



BATTERY MANAGEMENT PLAN

GOLDBOROUGH ROAD BATTERY ENERGY STORAGE SYSTEM
LAND SOUTH OF GOLDBOROUGH ROAD, HUNDLETON, PEMBROKE, NEAR SA71 5SH
P16-01-BMP JANUARY 2024

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1. INTRODUCTION

- 1.1 This Battery Management Plan has been prepared on behalf of Pembroke Green Limited (“The Applicant”) to accompany planning applications to Pembrokeshire County Council (PCC) for the proposed installation of a battery energy storage system with associated infrastructure and works (“the Proposed Development”) on south of Goldborough Road, Hundleton, Pembroke, near SA71 5SH (“the Site”).
- 1.2 This Battery Management Plan has been prepared by Enso Energy with appropriate input from battery design engineers and scheme funders. It has been prepared with sufficient technical expertise to inform the planning application and to offer the Local Planning Authority comfort within the scope of their planning assessments and considerations.
- 1.3 This Battery Management Plan first provides an overview of the Site and Proposed Development (Section 2), before detailing an overview of management and safety practices to be implemented as part of the battery storage facility at Goldborough Road BESS focussing on fire safety (Section 3). The report is then concluded (Section 4).
- 1.4 It is expected that a final Battery Management Plan could be secured through a pre-commencement planning condition of the battery energy storage system (‘BESS’). This approach is consistent with other planning applications, appeal and Secretary of State decisions including Developments of National Significance (DNS) and Nationally Significant Infrastructure Projects (NSIP) to account for the advances in battery technology between obtaining planning permission and the start of construction.

2. THE SITE AND PROPOSED DEVELOPMENT

The Site

- 2.1 The Site comprises land totalling approximately 6.8 hectares (ha). This includes the main BESS site, access to the public highway, and the underground cable route that connects the BESS to the point of connection at Pembroke Substation to the north of the Site.
- 2.2 The main BESS site sits within an irregularly shaped agricultural field, with the cable route to the point of connection crossing agricultural land and Goldborough Road to the east, before turning north towards Pembroke Power Station. The grid reference for the proposed BESS site is SM 92762 01061.
- 2.3 With regards to topography, the main BESS Site has a southerly aspect, sloping gently from approximately 60m above ordnance datum (AOD) on the northern boundary to 55m AOD on the southern boundary.
- 2.4 The immediate context comprises agricultural land set within fields which have strong hedgerow boundaries. The southern and western boundaries of the Site are bounded by a belt of trees and a watercourse. The eastern and northern boundaries comprise hedgerow planting. There is a small gap in planting on the north-western boundary.
- 2.5 Agricultural land and the settlement of Wallaston Green are located to the south; The C3101 road, agricultural land and two solar farms (Hoplass Solar Farm and Wogaston Solar Farm) are located to the west; Green Hill Reservoir is located to the north with Pembroke Power Station, the Valero Oil Refinery beyond; agricultural land and Lambeth Farm are located to the east.
- 2.6 The Valero Oil Refinery and the Pembroke Combined Cycle Gas Turbine ('CCGT') Power Station with overhead electricity transmission power lines are located approximately 1km north of the Site. Within the broader setting, the Dragon LNG terminal and South Hook LNG terminal are visually prominent features within the landscape near Milford Haven.
- 2.7 Pembroke Dock is located approximately 3.5km to the north-east of the Site. Milford Haven is located approximately 5km to the north-west of the Site.
- 2.8 Access to the Site is achieved via the C3101, leading to the B4320 towards Pembroke with the A477 beyond. There are no Public Rights of Way (PRoW) within the BESS Site. The Wales Coast Path, which runs around and through the Angle Peninsula is located approximately 1km to the

east of the BESS Site at its closest point. Footpath SP34/6 is located approximately 100m to the northeast of the BESS site.

The Proposed Development

- 2.9 The Proposed Development is for a Battery Energy Storage System which will provide high-speed energy balancing services to the National Grid. All associated plant and equipment, together with associated development (such as CCTV and fencing), landscaping and works are included within the proposals. The Proposed Development would operate for a temporary period of 40 years.

EIA Screening Response

- 2.10 In response to the Environmental Impact Assessment (EIA) Screening Requests made to NCC regarding the Proposed Development, NCC confirmed that an Environmental Statement would be required, and therefore the Proposed Development is 'EIA Development'.

3. BATTERY MANAGEMENT PLAN

Report scope

- 3.1 The use of batteries (including lithium-ion as well as other compositions of battery) as a means of energy storage is a maturing technology and emerging practice in the global renewable energy sector but is based on technological advances and development of energy storage at smaller scales used for decades.
- 3.2 As with all new and emerging practices within the UK, the Health and Safety Executive, Fire Services and other relevant oversight or regulatory bodies and safety groups work alongside developers to better understand any risks that may be posed and develop strategies and procedures to mitigate these risks. Battery storage facilities are considered safe where carefully designed and managed.
- 3.3 There is approximately 2 GW of operational battery storage in the UK. Battery storage facilities have been deployed, or are being explored for use, at relatively sensitive locations such as at hospitals and within dense residential areas given the valuable backup/emergency power and grid balancing services they can provide.
- 3.4 Government's commitment to developing a flexible energy grid and their encouragement of battery storage is clear (see Transitioning to a net zero energy system (July 2021) report and British Energy Security Strategy (April 2022)). They are further supported by the Future Energy Scenarios and National Grid are promoting their use on the system. These highlight there is no prohibition on new battery storage development on any safety ground within the UK, indeed, BESS projects are encouraged. The Government has put their full backing behind energy storage as a crucial element of various strategies to meet 'Net Zero' by 2050.

