western/south-western side of the BESS compound. The tank location is more than 10 m from the nearest BESS container, supporting safe access and use by the FRS during an incident.

The current design allows for a minimum firewater provision of 180,000 L, based on 25 L/s for 120 minutes. The final tank volume, outlet arrangement, flow rate and connection details will be confirmed during detailed design, in liaison with the FRS. **[HOLD 6]**.

Firewater hydrants are located towards the eastern and western ends of the BESS area, as shown in **Figure 13**. The hydrants are located more than 40 m from the nearest BESS containers, allowing responders to access water from a safer position during an incident. Responders should use a hydrant located a safe distance from the affected BESS container and, where practicable, upwind of the affected area.

Where hydrants, outlets or connection points are provided, they will be clearly marked, accessible to FRS vehicles, and protected from vehicle impact where required. The outlet and connection details will be agreed with the local FRS. **[HOLD 7]**

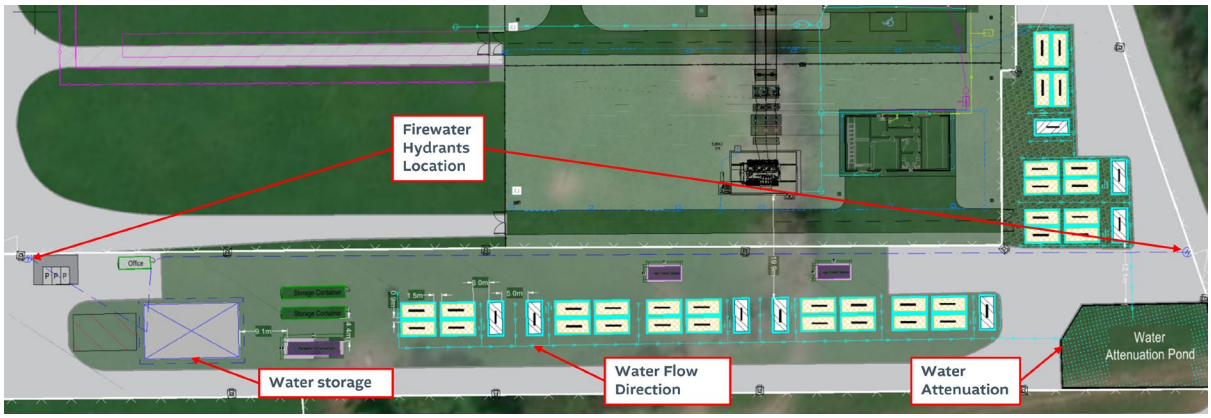


Figure 13: Firewater provisions

Firewater run-off will be managed through the site drainage and attenuation arrangements. The l ayout in **Figure 13** shows a water attenuation pond on the eastern side of the BESS area. The volume of the the attenuation pond is approximately 350 m^3. The pond volume will be refined during detailed design to align with the maximum expected firewater volume during an incident and to account for worst case flood conditions.

The drainage system is designed so that run-off from the BESS area is directed to the attenuation pond. The drainage system will be isolated from the surroundings through a shut-off valve, with isolation automated when fire conditions are detected in any battery on site. This allows potentially contaminated firewater run-off to be retained for assessment, treatment or removal following an incident.

4.4 Remediation

Following an incident, the affected area will not be re-entered until it has been confirmed safe by the FRS in consultation with the operators and Sungrow representative. The recovery process will consider residual electrical hazards, potential re-ignition, damaged battery equipment, contaminated residues, firewater run-off and environmental impacts.

The affected BESS container and surrounding area will be monitored after the incident, including

for signs of re-ignition. Monitoring will continue for at least 24 hours after the initial fire has subsided, where required by the incident conditions. Thermal imaging cameras may be used to support this assessment.

The post incident recovery arrangements will include:

- de-energising affected equipment;
- isolating the damaged BESS unit or area;
- controlling access to the incident area; and
- arranging removal or disposal of damaged equipment and waste materials.

Contaminated firewater and incident run-off retained within the drainage and attenuation system will be assessed before discharge, treatment or removal from site. The recovery arrangements will identify how retained water will be sampled, treated, removed or disposed of following an incident. **[HOLD 8]**

Damaged BESS components, residues and contaminated materials will be managed as waste and removed by suitably competent contractors in line with applicable environmental and waste management requirements.

The site will only return to normal operation once the affected area has been made safe, damaged equipment has been assessed or removed, environmental controls have been completed, and any required investigation, approval or recommissioning process has been closed out.

5 Emergency Services

5.1 Contact Information

The persons that could be involved in an emergency scenario, their responsibilities and contact information are presented in **Table 3**. See **Section 6** for ERPs and who is required to be contacted for different events.

