

# BATTERY ENERGY STORAGE SYSTEMS (BESS) PLANNING CHECKLIST

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| Address                                                                                                 | New House Farm, Luzlow, Bagnall, Stoke-On-Trent, ST9 9JZ                                                                                                                                                                                                          |                                                                                                                                                                       |
| Prem Id                                                                                                 | Luzlow BESS                                                                                                                                                                                                                                                       |                                                                                                                                                                       |
|                                                                                                         | Name                                                                                                                                                                                                                                                              | Contact details                                                                                                                                                       |
| Agent                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                       |
| Developer                                                                                               | Root Power Ltd                                                                                                                                                                                                                                                    |                                                                                                                                                                       |
| Owner                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                       |
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| <b>NFCC GUIDANCE</b> <b>PROPOSAL (Developer)</b> <b>OUTSTANDING ISSUES (Fire and Rescue Service)</b>    |                                                                                                                                                                                                                                                                   |                                                                                                                                                                       |
| <b>INFORMATION REQUIREMENTS</b>                                                                         |                                                                                                                                                                                                                                                                   |                                                                                                                                                                       |
| Robust Emergency Response Plan                                                                          | To be developed on receipt of planning consent suggest this is dealt with by planning condition.                                                                                                                                                                  | Noted – to be subject to planning condition                                                                                                                           |
| <b>SYSTEM DESIGN AND CONSTRUCTION</b>                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                       |
| Battery chemistries being provided i.e. Lithium-Ion Phosphate LFP or Nickel Manganese Cobalt Oxide NMC. | At this juncture of the programme the selection of the BESS technology to be positioned at Luzlow has yet to be decided.                                                                                                                                          | TBC on decision being made                                                                                                                                            |
| The Battery form factor i.e. cylindrical, pouch, prismatic                                              | Most probably prismatic. Pouch and Cylindrical forms are not used in BESS                                                                                                                                                                                         | Noted                                                                                                                                                                 |
| Type of BESS i.e. container or cabinet                                                                  | TBD – most probably container                                                                                                                                                                                                                                     | noted                                                                                                                                                                 |
| Number of BESS containers/cabinets                                                                      | 48                                                                                                                                                                                                                                                                | noted                                                                                                                                                                 |
| Size/capacity of each BESS unit (in MWh)                                                                | Approx 2MW                                                                                                                                                                                                                                                        | noted                                                                                                                                                                 |
| BESS site layout                                                                                        | See OBSMP Figure 6-1 [ARC-1223-003-R4 Issue 2]                                                                                                                                                                                                                    | Referenced doc viewed– proposed site plan noted                                                                                                                       |
| Evidence that site geography has been taken into account i.e. prevailing wind conditions                | Met data (wind rose) shows the predominant direction is SE veering to SW. Given the site entrance is south of the BESS units and other infrastructure, obscuration of the access points into the site is unlikely. See OBSMP Figure 6-1 [ARC-1223-003-R4 Issue 2] | Further detail required beyond impact of conditions on access. Wind direction vs proximity of nearby buildings / type of use etc                                      |
| Access to and within the site for FRS assets                                                            | Twin points of access to the site from the SE and SW off a common point from the public highway. See OBSMP Figures 2-1 and 6-1 [ARC-1223-003-R4 Issue 2]                                                                                                          | Only one route apparent on proposed plans in fig.6.1– further information will be required on 2 <sup>nd</sup> access route and will both need to comply with ADB – B5 |
| Fire-resisting design features                                                                          | BESS TBD but will be UL9540A certified                                                                                                                                                                                                                            | Noted for future further information                                                                                                                                  |

