HIGH MATHERNOCK BESS

GEOLOGY, SOILS AND GROUNDWORKS STRATEGY

– VERSION 2

This is an updated report that reflects changes made to reduce site footprint layout after the original submission and consultation

Changes made to report content

- Ground works strategy drawing changed
- Retaining wall drawing changed
- Conclusion unchanged

High Mathernock
Battery
Energy
Storage
System

GEOLOGY, SOIL AND GROUNDWORKS STRATEGY

HARMONY HM LTD

October 2025

INTRODUCTION

This report provides an assessment of the rocks and soils underlying the High Mathernock BESS site and then considers how the ground conditions will then dictate the groundworks strategy.

The High Mathernock BESS Site is within the Inverclyde Council area.At its nearest point, the site is a distance of 1.9km from the town of Port Glasgow and 2.9km from the village of Kilmacolm. The proposed built area is 2.7ha, within a site area of 8.48ha.

It lies within the broad open Gryffe Valley at a lowest elevation of 135m AOD rising to 147m AOD. The Site is just to the south of Auchentiber Road whereby it gently undulates down to the flat alluvial plain close to the River Gryffe.

This report will consider the characteristics of the soil, underlying bedrock and a groundworks strategy designed in minimise imported aggregates, greatly reducing the overall number of vehicular movements required during construction.

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GEOLOGY

The bedrock at the Site consists of lavas of the Clyde Plateau Volcanic Formation

(Strathclyde Group) of Lower Carboniferous age (BGS 1990). These volcanic rocks, thought to have been formed by sub aerial fissure eruptions, form a succession up to 750 m thick of nonporphyritic (mugearite) and feldspar-phyric (hawaiite) lavas with subordinate pyroclastic and volcaniclastic deposits.

Typically, the rock is strong, massive or weakly foliated, dark grey or purplish grey basalt (locally andesitic), sometimes weakly vesicular or amygdaloidal, fresh or slightly weathered beneath a thin orangish brown weathered surface veneer.

These lithologies are thought to be the autobrecciated, hydrothermally altered and/or weathered tops of lava flows, but may include lapilli tuff deposits. Discontinuities are systematically or randomly orientated and generally close spaced. Permeability of the bedrock is likely to be very low, depending on the transmissivity of the fracture system.

GEOLOGY

Just south of the proposed BESS the land levels out to alluvial deposits close to the River Gryffe. This Alluvium is a general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain.

Figures 1 & 2 sourced from https://geologyviewer.bgs.ac.uk/

Figure 1. Bedrock Geology

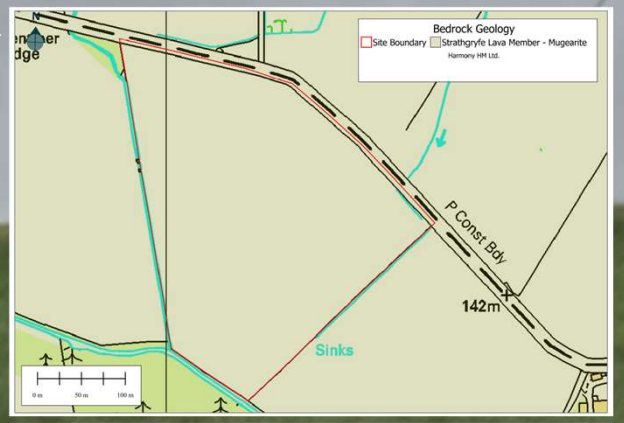
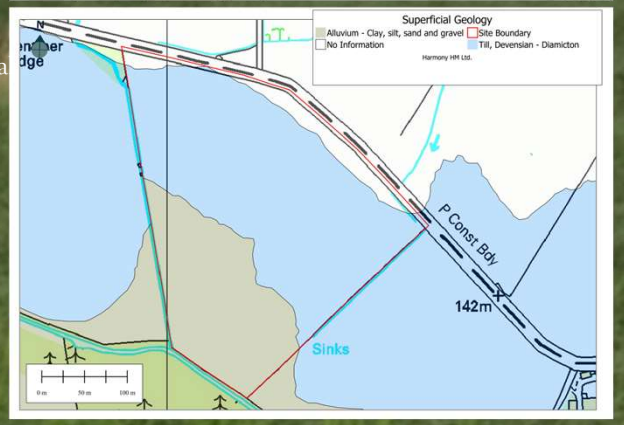


Figure 2. Superficial Geology



SOILS

The Site is undulating pastureland with patches of rush in the low-lying parts of the site. Surface drainage occurs by diffuse flow through the turf into modified natural features and man-made drainage ditches that feed into and draining away from wet boggy areas.

