Shires Stability

# BLACKHILLOCK 349 MW BESS

## DESIGN AND ACCESS STATEMENT

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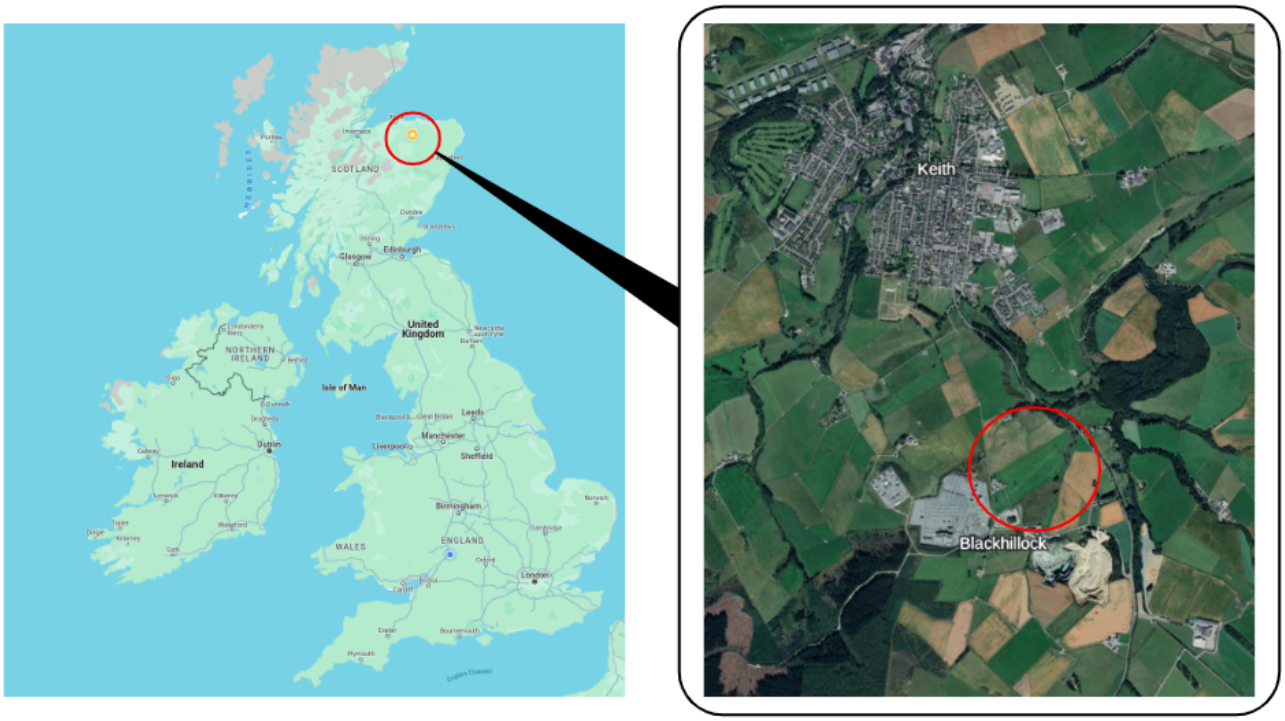
# Table of Contents