Table 3: Emergency Contact Information [HOLD 9]

Name	Position	Organisation	ERP Responsibilities	Contact Number
TBC	Operations (BESS)	BayWa	Responsible for contacting Control Room	TBC
TBC	Operations (Solar)	BayWa	Responsible for contacting Control Room	TBC
TBC	Site Representative	BayWa	Responsible for attending incident	TBC
TBC	Control Room Operator	BayWa	Responsible for initiating ERP and being the Primary Point of Contact with the Emergency Services and local receptors. Responsible for contacting emergency services, site representative (Solar and BESS, if incident is related to battery container) and local residents.	TBC
TBC	Emergency representative	BayWa	To be contacted if emergency incident is related to battery containers. Responsible for attending incident following any incident.	TBC
n/a	Fire and rescue service	Longford County Fire & Rescue Service	Responsible for arranging FRS to attend site to follow firefighting strategy/ERP until situation is declared safe.	999 Local service: +353 43 334 71 36
n/a	Ambulance service	Longford Ambulance Station	Responsible for arranging ambulance service to attend site and treat casualties, as required.	999
n/a	Police	Longford Garda Station	Responsible for people management and traffic management, as required (e.g. diverting traffic away from hazardous zone and to ensure a clear path along access routes).	999 Local service: +353 43 335 0570
TBC	Sungrow Technical Support Representative	Sungrow	To provide technical support during BESS related incidents and post incident recovery / re-entry advice.	TBC

5.2 Hospital and Ambulance Service

The closest hospital to the Foigha BESS site is Midland Regional Hospital, Mullingar located to the east direction approximately 35 km from the BESS site. And the closest Ambulance Service to the Foigha BESS site is Longford Ambulance Station located north direction approximately 18 km from the BESS site.

The address and maps showing the most direct routes are provided below:

Midland Regional Hospital
Longford Rd, Robinstown (Levinge),
Mullingar, Co. Westmeath,
N91 NA43, Ireland