The Site is mapped with shallow bedrock overlain with relatively thin superficial deposits (typically less than 2m).

This thin soil of superficial deposits is described by the James Hutton Institute as dark brown to brown or reddish brown in colour. These Brown soils are of the Darleith association.

The texture is described as sandy silt loam to sandy loam with loamy sand more common on drifts derived from dolerites and basic agglomerates. Till deposits are finer textured with clay loam textures throughout the soils profile. Given the till nature of these deposits the soil is moderately stony with subsoil, increasing stone content if shattered rock is present. Areas of exposed rock can be seen locally nearby and a number on gathered stone piles within the site would indicate, at least, a moderate level of stoniness.

SOILS

The soil in combination with the undulating gradients throughout the field affects the Site's capability for agriculture. The Site is mostly Land Capability 4.2, with a small area of 5.3 to the north of the Site. Both categories are considered to be non-prime agricultural land. This is reflected is in its use as grassland for grazing livestock and fodder preservation.

Figures 3 & 4 sourced from
https://map.environment.gov.scot/Soil_maps/?layer=2#

Figure 3. Soils Map

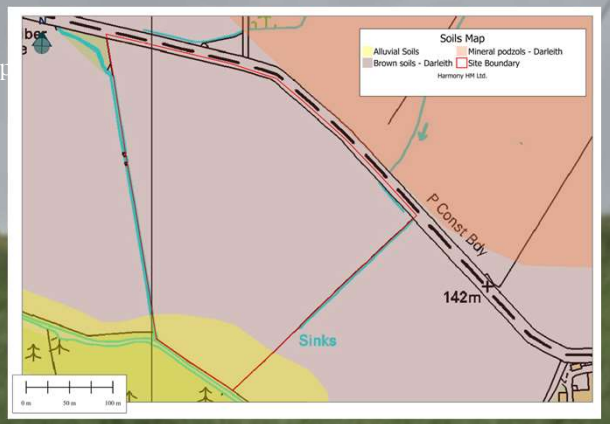
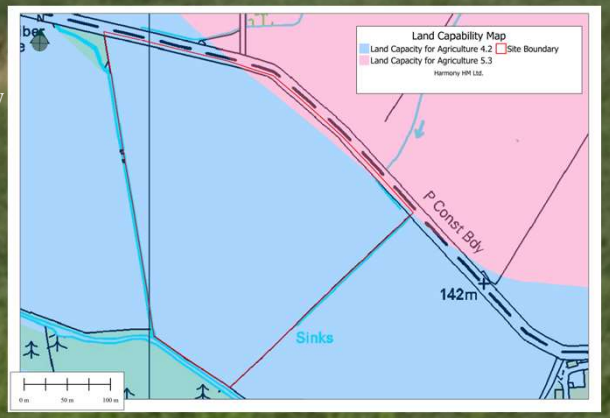