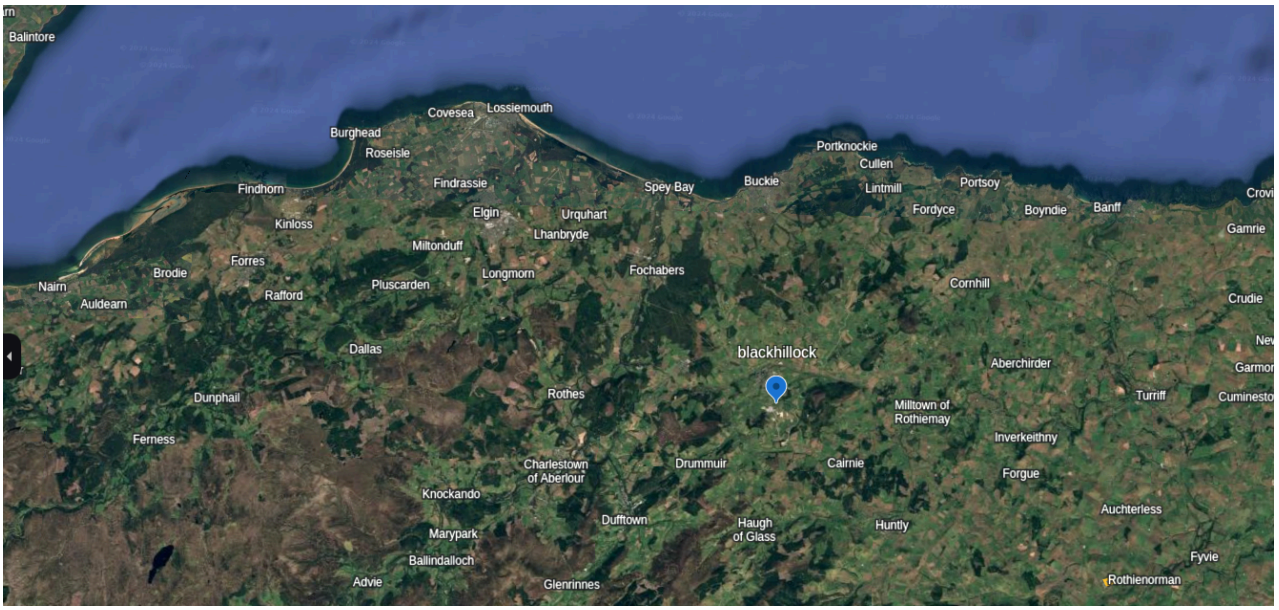
# 1. Presentation of the project

This document provides information in support of the proposed development of a 349MW Battery Energy Storage System (BESS) located at Gibston Farm, Blackhillock, Keith, AB55 5YN, on cultivated arable land. The land is approximately 86000m$^2$ / 21.5 acres. The 349MW BESS is to be connected to the existing Blackhillock substation.

## 1.1. Location

The project is located near the town of Keith, Aberdeenshire, in a rural area.




***Location: Blackhillock, near Keith, Aberdeenshire.***

Existing trees and woodland constitute a natural barrier for visual impact. The A96 lies to the north-east, and forms part of a suitable route for construction traffic.

***Location and size of the land for the BESS***

There are a number of residential properties within 300m of the site, most notably at the south-western edge of the field. Additionally, a high-voltage pylon line traverses the site, dividing the available construction area into two parts, with a 70 metre strip beneath the HV line which excludes plant and equipment.

***View of the land***

## 1.2. Principles of a BESS

A key function of a BESS is to charge with electricity from the grid during periods of low demand and then discharge that electricity during periods of high demand. Energy will be taken from existing and proposed generation sources, including renewables such as wind farms, solar and hydro schemes in the wider area. The existing Blackhillock substation then distributes nationally and to smaller sub-stations regionally to meet demand requirements.

In addition, the BESS will contribute to grid stability by offering services to the National Grid, such as frequency control and inertia.

Energy storage is a key enabler that will allow significant increases in intermittent renewable generation from wind and solar onto the UK electricity system by allowing rapid rebalancing of supply and demand, and critical stabilisation functions. Without these services, it is not possible to connect additional wind or solar to the electricity network.

The proposed BESS project provides benefit by supporting the Scottish Government's transition to a low carbon electricity system by increasing the capacity of intermittent generation on the Scottish electricity network. Scotland's long-term climate change targets will require the near-complete decarbonisation of the energy system by 2050, with renewable energy meeting a significant share of the needs.

The Scottish energy strategy published in December 2017 sets a 2030 target for the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied by renewable sources. This is taken forward in the National Planning Framework 4 which identifies, as a National Development, Strategic Renewable Electricity Generation and Transmission Infrastructure to '*support electricity generation and associated grid infrastructure throughout Scotland, providing employment and opportunities for community benefit, helping to reduce emissions and improve security of supply .*
*https://www.gov.scot/publications/national-planning-framework-4/*

**The primary benefits include:**
1. Managing imbalance caused by short term discrepancies between intermittent renewable generation, and time variable demand, thereby facilitating improved decarbonisation of the electricity supply system.
2. Providing services to increase power flow capacity on the grid that increases grid headroom.
3. Increasing security of supply and grid stability.

The main factors in considering a location include, but are not limited to, the following criteria:

- Connection capacity to the national transmission grid and associated connection offer
- Land availability close to the substation for lease/purchase, and easements, servitudes or wayleaves of existing services and proposed cable routes
- Setting the proposed BESS into the landscape, to reduce visual impact
- Siting the BESS away from adjacent residential properties, as far as possible to minimise visual and noise impacts
- Ecological impact and special protection areas
- Topography and geotechnical conditions
- Site access and construction traffic impact
- Drainage and flooding
- Local heritage/archaeology and historic environment

## 1.3. National Grid Connection Offer

Confirmed grid connection offer received from National Grid

Ref: A/SHETL/BLAC/22/BLAC-EN(1) 08/08/2024

Grid Supply Point/Connection Site: Blackhillock BESS 400kV Substation

- Connection Entry Capacity: 349MW
- Transmission Entry Capacity: 349MW
- Demand Limit: 349MW