Longford Ambulance Station
6 Golf View,
Glack, Longford,
N39 E0W0, Ireland

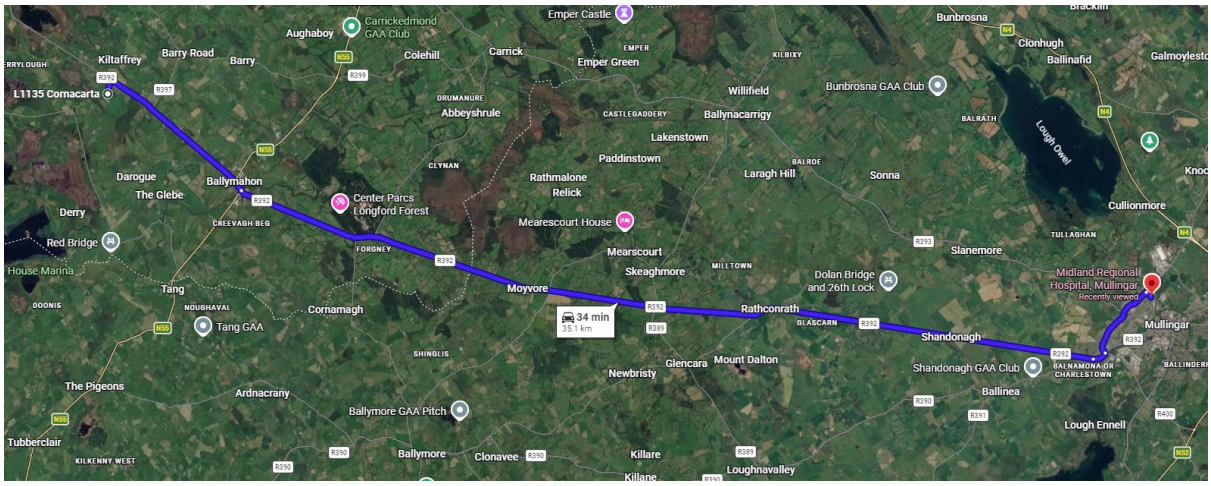


Figure 14: Google Directions from Foigha BESS Site to Midland Regional Hospital

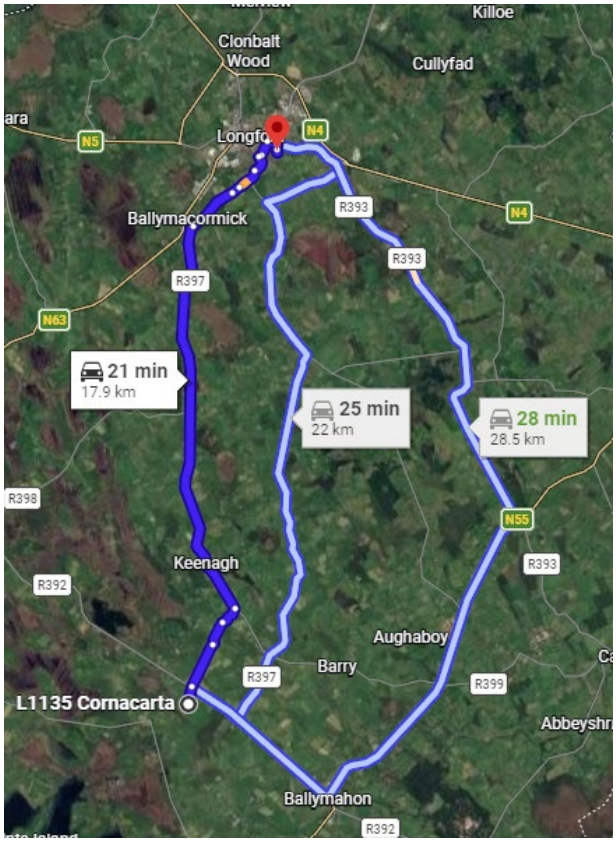


Figure 15: Google Directions from Foigha BESS Site to Longford Ambulance Station

5.3 Fire and Rescue Service

The closest fire and rescue station to the Foigha BESS Facility is the Ballymahon Fire Station, located approximately 5.8 km south-east from the site at the following address:

Ballymahon Fire Station
Park Side Gardens,
Edgeworthstown Road,
Ballymahon, Co. Longford
N39 RK11, Ireland

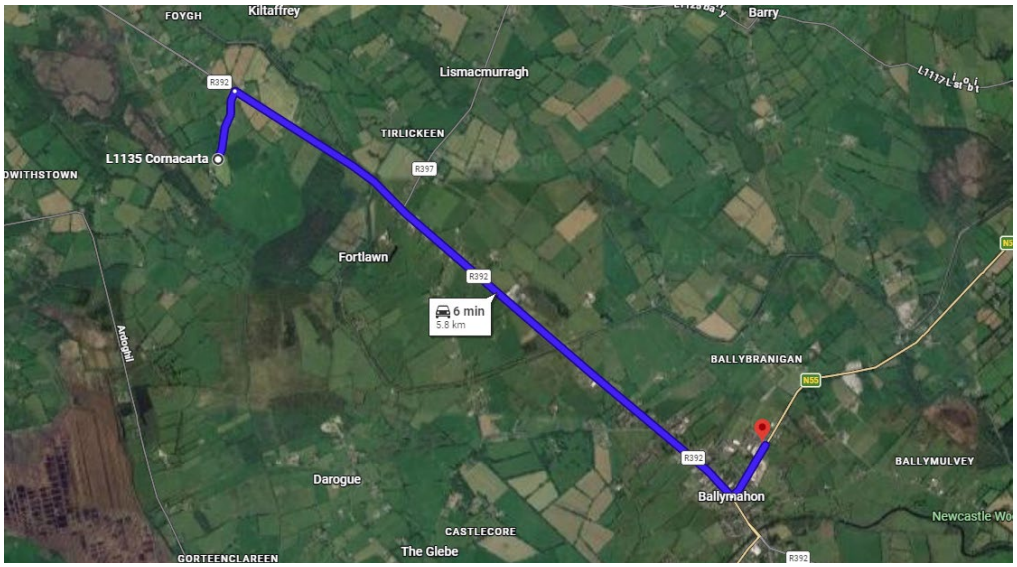


Figure 16:Google Directions from Foigha BESS Site to Ballymahon Fire Station

5.4 Police Service

The closest police station to the BESS Facility is the Ballymahon Garda Station, located approximately 5.7 km south-east from the site at the following address:

Ballymahon Garda Station
Battery Rd,
Abbeycartron, Longford,
N39 VE84, Ireland

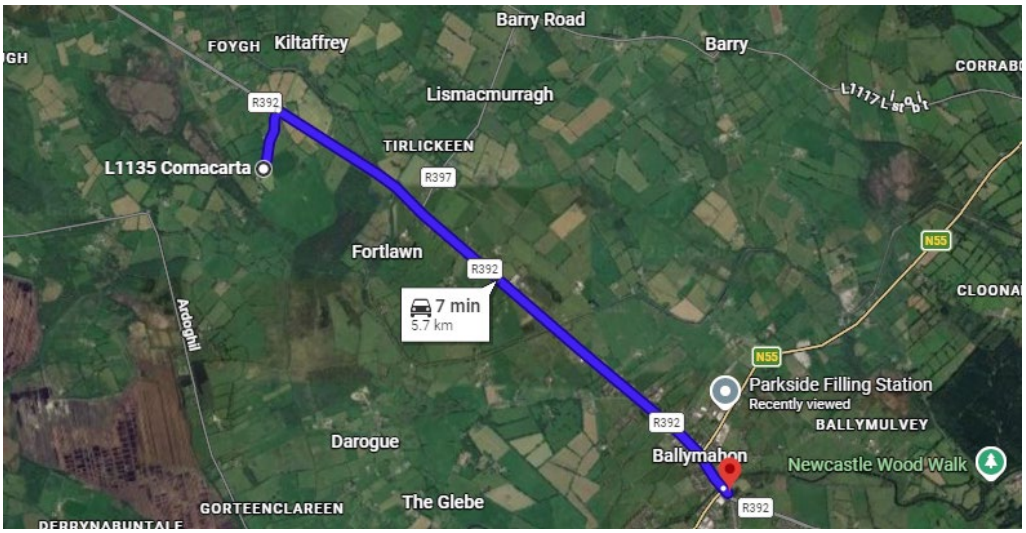


Figure 17: Google Directions from Foigha BESS Site to Ballymahon Garda Station

6 Emergency Response Plans

The emergency response required will depend on the type of incident, the scale of the event and the potential for escalation. This section provides incident specific response plans for the foreseeable BESS emergency scenarios identified for Foigha. The main emergency response categories identified for Foigha are:

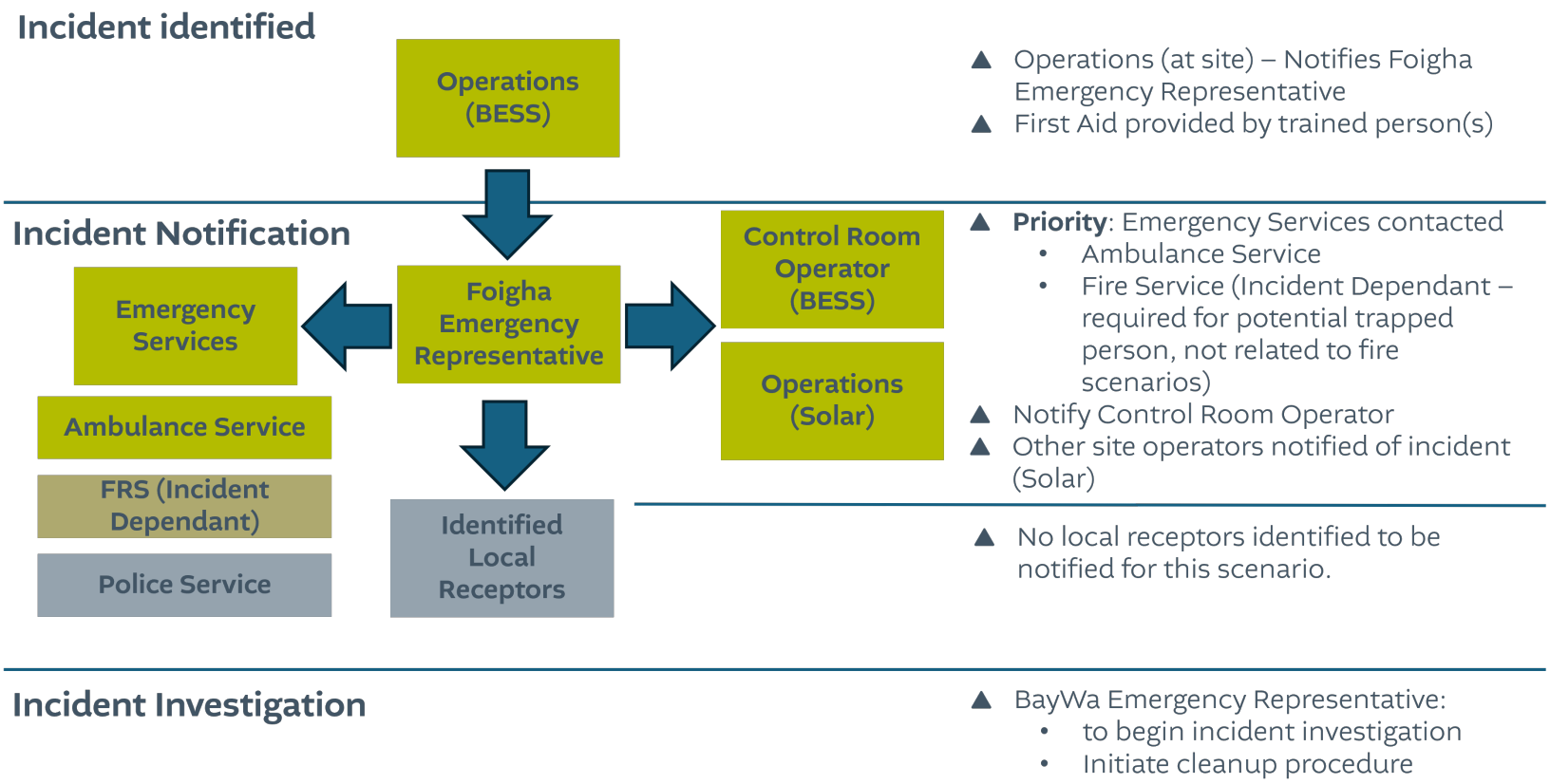
- First Aid – Medical Emergencies
- Thermal runaway and Fire Incident
- External Site Fire