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| Fire suppression systems                                                                                                                                                                                                                 | BESS TBD but will be UL9540A certified                                                                                                     | Noted for future further information                                                   |
| On site water supplies                                                                                                                                                                                                                   | Two Options being explored in the design, EWS (x2) and/or Fire Hydrants (subject to suitable local supply and flowrate)                    | Local hydrant supply and pressures cannot be guaranteed. Would await capacity of tanks |
| Smoke or fire detection systems                                                                                                                                                                                                          | BESS TBD but will be UL9540A certified                                                                                                     | Noted – await detail                                                                   |
| Gas or specific vapour detection systems                                                                                                                                                                                                 | BESS TBD but will be UL9540A certified                                                                                                     | Noted – await detail                                                                   |
| Temperature management systems                                                                                                                                                                                                           | BESS TBD but will be UL9540A certified                                                                                                     | Noted – await detail                                                                   |
| Ventilation systems                                                                                                                                                                                                                      | BESS TBD but will be UL9540A certified                                                                                                     | Noted – await detail                                                                   |
| Exhaust systems and deflagration venting systems                                                                                                                                                                                         | BESS TBD but will be UL9540A certified                                                                                                     | Noted – await detail                                                                   |
| Identification of any surrounding communities, sites and infrastructure that may be impacted because of an incident                                                                                                                      | There are no occupied buildings within 25m of the BESS units, the nearest occupied buildings being to the northeast at some 180m distance. | What is the occupancy type of nearest buildings within potential smoke plume.          |
| <b>TESTING</b>                                                                                                                                                                                                                           |                                                                                                                                            |                                                                                        |
| Details of any evidence based testing of the system design should be requested; i.e. results of UL 9540A testing.                                                                                                                        | BESS TBD but will be UL9540A certified                                                                                                     | Noted await detail                                                                     |
| <b>DESIGN</b>                                                                                                                                                                                                                            |                                                                                                                                            |                                                                                        |
| Rack layout                                                                                                                                                                                                                              | BESS TBD                                                                                                                                   | Info tbc                                                                               |
| Thermal barriers and insulation                                                                                                                                                                                                          | BESS TBD                                                                                                                                   | Info tbc                                                                               |
| Container layout and access arrangements                                                                                                                                                                                                 | BESS TBD                                                                                                                                   | Info tbc                                                                               |
| <b>DETECTION AND MONITORING</b>                                                                                                                                                                                                          |                                                                                                                                            |                                                                                        |
| Is there early detection of a fault within the batteries with immediate disconnection of the affected battery/batteries; i.e. Provision of an effective Battery Management system and/or a specific electrolyte vapour detection system. | BESS TBD but will be UL9540A certified                                                                                                     | Await further detail                                                                   |
| Should thermal runaway conditions be detected is there a facility in place for the early alerting of emergency services.                                                                                                                 | BESS and site will be remotely monitored 24/7                                                                                              | What actions would be taken by remote monitoring should incident occur?                |
| Are detection systems in place for other fires which do not involve thermal runaway i.e. fires involving electrical wiring.                                                                                                              | BESS TBD but will be UL9540A certified                                                                                                     | Await further detail                                                                   |

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| Is continuous combustible gas monitoring within units provided. Gas detectors should alarm at the presence of flammable gas, shut down the ESS, and cause the switchover to full exhaust of the ventilation system.                   | BESS TBD but will be UL9540A certified | Await further detail |
| Are external audible and visual warning devices such as cabinet level strobe lights linked to the Battery Management System when a thermal runaway event is identified and the detection and suppression system activation            | BESS TBD                               | Await further detail |
| <b>SUPPRESSION SYSTEMS</b>                                                                                                                                                                                                            |                                        |                      |
| Are suitable fixed suppression systems installed in units in order to prevent or limit propagation between modules                                                                                                                    | BESS TBD but will be UL9540A certified | Await further detail |
| Where a suppression system is not required then this decision should be supported by an evidence based justification and Emergency Response Plan that is designed with this approach in mind                                          | BESS TBD but will be UL9540A certified | Await further detail |
| The choice of suppression system should be informed by liaison with a competent system designer who can relate the system choice to the risk identified and duration of its required activation; such a choice must be evidence based | BESS TBD but will be UL9540A certified | Await further detail |
| Any calculations for sufficient water supply for an appropriate suppression system will need to be completed by a competent person considering the appropriate risk and duration of any fire                                          | BESS TBD but will be UL9540A certified | Await further detail |