Connection Date: 29 October 2027

## 1.4. Land Availability

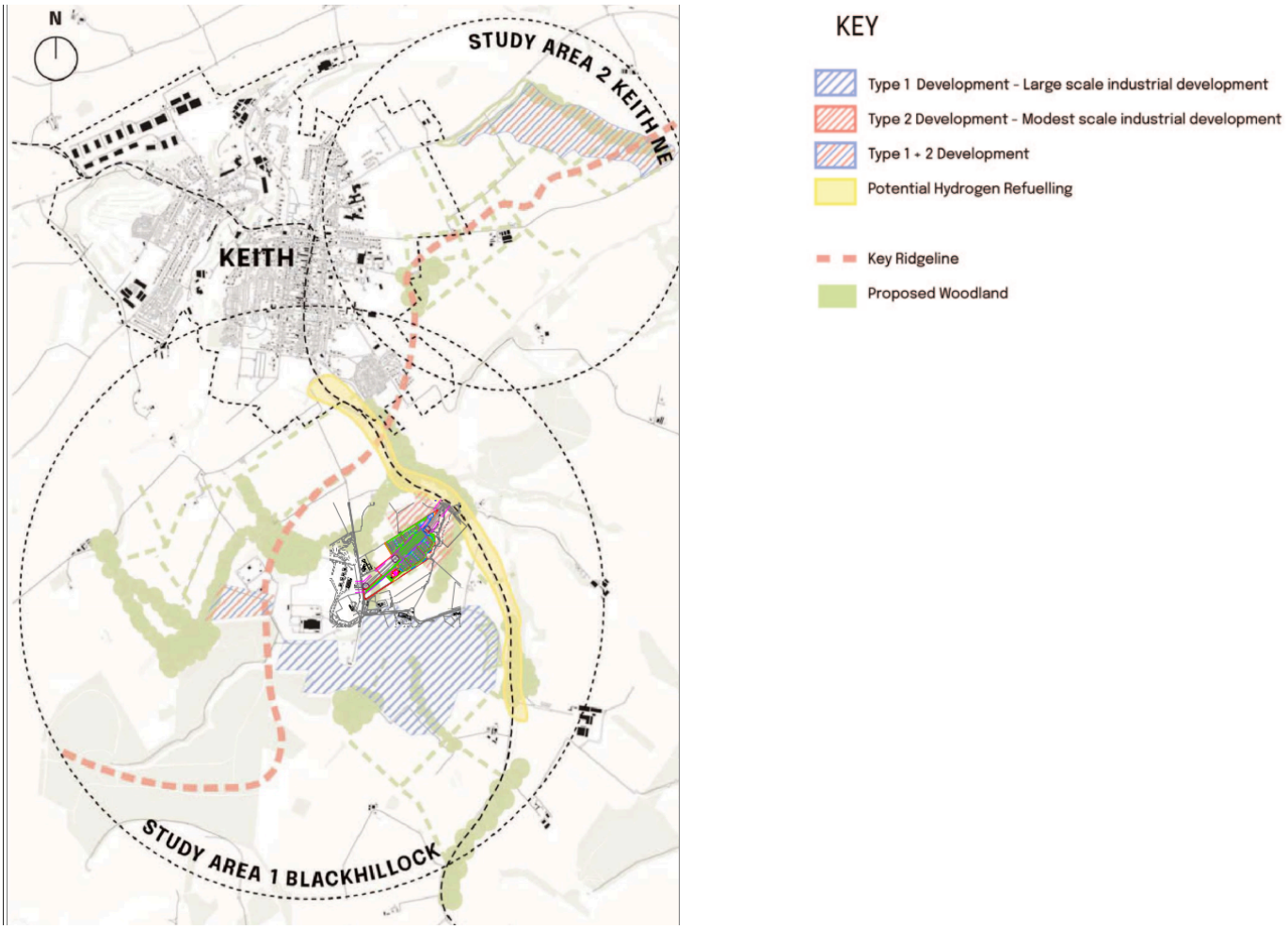
We use desktop tools, local contacts, land agents and database registers to search for suitable land close to substations. When suitable land is found, we reach out to land owners to investigate if they are open to dialogue for land lease and purchase options. The land around Blackhillock 400kV substation has seen a large rise in applications and exclusivity agreements by renewable energy companies seeking to establish electrical connections to the grid and has led to a shortage of land availability.

**Justification**

We have determined that the land that we have secured, approximately 40 metres from the existing substation, offers the best combination of availability, avoidance of utility servitudes, access and importantly, lowest impact to the surrounding population and environment.

It is worth noting that a major connection node such as Blackhillock would be expected to have several such projects connected to it as we transition to a renewable grid, and providing some separation between them lessens their cumulative impact in the landscape.

The local authority, Moray Council, approved the area for renewable energy development as shown in the figure below:




***Area identified as possible location for BESS in Keith Green Energy Infrastructure Framework 2023.***

## 1.5. Proximity to existing energy infrastructure and landscape

As it is better to locate close to an existing substation or energy source and as land-take is relatively high, it is difficult to avoid using countryside locations for BESS facilities. Developing in a pristine high-quality landscape of special national, regional or local designation is obviously not desirable, but at the same time care needs to be taken to consider accumulated impact from multiple developments, since the transition to net zero will require substantial integration of infrastructure into rural spaces. At Blackhillock the existing substation is a low level structure, and visual impact tends to be dominated in the landscape by overhead line lattice pylons.