Figure 4. Land Capability Map

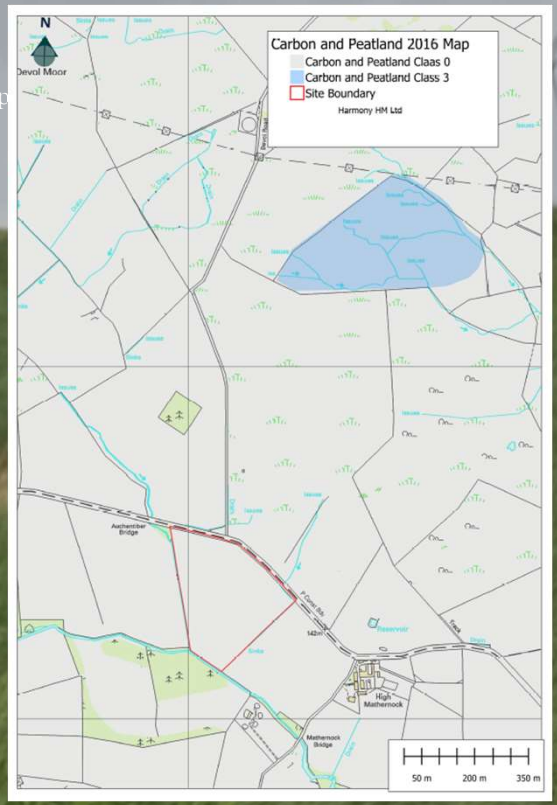


PEAT

A desk survey, using the Carbon and Peatland 2016 map, and site walkover concluded that there was a low likelihood of peat within the Site.
A wider survey showed that the nearest peat area was 7.36km from the Site boundary. This area is Class 3, which is not considered to be nationally important.

Figures 5 sourced from https://map.environment.gov.scot/Soil_maps/?layer=2#

Figure 5.
Carbon and Peatland Map



WATERCOURSE AND GROUNDWATER

The site is bounded by a burn to the west, a drainage ditch to the east and Gryfe Water to the south. All of these watercourse features are outwith the site boundary and the built area. There are areas of wet ground within the site boundary.

A Ground Water Dependent Terrestrial Ecosystems site assessment was carried out by ITPEnergise (now part of SLR Consulting), as part of a National Vegetation Classification survey. This concluded that these area were likely to be mostly fed by rainfall and runoff from the surrounding land.

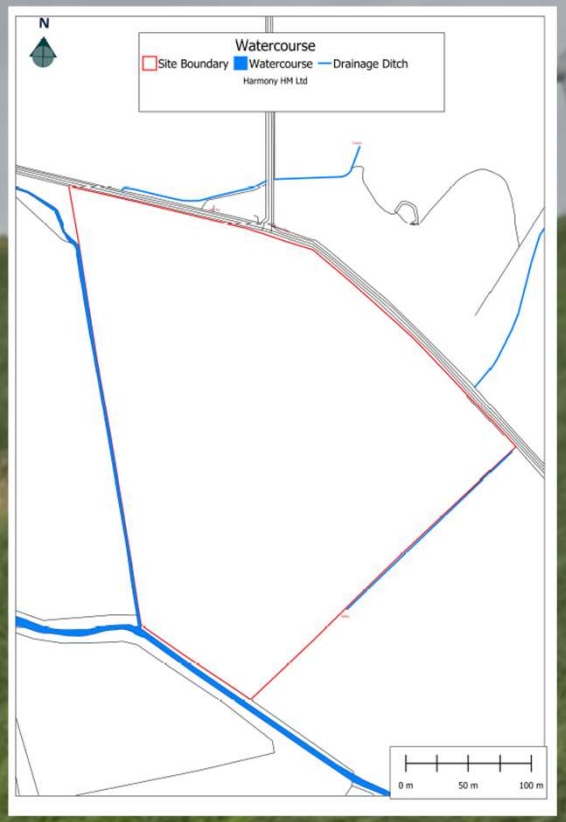


Figure 6.
Watercourse

GROUNDWORKS STRATEGY

Given both the shallow superficial nature of the soil, and the underlying Mugearite bedrock (that is considered very good quality for aggregate) it's the intention of the developer to utilise this Mugearite bedrock as aggregate for the construction of the proposed BESS Site.

It was considered that utilisation of this material would greatly reduce vehicular movements during the construction phase and overall reduce the environmental impact of the development.

A cut and fill projection was calculated to ensure the site would be aggregate neutral, whereby it is projected no aggregate will be required to be imported to the Site during construction. This creates a single platform for the BESS at 138m AOD.

This cut and fill projection is shown in Figure 7. below.