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| Has water run-off and potential impact on the environment, along with mitigation measures been considered and detailed in the Emergency Response Plan                                                                                                                                                | Run off is covered in the Drainage Strategy and would be detailed in the Emergency Response Plan (which should be a condition on any planning consent).                                                                                                | Await further detail                                                                                                                                           |
| Lack of sufficient water supplies at a particular site location should not be considered as the basis for a suppression system choice                                                                                                                                                                | Two Options being explored in the design, EWS (x2) and/or Fire Hydrants (subject to suitable local supply and flowrate). Tanks capacity 240m3                                                                                                          | Await further detail                                                                                                                                           |
| <b>DEFLAGRATION PREVENTION AND VENTING</b>                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                        |                                                                                                                                                                |
| Are BESS containers fitted with deflagration venting and explosion protection appropriate to the hazard                                                                                                                                                                                              | BESS TBD but will be UL9540A certified                                                                                                                                                                                                                 | Await further detail                                                                                                                                           |
| Will flames and materials discharged because of any venting directed outside to a safe location and should not contribute to any further fire propagation beyond the unit involved. Exhaust systems designed to prevent deflagration should keep the environment below 25% of Lower Explosive Limit. | BESS TBD but will be UL9540A certified – vegetation around BESS cleared to 10m                                                                                                                                                                         | Noted - Await further detail                                                                                                                                   |
| <b>ACCESS</b>                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                        |                                                                                                                                                                |
| Have at least 2 separate access points to the site to account for opposite wind conditions/direction.                                                                                                                                                                                                | There are two points of access into the BESS compound, emanating from Luzlow Road, Figure 6-1 refers. There is also a pedestrian point of entry on the eastern security fence should both vehicular points of entry be obstructed.                     | Two separate points of access from the road unclear in fig.6.1 but assuming that they are available they must comply with ADB B5 for width /weight limits etc. |
| Are roads/hard standing capable of accommodating fire service vehicles in all weather conditions.                                                                                                                                                                                                    | The site compound is a metalled surface and lends itself well for the positioning of FRS vehicles in attendance. There is no extreme of grade at the site. The site access road is suitable for Heavy Goods Vehicle traffic – asphalt in construction. | noted                                                                                                                                                          |
| Have perimeter road or roads with passing places suitable for fire service vehicles been provided.                                                                                                                                                                                                   | The site service road loops in the site allowing for drive in, drive out using the two points of site access. Given the compact nature of the site access to all BESS is possible from this looped route.                                              | noted                                                                                                                                                          |
| Road networks on site must enable unobstructed access to all areas of the facility.                                                                                                                                                                                                                  | Access to all BESS units is afforded from the service road in the BESS compound.                                                                                                                                                                       | noted                                                                                                                                                          |

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| Turning circles, passing places etc. size to be advised by FRS depending on fleet.                                                                                                                                                                           | There is hard standing within the BESS compound which can serve a passing point or manoeuvring area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | See previous comments as per ADB for initial guidance                                                                                                       |
| Access between BESS units and units spacing: Suitable access for firefighters to operate unimpeded between units will be required. This should allow for the laying and movement of hose lines and such access should be free of restrictions and obstacles. | <p>The suggested 6m separation is based on a 2017 Issue of the FM Global Loss and Prevention Datasheet 5-33 (footnote 9 in the NFCC Guidance refers). This Datasheet was revised in July 2023 and now details the following:</p> <ol style="list-style-type: none"> <li>1. <i>For containerized LIB-ESS comprised of Lithium Ferrous Phosphate (LFP) cells, provide aisle separation of at least 5 ft (1.5 m) on sides that contain access panels, doors, or deflagration vents.</i></li> <li>2. <i>For containerized LIB-ESS comprised of Lithium Nickel Manganese Cobalt (NMC) cells where wall construction is unknown or has an ASTM E119 rating less than 1 hour, provide aisle separation of at least 13 ft (4.0 m) on sides that contain access panels, doors, or deflagration vents. For containerized NMC LIB-ESS where wall construction is documented as having at least a 1-hour rating in accordance with ASTM E119, aisle separation of at least 8 ft (2.4 m) is acceptable.</i></li> </ol> <p>Following this revision to the Datasheet, the BESS containers on-site are compliant with the minimum distances and conformance to ASTM E119 1-hour fire rating will be confirmed on the down select of the BESS units to be procured. The distance between BESS container pairs is approx. 3.0m for sides that contain access panels or doors.</p> | Detail tbc when all confirmed                                                                                                                               |
| A standard minimum of 6m between units is suggested.                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Noted – taken this answer as no with mitigation tbc as previous answers have suggested container types have not been selected but will be UL9540A certified |
| It is recommended to not stack containers/units on the basis of the level of risk in relation to fire loading, potential fire spread and restrictions on access.                                                                                             | No stacking of BESS units at this site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | noted                                                                                                                                                       |
| Is the distance from BESS units to occupied buildings and site boundaries a minimum of 25 m is proposed prior to any mitigation such as blast walls                                                                                                          | There are no occupied buildings within 25m of the BESS units, the nearest occupied buildings being to the northeast at some 180m distance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | noted                                                                                                                                                       |