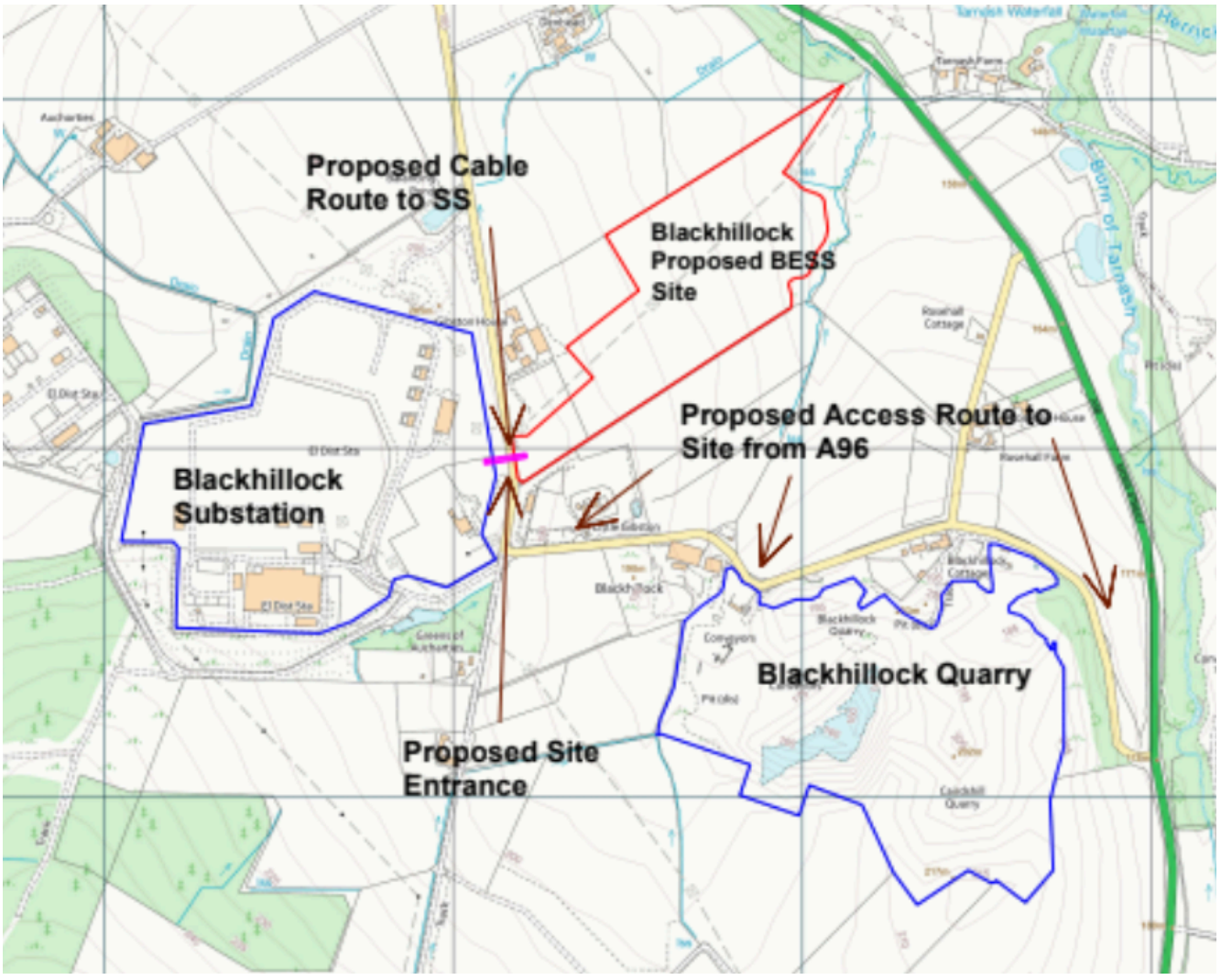
**Justification**

The proposed location is traversed by a line of lattice pylons, and is not constrained by special landscape designation. The landscape therefore has elements of existing energy infrastructure, which will remain the dominant feature, with the BESS contributing a relatively low impact, which avoids creating an overbearing accumulation. Further information is provided in the LVIA. It is proximate to the Blackhillock substation, which is sited in a more open landscape and other development sites in the area risk a similar or greater visual impact or to a larger number of people.

***Site view from the A96***

***Blackhillock substation view from the land entrance***

*Proximity with Blackhillock substation*



## 1.6. Local impact

How the site impacts the local community plays a key part of the site selection process. While the wider social benefit of BESS sites to the national grid in allowing increasing amounts of renewable energy to be generated is not in doubt, this still needs to be balanced with its impact on the local population, both during construction and operation.

When selecting a site, factors such as project economics, ecology and environment are important criteria but so is the potential impact on people who live and work in the immediate area, principally due to visual impact and noise. Selecting land away from population clusters, holding open dialogue about the project with local people and their representatives, and minimising impact by using considerate construction techniques and management, helps to build confidence with the local population. Creating new habitats and enhancing existing ecological areas brings benefits to the local ecology, and compensates for harms.

**Justification**

A landscape-led design approach to the site follows the principle of blending into the existing landscape with low terracing, utilising the natural topography of the land and ensuring that additional tree planting matches the existing landscape.

This is to ensure that the visual impact is strongly mitigated and the area enhanced ecologically. The preferred site also allows the designers to take advantage of the natural topography of the land, enhance an existing biodiversity habitat, and the potential to construct a 228,000 litre reservoir and catchment ponds for cooling batteries in an emergency.

By using the naturally sloping hillside, water will return through drainage channels to interceptor ponds before being returned to the lake. The interceptor ponds serve to protect the environment in the event of an emergency by stopping water flowing into the biodiversity area and wider environment.