Each emergency response category has its own plan, presented in the tables below. Each Emergency Response Category has its own plan with the following topics covered:

- Emergency Communications
- Initial response action and muster points
- Significant Hazards Notification for Emergency Responders
- Access Arrangements for Emergency Responders
- Local Receptors to notify
- FRS role and expected response
- Relied upon systems
- Actions to avoid
- Applicable procedures/plans
- Post incident actions

The Emergency services required to be contacted will depend on the severity of the incident and any escalation potential, it will be the Control Room Operator's responsibility to determine which emergency services need to be contacted.

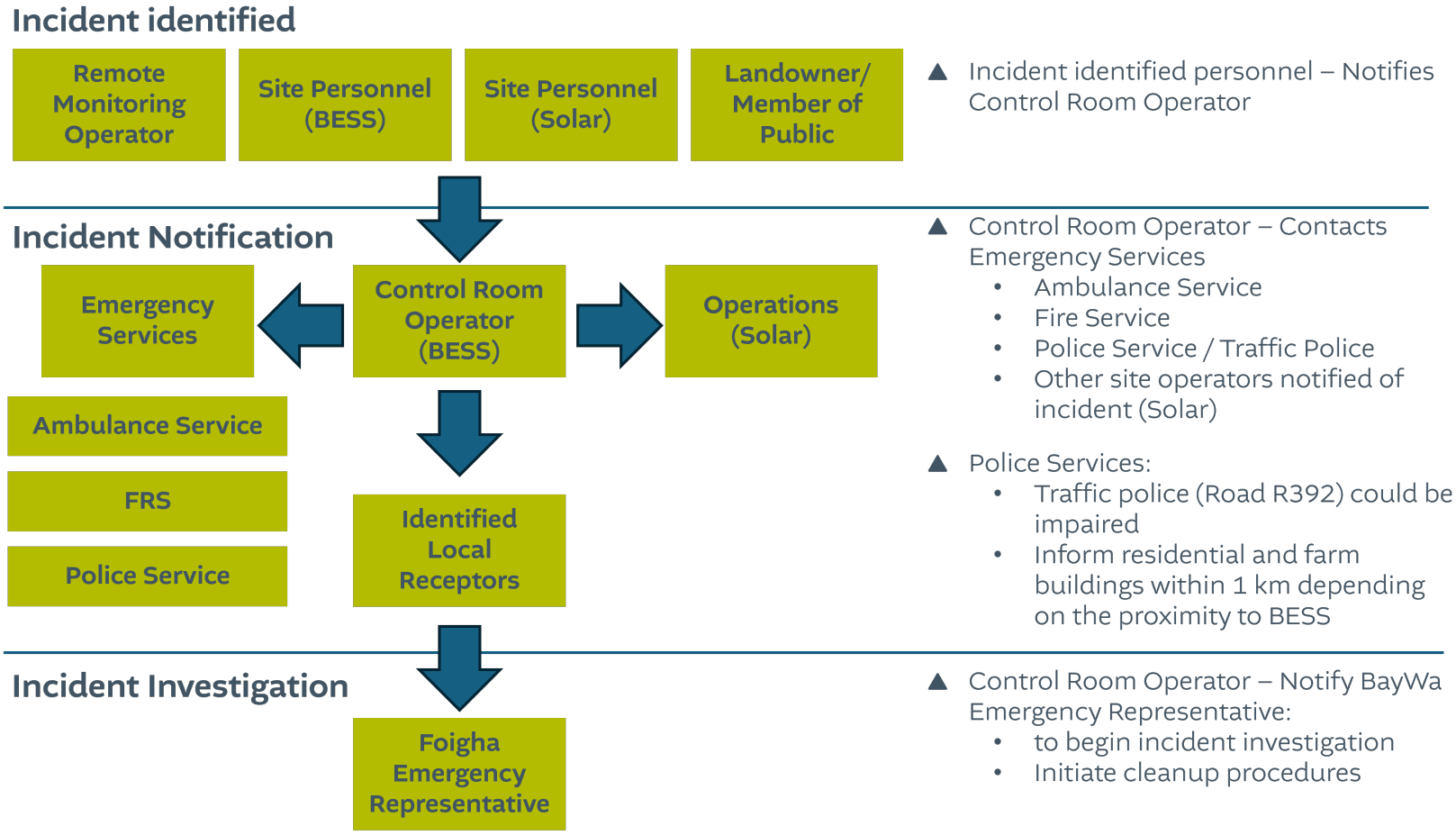
6.1 First Aid – Medical Emergency

Topic	Details
Emergency Communications **Green boxes** – To Action **Brown boxes** – Action required depending on Incident type **Grey** – Not required to be contacted	