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| Reduction of distances may be possible in areas of lower risk e.g. rural setting                                                                                                                     |                                                                                                                                                                         | n/a                                                            |
| <b>WATER SUPPLIES</b>                                                                                                                                                                                |                                                                                                                                                                         |                                                                |
| As a minimum hydrant, supplies for boundary cooling purposed should be located close to BESS containers and should be capable of delivering no less than 1900 litres per minute for at least 2 hours | Two Options being explored in the design, EWS (x2) and/or Fire Hydrants (subject to suitable local supply and flowrate). Tanks capacity 240m3                           | Detail tbc                                                     |
| Water supply for any automatic suppression system will be covered by relevant British Standard or equivalent                                                                                         | BS9999:2017 to be adopted                                                                                                                                               | ? await detail of BS/equivalent relevant to suppression system |
| Any static water storage tanks designed to be used for firefighting must be located at least 10m away from any BESS container/cabinet and should be clearly marked                                   | Two Options being explored in the design, EWS (x2) and/or Fire Hydrants (subject to suitable local supply and flowrate). Tanks capacity 240m3 – see Figure 6-1 in OBSMP | Detail tbc                                                     |
| Outlets and connections should be agreed with the local FRS                                                                                                                                          | BS9999:2017 to be adopted                                                                                                                                               | Subject to planning condition                                  |
| <b>SIGNAGE</b>                                                                                                                                                                                       |                                                                                                                                                                         |                                                                |
| Does signage include details of relevant hazards posed; the type of technology associated with the BESS; any suppression system fitted; 24/7 emergency contact information                           | Signage to be positioned at the entrance to the site. Signage to be confirmed through design process and will be detailed in the ERP.                                   | Noted / planning condition                                     |
| Has at least one sign legible at night at a distance of 30m or from the site boundary, whichever is closer been provided                                                                             | Signage to be positioned at the entrance to the site. Signage to be confirmed through design process and will be detailed in the ERP.                                   | Noted / planning condition                                     |
| Has adherence to the Dangerous Substances Regulations 1990 been considered where the total quantity of dangerous substances exceeds 25 tonnes                                                        | No dangerous substances under the DSR will be held at the site                                                                                                          | noted                                                          |
| <b>EMERGENCY PLANS</b>                                                                                                                                                                               |                                                                                                                                                                         |                                                                |
| Have site operators developed emergency plans and share these with the Fire and Rescue Service                                                                                                       | To be developed on receipt of planning consent - suggest planning condition to request Emergency Response Plan                                                          | Planning condition                                             |

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| Has a risk management plan been developed that includes the various hazards and risks at and to the facility and their proposed management.<br>Any safety issues for firefighters responding to emergencies at the facility                                                                            | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition |
| Is there safe access to and within the facility for emergency vehicles and responders, including to key site infrastructure and fire protection systems                                                                                                                                                | To be developed on receipt of planning consent- suggest planning condition to cover this.  | Planning condition |
| Is the proposed fire detection and suppression systems (e.g. water supply on site) adequate                                                                                                                                                                                                            | To be developed on receipt of planning consent- suggest planning condition to cover this.  | Planning condition |
| Are there natural and built infrastructure and on-site processes that may impact or delay effective emergency response                                                                                                                                                                                 | To be developed on receipt of planning consent - suggest planning condition to cover this. |                    |
| Does the Emergency Plan contain how the fire service will be alerted                                                                                                                                                                                                                                   | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition |
| Is there a facility description, including infrastructure details, operations, number of personnel and operating hours                                                                                                                                                                                 | To be developed on receipt of planning consent- suggest planning condition to cover this.  | Planning condition |
| Is there a site plan depicting key infrastructure: site access points and internal roads; firefighting facilities; drainage; and neighbouring properties                                                                                                                                               | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition |
| Are there details of emergency resources, including fire detection and suppression systems and equipment; gas detection; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment; first aid | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition |
| Are there up-to-date contact details for facility personnel and any relevant off-site personnel that could provide technical support during an emergency                                                                                                                                               | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition |
| Is there a list of dangerous goods stored on site                                                                                                                                                                                                                                                      | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition |

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| Are there site evacuation procedures                                                                                                                                         | To be developed on receipt of planning consent - suggest planning condition to cover this. | Planning condition                      |
| Are there emergency procedures for all credible hazards and risks; including building infrastructure and vehicle fire, grassfire and bushfire                                | To be developed on receipt of planning consent- suggest planning condition to cover this.  | Planning condition                      |
| <b>ENVIRONMENTAL IMPACTS</b>                                                                                                                                                 |                                                                                            |                                         |
| Have suitable environmental protection measures been provided; this includes systems for containing and managing water runoff.                                               | Covered in Drainage Strategy and can be controlled by condition.                           | Detail tbc                              |
| Have sites located in flood zones developed details of flood protection or mitigation measures.                                                                              | Flood Risk Management Plan and Drainage Strategy developed.                                | Detail tbc                              |
| <b>RECOVERY</b>                                                                                                                                                              |                                                                                            |                                         |
| Is there a post-incident recovery plan that addresses the potential for reigniting of ESS and de-energizing the system, as well as removal and disposal of damaged equipment | O&M will remove the damaged items from the site and replace with new.                      | Planning condition – further detail tbc |