## 1.7. Noise receptors

When planning large scale BESS sites, noise is one of the primary concerns both during construction and when operational. When searching for suitable land, close to substations, sensitive noise receptors are a major factor of site choice and site selection / deselection. As it is almost impossible to fully resolve the issue through site selection alone within the UK, the engineering design typically also incorporates other mitigations including constructing noise barriers, specifying acoustic control equipment, and in the way the site is set out.

**Justification**

The land close to the existing substation contains a number of residential buildings (sensitive noise receptors). The proposed land offers the best compromise of low population density, natural topography of the land and proximity to the existing substation.

The nearest noise receptor to the proposed BESS is the current landowner, who fully supports the proposal. The site incorporates earthwork features and acoustic barriers to absorb and block noise, and extensive acoustic modelling work has been carried out to create an acoustically optimised layout to ensure that noise from the BESS site will not have a detrimental impact on sensitive receptors. Noise impact on visitors to the area is not a significant issue as there are no known attractor facilities (for example, tourist areas, natural beauty locations or core / cycle paths in close proximity to the site), and the noise produced by the site is unlikely to be perceptible to a casual visitor during daylight hours. Reference should be made to the noise report which accompanies the application.

## 1.8. Site surveys

A number of site surveys are carried out by third party consultants to ensure that the land is suitable for the BESS site to be constructed. One such example is the impact on the ecology of the land in and around the proposed site, which then highlights the enhancement of existing habitats and creation of new ones where appropriate, to ensure the BESS site will have a minimal impact on the local environment.

Typically reports investigate factors such as flood and drainage, construction impacts, heritage, archaeological remains, and any nearby special designations.

**Justification**

Special consideration was made for this site to ensure there were not any significant areas of natural or archaeological interest, or other restrictions to develop the land. The (Confidential) Ecology Report identifies the relatively low-ecological value of the site and proposes necessary mitigation to ensure no detrimental impact on any protected species.

The site was designed with the landowner to ensure that other areas of the farm can continue in their current operation without impact. A specialist landscape team will be contracted to ensure that the long term wellbeing of the site is maintained and that features such as the lake are inspected frequently.

# 2. Design approach

BESS projects are relatively standard facilities, built in a modular fashion from many shipping container sized units. The exception to this is the high voltage switchgear element that connects the site to the grid. The modest size of individual plant limits its landscape impact, especially with respect to the existing pylons and existing large high voltage switch yard adjacent to the site. This BESS facility is designed to operate at 349MW power with approximately 2 hours of energy storage. In the first version of the pre-application, we proposed a first layout with an Air Insulated Switchgear (AIS) connection, which is the most economically competitive:


***Site layout (AIS)***

After the first public consultation organised in Keith, we paid attention to the local community feedback, where some residents expressed their concern regarding the visual impact, particularly of the AIS switchgear, which was visually dominating due to its height.

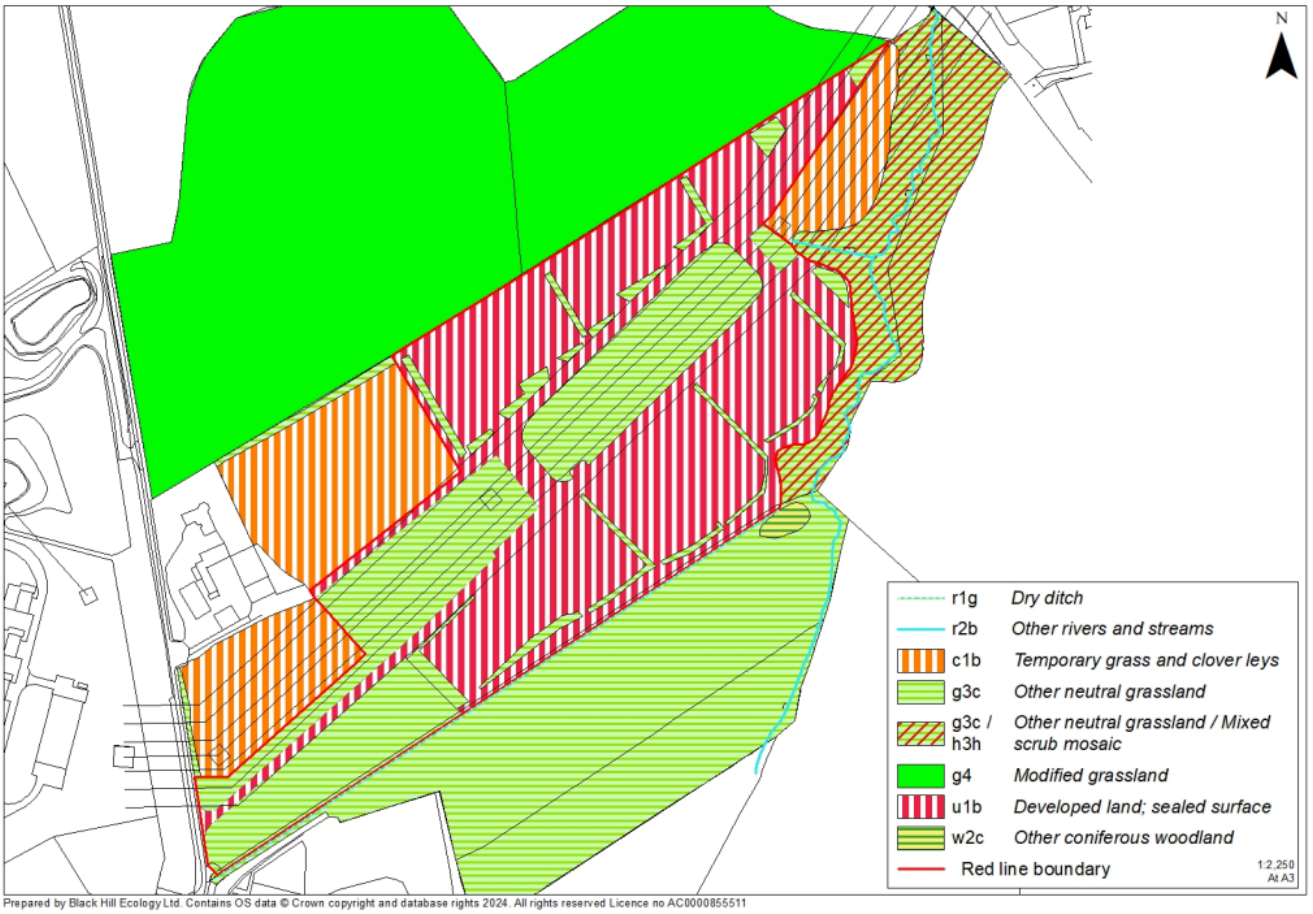
From that feedback, we reviewed our original plan, changing the layout to a Gas Insulated Switchgear (GIS) connection, which, though more expensive than AIS, has much lower visual impact due to its compact footprint, and lower height than the AIS solution.