Topic	Details
Initial response actions	**1.** Notify the Foigha Emergency Representative. **2.** Provide first aid by trained personnel where safe to do so. **3.** Stop work in the affected area. **4.** Keep the casualty away from live equipment, BESS containers, PCS equipment, transformers and other electrical infrastructure where practicable. **5.** If electrical contact is suspected, do not touch the casualty until the equipment has been isolated by authorised personnel or the area is confirmed safe.
Significant Hazards Notification for Emergency Responders	▲ Electrical Hazards - High Voltage ▲ Batteries remain live several hours after shutdown.
Access Arrangements for Emergency Responders	Use designated site access route, see **Section 4.1**: Site Access. Foigha Emergency Representative to direct responders to casualty location.
Local Receptors to notify	None Identified
FRS role and expected response	Not normally required for medical emergency. May assist if person is trapped, access is unsafe, or electrical/BESS hazards affect rescue.
Relied upon systems	Communication devices E-stop Battery Management Controller - Shutdown
Actions to avoid	**1.** Do not touch casualty if electrical contact is suspected. **2.** Do not enter restricted electrical or BESS areas unless authorised. **3.** Do not move casualty unless needed for immediate safety or life saving care.

Topic	Details
Applicable procedures / plans	Foigha Emergency Response Plan, Foigha Battery Safety Management Plan, Foigha O&M Manual, First aid procedure, Electrical safety procedure. **[HOLD 10]**
Post incident actions	**1.** Record incident **2.** Review response and update procedures if required

6.2 Thermal Runaway and Fire Incident

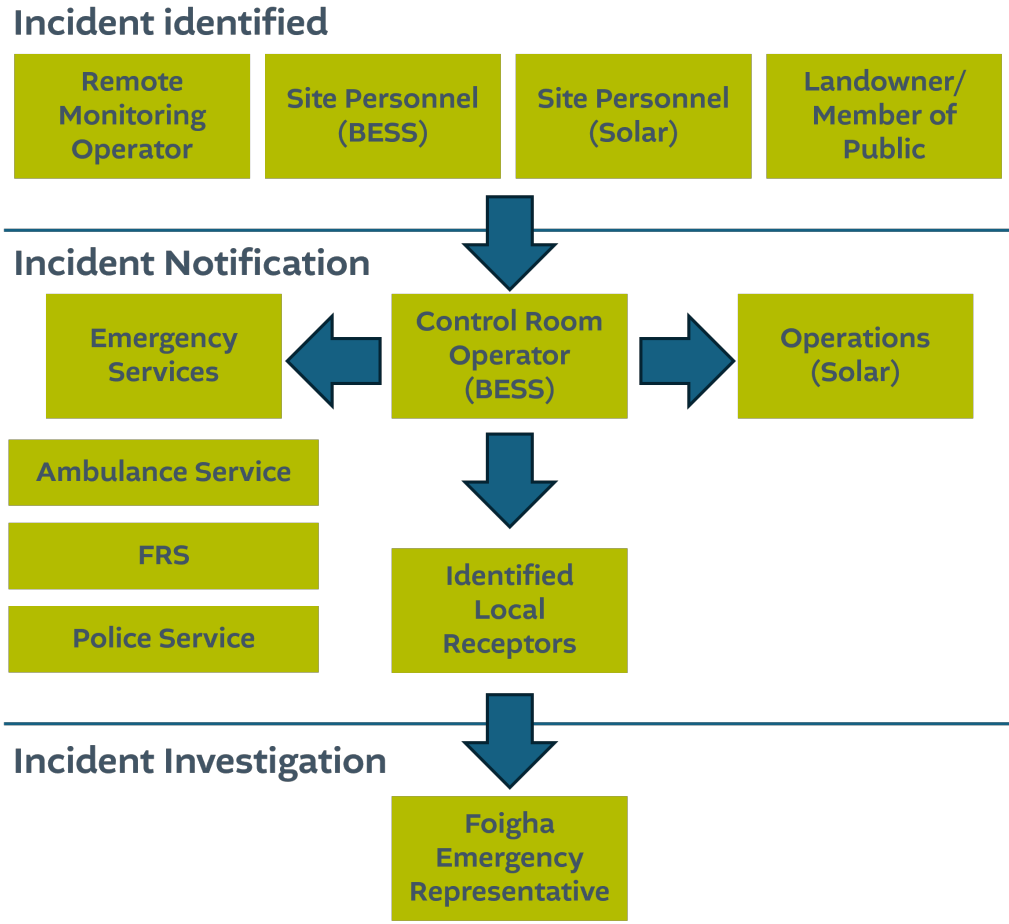
Topic	Details
Emergency Communications **Green boxes** – To Action **Brown boxes** – Action required depending on Incident type **Grey** – Not required to be contacted	