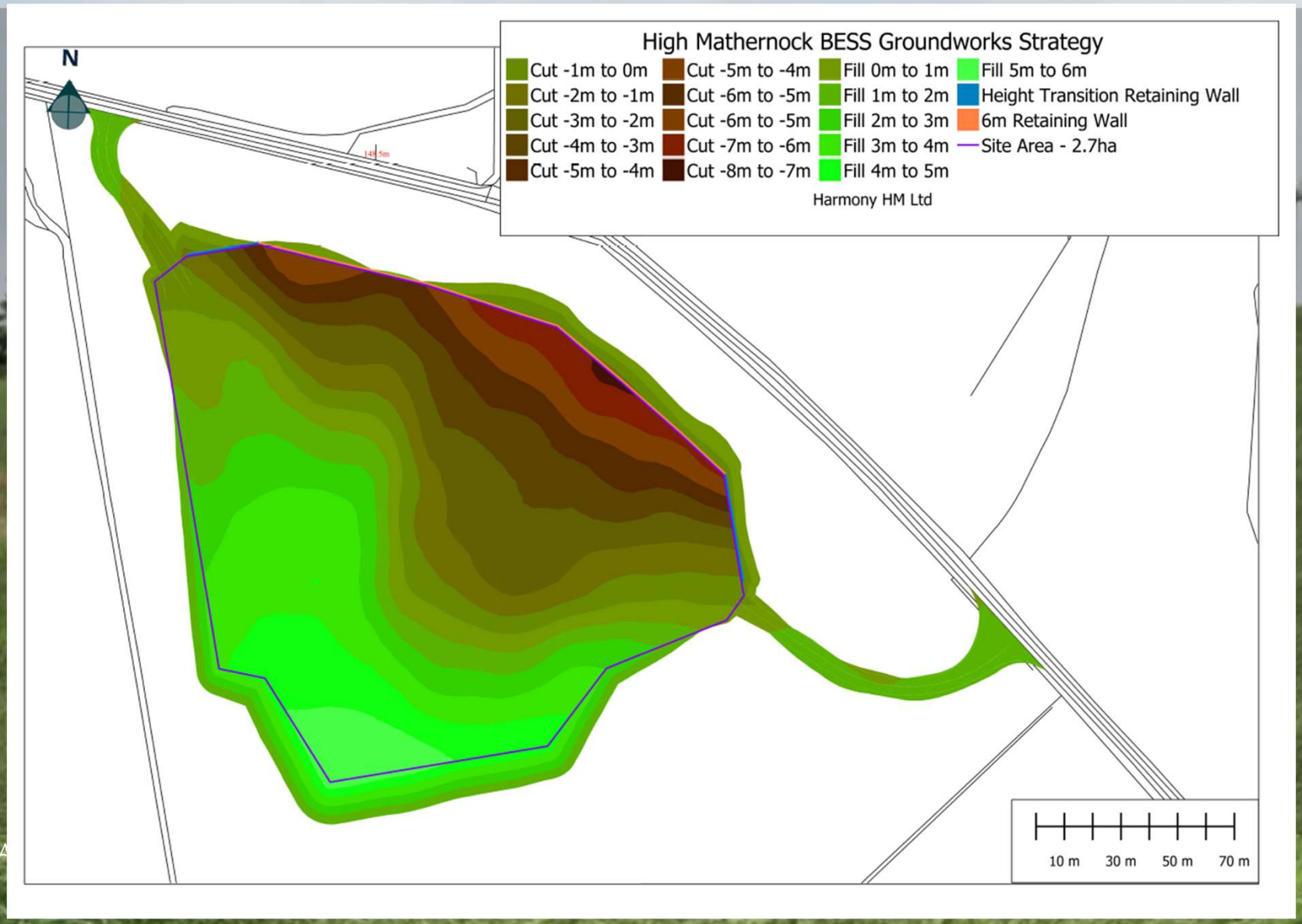


Figure 7.
High Mathernock BESS Groundworks Strategy

RETAINING WALL

To the north of the BESS Site a retaining wall is required to hold back the existing ground. This will create a level platform for the development, reducing it's overall footprint. This will allow more of the Site area to be used for biodiversity enhancement. The wall will consist of gabion cages with a sections of the wall 6m high x 188m long. There will be two sections of height transition retaining wall, that will descend in height from 6m to the site level. These will be 26m and 38m in length The cages are usually up to 1m high and stacked up to the required height.