***Site layout (GIS) proposed design after the first public consultation***

To comply with Keith Green Energy and infrastructure Framework guidelines, we appointed an independent landscape architect, Liz Lake Associates (LLA), to review the layout. After reviewing the proposed layout, LLA advised a significant increase in the amount of planting and screening. We adopted a more compact battery design to allow more planting space for screening and biodiversity.

Ecological consultants Blackhill Ecology have also reviewed the Blackhillock BESS site layout, as captured by the associated Biodiversity Net Gain Feasibility Report. Following recommendations detailed within the report, Blackhillock Flexpower shall incorporate additional neutral grassland area (within the existing site boundary) in order to meet the desired and necessary Biodiversity Net Gain. This approach has been denoted as ‘Option 2’ within the report.

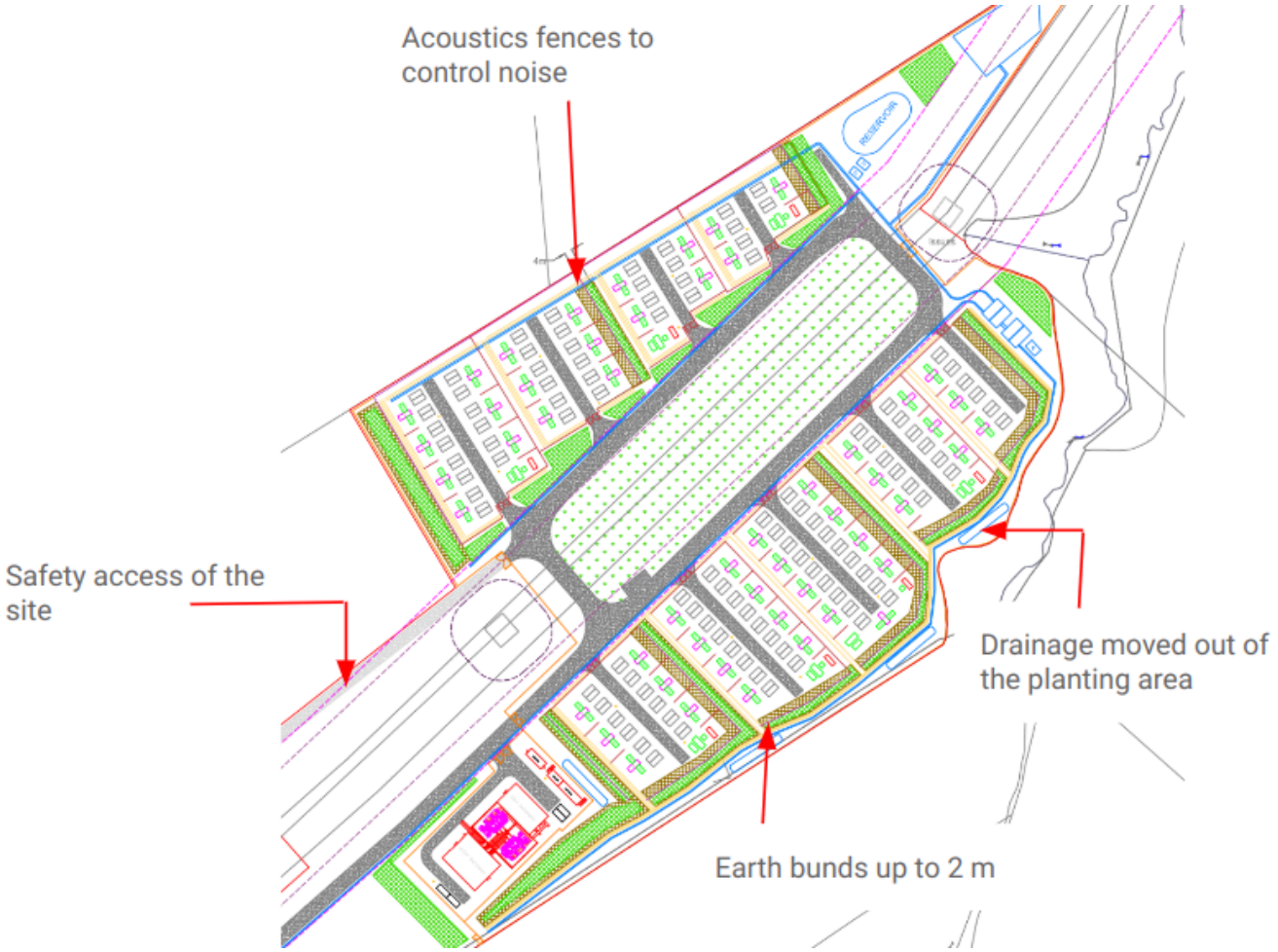
The overall UK Habitat Classification Map associated with ‘Option 2’ has been outlined in the figure below.