Topic	Details
Initial response actions	**1.** Notify the Foigha Emergency Representative. **2.** Stop work and evacuate the affected area and move to muster point. **[HOLD 4]** **3.** Control Room Operator to confirm affected unit and alarm status where possible. **4.** Remote shutdown to be arranged where available (if not already initiated by the Battery Management System).
Significant Hazards Notification for Emergency Responders	▲ Shutting off power to the BESS does not de-energise the battery, and a shock hazard may still be present ▲ Toxic smoke will be produced during a thermal runaway/fire event. Position yourself upwind and at least 30 m from the affected battery container to prevent inhalation ▲ Battery fires can reach temperatures over 1000 °C and debris/ejecta can be thrown from the container. Position yourself at least 30 m from the affected battery container to avoid exposure to thermal radiation and debris/ejecta ▲ Explosion/deflagration risk. Explosions can occur even during active fires. Position yourself at least 30 m from the affected battery at all times to protect against explosion overpressure, flames, and debris/ejecta. ▲ Re-ignition risk. Re-ignition and further explosions can occur hours or days after the initial incident. ▲ FK5112 clean agent suppression may have discharged. Visible flames may be suppressed, but thermal runaway and off-gassing may continue, creating a potential explosion/deflagration risk. Maintain a distance of at least 30 m from the battery even if no flames are visible.
Access Arrangements for Emergency Responders	Use designated site access route, see **Section 4.1**: Site Access. Assess current wind direction and approach the site from upwind side to prevent exposure to toxic smoke.
Local Receptors to notify	Notify only where required by incident scale, smoke/gas behaviour, and wind direction Notify Police service of the receptors located in 1 km radius. **[HOLD 11]**
FRS role and expected response	Follow the firefighting strategy in **Section 4.2**. ▲ Wear SCBA and firefighting gear which can provide appropriate protection during BESS events ▲ Review information provided by the BMS with site personnel to establish threat conditions

Topic	Details
	▲ Approach from the upwind side where practicable. ▲ Access the safest available hydrant. ▲ Maintain at least 30 m from the affected BESS container while having access to firewater. ▲ Allow the affected container to burn out. ▲ Confirm drainage isolation before applying water ▲ Apply boundary cooling to adjacent BESS containers and nearby assets at risk ▲ Monitor for explosion event or re-ignition after fire subsides ▲ Do not approach or open the affected container unless directed in consultation with technical support, who confirm that the incident has subsided
Relied upon systems	**1.** Communication devices **2.** CCTV/site monitoring **3.** BMS/control system information **4.** Smoke, heat and flammable gas detection **5.** FACP **6.** Emergency ventilation **7.** FK5112 suppression system **8.** Alarm bell/sounder beacon/warning signs **9.** Remote shutdown/isolation **10.** Firewater tank and hydrants

Topic	Details
Actions to avoid	**1.** Do not open a battery container when there is a fault condition. **2.** Do not approach within 30 m of the affected BESS container. **3.** Do not assume the affected container is safe because visible flames are not present or because FK5112 suppression has discharged. **4.** Do not directly apply water into affected container. **5.** Do not isolate emergency ventilation during gas event unless required by agreed strategy. **6.** Do not approach affected container until incident has subsided and area is confirmed safe. **7.** In case of flooding, stay out of the water if any parts of the BESS or its wiring is submerged.
Applicable procedures / plans	Foigha Emergency Response Plan, Foigha Battery Safety Management Plan, Foigha O&M Manual, Sungrow emergency guidance, Site evacuation procedure
Post incident actions	**1.** Monitor affected area for at least 24 hours where required. **2.** Use thermal imaging cameras where available (do not rely on them as the only means of confirming temperature or safe re-entry. Vapour or smoke from thermal runaway may obscure readings and indicate a lower temperature than is actually present). **3.** Retain contaminated firewater in drainage/attenuation pond until it has been treated and disposed of responsibly by a suitably qualified contractor. **4.** Do not re-enter or return unaffected equipment to service until area is confirmed safe to operate.