During construction, the gabion cages would be filled with stone. As the filled gabion consists of 30-40% voids, topsoil can be added to retain the moisture in the structure for vegetation as well as to give a substrate available for roots growth between the stones.

RETAINING WALL

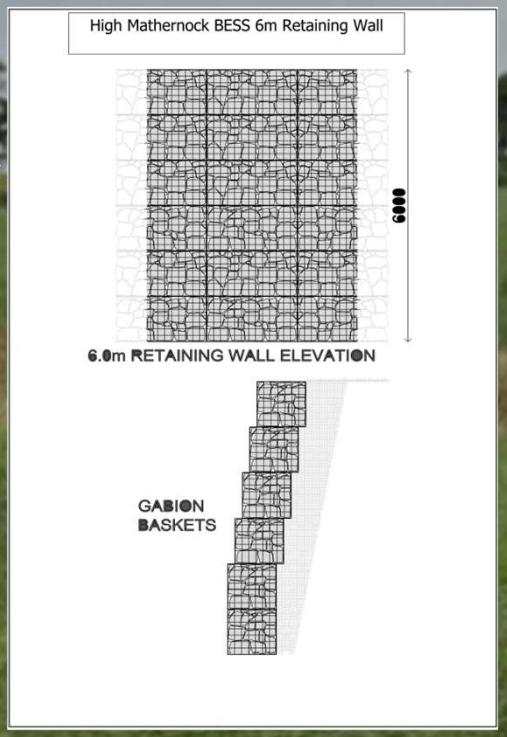


Figure 8. Gabion Cage Retaining Wall

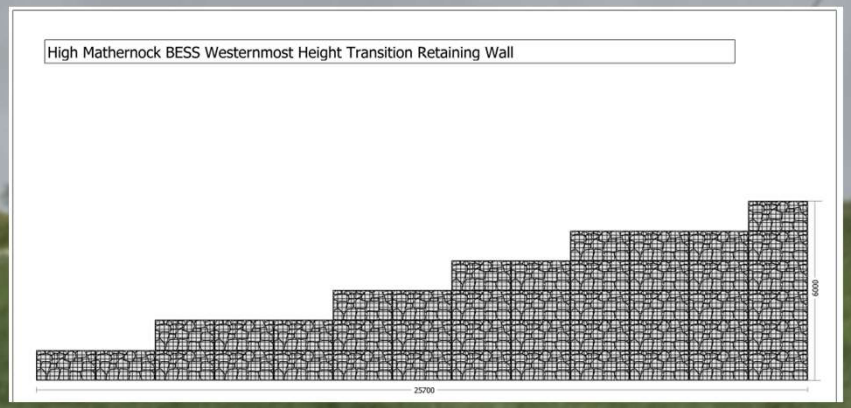


Figure 9. Westernmost Height Transition Retaining Wall

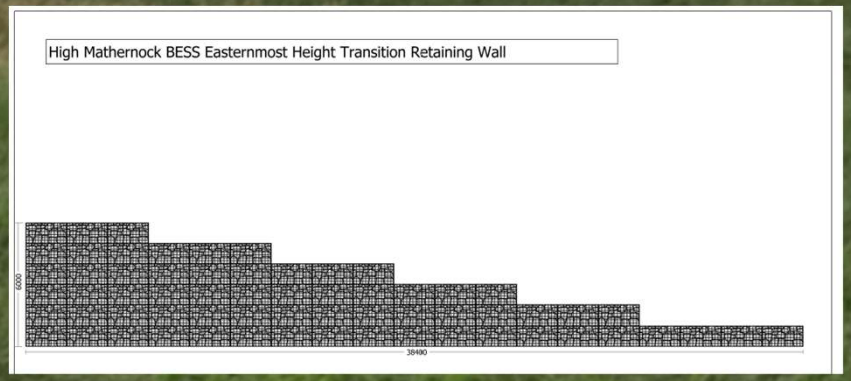
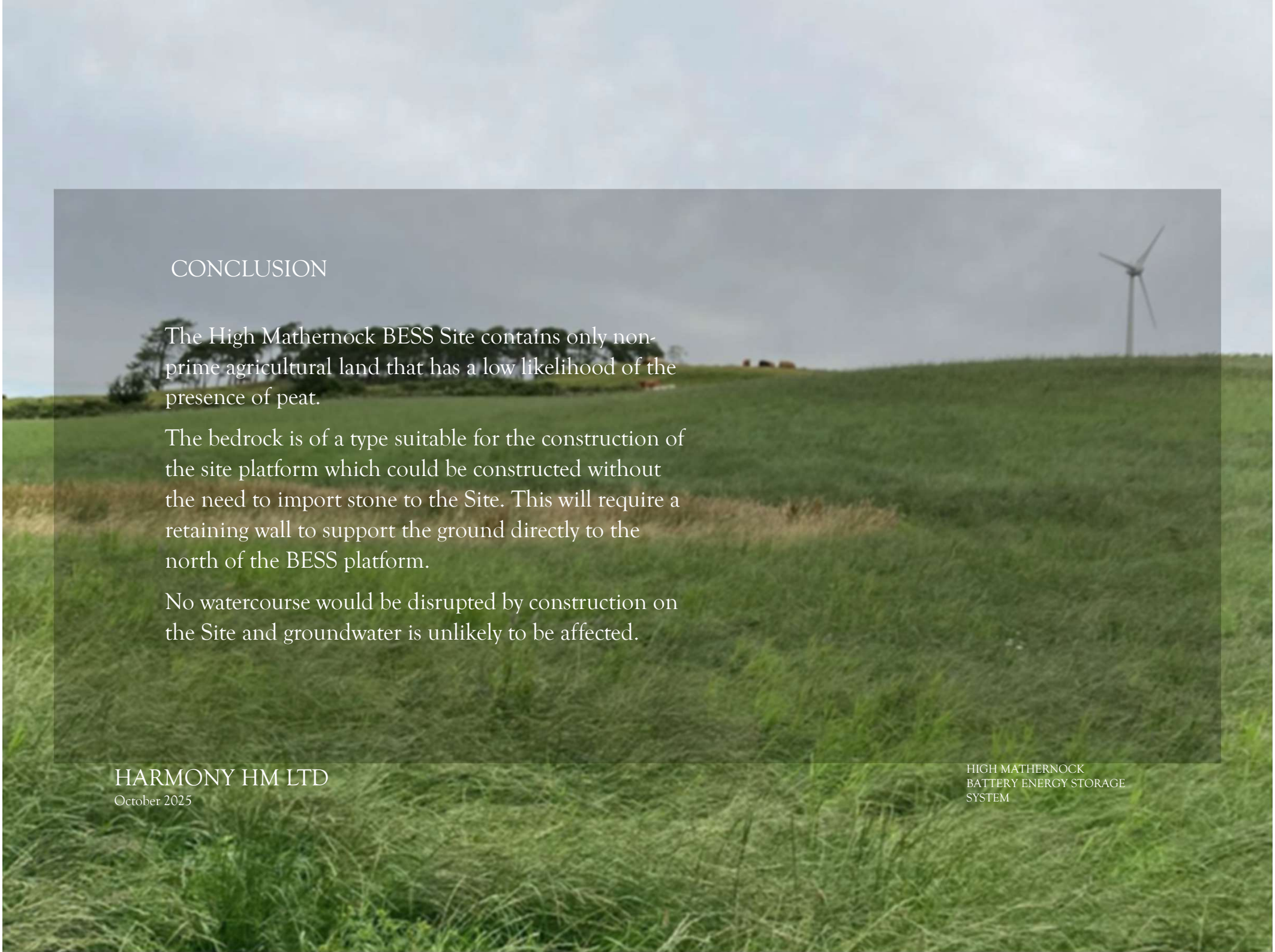


Figure 10. Easternmost Height Transition Retaining Wall



CONCLUSION

The High Mathernock BESS Site contains only non-prime agricultural land that has a low likelihood of the presence of peat.

The bedrock is of a type suitable for the construction of the site platform which could be constructed without the need to import stone to the Site. This will require a retaining wall to support the ground directly to the north of the BESS platform.

No watercourse would be disrupted by construction on the Site and groundwater is unlikely to be affected.