***Option 2 UK Habitat Classification Map***

Noise impact has been mitigated by greater landscaping, which provides both acoustic benefits and visually softens the scheme, as it is located between and around the different equipment terraces.

To keep enough space for planting, screening, and planting maintenance access, we reviewed the number of batteries on site and took the decision to reduce the number from 284 to 208.




Second safety access added to the site for emergency use (light grey).

To minimise traffic movements during construction, and assist with biodiversity enhancement, we decided to use the topsoil removed from terracing to create earth bunds on the south and east sides of the site, providing additional screening from a more natural barrier. This topsoil is then also available for reinstatement works at the end of life, once again minimising future traffic movements. Topsoil removal is normally one of the largest contributors to HGV construction traffic for a site of this type.

# 3. BESS Equipment

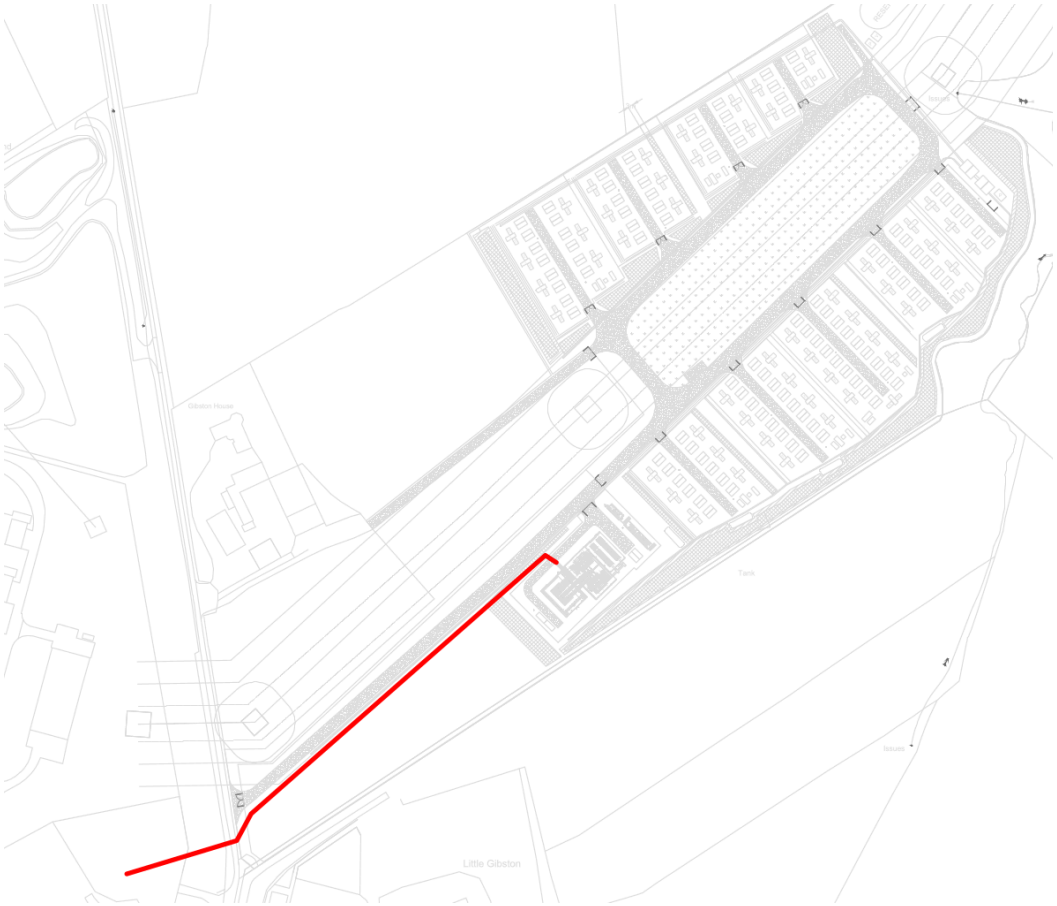
The substation includes 2 x transformers, HV equipment and a control building.
The remaining BESS area consists of 208 x 20ft battery containers, and 52 x 20ft combined inverter/transformer skids.