Application proposals

- 3.5 An overview of the general management and safety practices to be implemented as part of the battery storage facility is provided in this report.
- 3.6 The battery storage units are air cooled by Heating, Ventilation and Air Conditioning ('HVAC') systems. Additionally, water can be circulated within a closed system as a coolant to the batteries however no water is discharged from the units.
- 3.7 The battery storage facility located away from any residential receptors and PRoW. The BESS will be located within a secured fenced area, and the Valero Refinery is regularly visited by large vehicles such as HGVs – access to the National Highway network is suitable.

Battery storage facility management and fire safety

- 3.8 The BESS is designed to be safe during both construction and operation.
- 3.9 Safety systems, including automatic shut off and temperature monitoring of battery units are built into the BESS. These are designed to the same electrical safety standards as the other proposed high voltage electrical equipment.
- 3.10 The BESS includes heating, cooling and ventilation systems.
- 3.11 The design approach will include procuring components and using construction techniques which comply with all relevant legislation.
- 3.12 Early warning systems, automatic fire detection and suppression systems and shut off systems are employed as part of the BESS, which is connected to a 24-hour control room where real-time updates are provided advising of all installed battery faults, heat, smoke or fire alarms status and activation. The control room also has access to the CCTV feeds.
- 3.13 Detailed design of the battery safety systems is not considered to be a planning matter, but a specialist design topic. The Battery Management Plan provides an overview of current design principles and multitude of sensor and fire suppression systems proposed. Should planning permission be granted the Applicant would work with development partners to use of best available technology reflecting the latest battery storage design and safety systems.
- 3.14 The containers making up the BESS are adequately separated from each other, and the layout of the battery storage compound is designed to prevent the spread of fire from one unit to other in the very unlikely event a fire should occur.
- 3.15 Fire risk within the battery containers can be managed in several ways (in addition to the base chemistry of the battery cells) using software and hardware fail safes and fire suppression systems. The battery management system is capable of detecting problems using cell and module voltage and temperature measurements within the batteries and on each rack. Battery cells and racks are typically separated by an air gap and/or a thermal barrier to prevent the propagation of heat between neighbouring components that could result in a cascading effect of thermal runaway ¹ events.

¹ A thermal runaway differs to a conventional fire as a chemical exothermic reaction.

- 3.16 The battery containers are fitted with monitoring systems to ensure the temperature within each cell of the battery module is monitored. If there is a temperature variation outside optimum operating conditions within an individual module this will trigger a response from the air conditioning units. If temperature increase continues or there is a failure of the air-conditioning units, the battery storage facility container will automatically partially or fully shutdown to mitigate against the risk of thermal runaway and fire. Multiple types of additional fire and gas build up detection systems and electrical isolations are typically deployed within battery storage units. Automatic disconnects will occur if any unusual parameters are measured.
- 3.17 In the very unlikely event of a battery fire in one of the modules, a fire suppression system would be triggered automatically. The fire suppression system would comprise FM200 gas, Novec 1230 fire suppression gas or similar. The primary function of the gas is to put out flames by physically cooling below the ignition temperature of what is burning and chemically inhibiting the fuel source.
- 3.18 An emergency stop system will be installed around the site, located externally on each battery storage container, acting as a manual override emergency stop button for that container. A site-wide BESS manual override emergency stop button will be provided near the BESS access and at the main control unit. Emergency stop buttons will also be located within each container. Activation of the emergency stop button will disconnect all electrical circuits and provide isolations.
- 3.19 As with all development that connect to the transmission system, there is a technical requirement for circuit-breakers which allows for a forced lockout to occur, for example if the BESS is not operating to normal conditions.
- 3.20 Through the built-in management the risk of a fire occurring from the BESS will be reduced. In the very unlikely event a fire did occur, the risk of it spreading to the point where it became a major incident will be reduced to an acceptable level.
- 3.21 The BESS would include redundancy in the design to provide multiple layers of protection against fire through, for example, the use of fire-resistant materials and adequate separation between elements of the battery storage facility.
- 3.22 Regular inspections and on-site safety testing of the BESS and system equipment (including fire doors, emergency lighting, alarm systems, firefighting systems, etc) shall be incorporated

into the operation and maintenance schedule. The schedule shall meet manufacturers requirements and be undertaken by suitably trained and experienced staff.

- 3.23 Prior to commissioning of the BESS, as is standard practice, the equipment will undergo a range of 'acceptance tests' to ensure the proper functioning of all components.
- 3.24 A Tactical Response Plan in case of an incident to enable an adequate emergency response to a fire or incident can be developed with the local fire and rescue service following the approval of planning permission. A Tactical Response Plan would include the means by which the BESS compound can be closed to prevent any potential source of contamination released arising from firefighting appliances in event of an emergency. A "site familiarisation visit" under Section 7(2)d of the Fire and Rescue Services Act 2004 would be facilitated if requested.

4. CONCLUSION

- 4.1 This Battery Management Plan has been prepared to support an application to Pembrokeshire County Council for the proposed installation of a battery energy storage system with associated infrastructure and works on land south of Goldborough Road, Hundleton, Pembroke, near SA71 5SH.
- 4.2 This document has set out an overview of management and safety measures to be implemented as part of the battery storage facility in order to safeguard the amenity of local residents and the environment.



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