6.3 External Fire Incident

Topic	Details
Emergency Communications **Green boxes** – To Action **Brown boxes** – Action required depending on Incident type **Grey** – Not required to be contacted	 ▲ Incident identified personnel – Notifies Control Room Operator ▲ Control Room Operator – Contacts Emergency Services • Ambulance Service • Fire Service • Police Service / Traffic Police • Other site operators notified of incident (Solar) ▲ Police Services: • Traffic police (Road R392) could be impaired • Inform residential and farm buildings within 1 km depending on the proximity to BESS ▲ Control Room Operator – Notify BayWa Emergency Representative: • to begin incident investigation • Initiate cleanup procedures

Topic	Details
Initial response actions	**1.** Notify the Foigha Emergency Representative. **2.** Stop work and evacuate the affected area and move to muster point. **3.** Monitor whether fire could spread towards BESS or electrical infrastructure. **4.** Consider shutdown/isolation to be arranged where available.
Significant Hazards Notification for Emergency Responders	▲ BESS containers nearby ▲ High voltage electrical equipment ▲ If fire spreads to BESS: o Toxic smoke o Flammable gas generation and fire o Explosion/deflagration risk o Ejecta, debris and thermal radiation
Access Arrangements for Emergency Responders	Use designated site access route, see **Section 4.1**: Site Access. The approach route should be selected based on the incident location, wind direction, smoke or vapour movement, visibility and access conditions.
Local Receptors to notify	Notify only where required by incident scale, smoke/gas behaviour, and wind direction Notify Police service of the receptors located in 1 km radius.
FRS role and expected response	▲ Manage external fire ▲ Protect and prevent spread to BESS and associated infrastructure ▲ If BESS becomes involved follow the firefighting strategy in **Section 4.2** and ERP for thermal runaway and fire incident in **Section 6.2**

Topic	Details
Relied upon systems	**1.** Communication devices **2.** CCTV/site monitoring **3.** Emergency shutdown/isolation **4.** Firewater tank and hydrants
Actions to avoid	Do not approach BESS containers or electrical infrastructure if affected by fire.
Applicable procedures / plans	Foigha Emergency Response Plan, Site evacuation procedure
Post incident actions	Check whether the BESS container and associated infrastructures are affected.

7 Training and Drills

Technical training will be required for BayWa personnel working on the BESS and shall be provided by Sungrow. Appropriate knowledge of how to safely inspect, maintain, and operate the BESS will be key in minimising the risk of hazardous incidents occurring. This training should be provided by Sungrow or another suitably competent party and should cover the safe operation, inspection, maintenance, shutdown and isolation of the installed BESS system.

Personnel carrying out inspection, maintenance or electrical work on the BESS shall be suitably competent and qualified for the tasks they are undertaking.

ERP familiarisation will be included in the site induction for personnel attending the Foigha Solar and BESS site. This should cover the emergency contact arrangements, site access routes, muster points, alarm response, evacuation arrangements, firefighting strategy and actions to avoid during a BESS incident.

A schedule for regular drills and emergency response exercises will be developed by BayWa in coordination with the operator and local FRS. It is expected that an ERP drill will be carried out within the first six months of operation and then on an annual basis thereafter, unless an alternative frequency is agreed with the local FRS. **[HOLD 12]**

The local FRS should be familiarised with the Foigha BESS before operation. This should include the BESS layout, site access routes, hydrant locations, firewater tank, drainage isolation arrangements, emergency systems, alarm information, firefighting strategy and the expected response to a thermal runaway / fire incident.

Systems relied upon to prevent, detect or respond to emergency conditions should be tested at a suitable frequency to confirm they remain available and reliable. This includes alarms, detection systems, shutdown / isolation functions, BESS controls, communication arrangements and drainage isolation. The final test frequency will be confirmed with Sungrow, BayWa, the operator and relevant equipment suppliers. **[HOLD 13]**

Records shall be kept for training, drills, emergency system testing and lessons learned. The ERP should be reviewed at least annually and following any emergency exercise, incident, significant design change, change in operational arrangements or feedback from the local FRS. Any findings, recommendations or actions identified during drills or incidents shall be recorded, tracked to completion and used to update the ERP where required.

The ERP shall also be reviewed against relevant updates to BESS safety guidance, supplier information and industry lessons learned. Where new information identifies a reasonably practicable improvement to the emergency response arrangements, the ERP and associated procedures shall be updated.

8 References

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[5] U.S. Department of Transportation, Emergency Response Guidebook 2024

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[11] UL Firefighter Safety Research Institute, Four Firefighters Injured in Lithium-Ion Battery Energy Storage System Explosion – Arizona, 28 July 2020

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