Equipment List - Blackhillock

104x inverters and 52x 0.66/33kV power transformers
208x 20ft ISO Battery Containers
7x Emergency Diesel Generators (only used during grid failures)
7x Customer Substations containing 33kV SF6 Free Switchgear and Aux transformers
7x LV and control rooms (20ft ISO container)
2x 33kV Switchgear rooms
2x 33/400kV supergrid transformers
GIS 400kV switchgear building
1x Main control room
1x Amenities building
4x Storage containers

In addition to the proposed development, Blackhillock Flexpower will be responsible for the installation of the underground cable connections between the BESS substation and the existing Blackhillock substation.

Electricity would be imported and exported between the BESS substation and the existing substation.



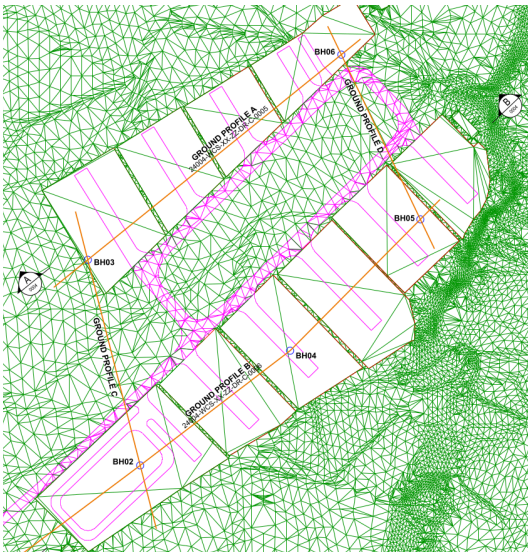
***400kv proposed cable route***

The cables will be installed underground and are not visible after installation. Depending on the ground conditions, they will be laid at an approximate depth of 1000mm (3ft 3”) to ensure the land retains its full use for agricultural purposes.

# 4. Primary Landscaping

In common with all projects of this nature it is necessary to remove the topsoil in areas where access tracks or plant are located. The topsoil will be used to the fullest extent possible on site, creating landscaping features to limit noise and visual impact.

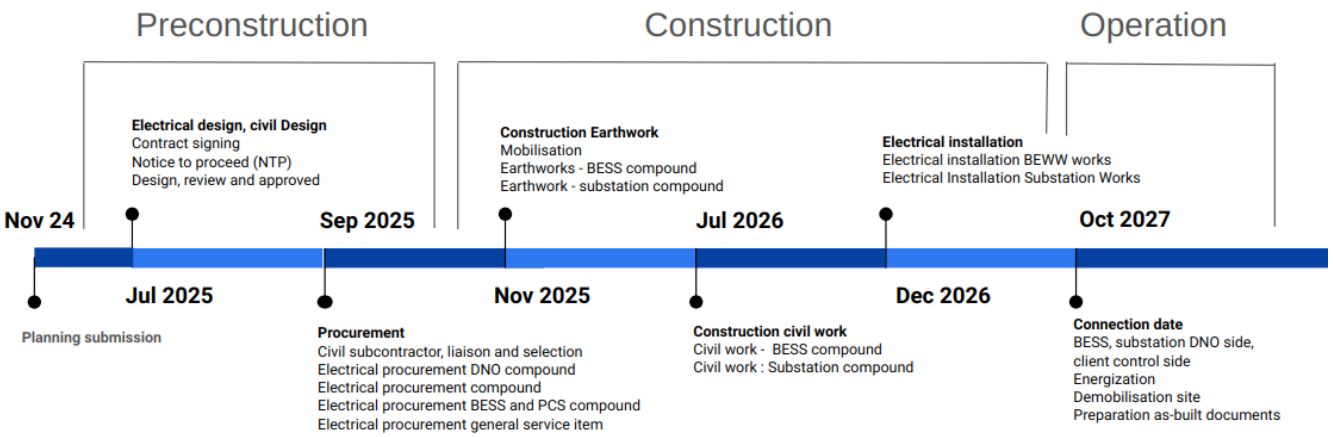
Due to the unevenness of the terrain, it is necessary to create terraces to provide level ground to mount the equipment, and this technique also minimises the visual impact on the landscape. The Figure below depicts the terracing and internal road layout.




The neighbouring quarry will be used where practical to provide stone material for reinforcing the terraces, gabion baskets and other aggregate. Other solutions available for this purpose, such as interlocking retaining wall blocks, reinforced concrete walls, geosynthetic reinforced earth walls and precast retaining wall panels, will be used if necessary due to engineering requirements.

# 5. Timeframe / Key dates

**Proposed programme:**




**Constructions progressions milestones (longstop dates):**

M5 - Contestable design works submission : 29/01/2026

M6 - Agree construction plan : 29/04/2026

M7 - Project Commitment : 29/07/2026

M8 - Initiate construction : 29/10/2026