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1. Introduction

1.1. Purpose of this Environmental Report

1.1.1. This Environmental Report has been prepared to accompany the application by Boralex Limited ('the Applicant') to construct and operate a Battery Energy Storage System (BESS) with a maximum output of up to 70 megawatts (MW) and an extension to the existing Limekiln Wind Farm Substation on land within the operational Limekiln Wind Farm, South of Reay in Caithness (hereafter referred to as the 'Site'). The project is known as Limekiln Battery Energy Storage System (BESS) (hereafter referred to as the 'Proposed Development').

1.1.2. As the Proposed Development exceeds 50 MW, the Applicant has submitted a planning application to Scottish Ministers, which will be determined under Section 36 of the Electricity Act 1989 ("the Electricity Act").

1.1.3. In April 2025, an EIA screening report was submitted to the Scottish Government's Energy Consents Unit to establish whether a formal EIA was required for the scheme. In May 2025, Scottish Ministers issued a formal EIA screening opinion which confirmed that an EIA was not required.

1.1.4. This Environmental Report has been prepared which covers a number of the topics that would have been included in an EIA Report. However, the assessment methodology differs from what is applicable for an EIA case, and importantly this report and the application is not subject to the EIA regulations.

1.2. The Applicant

1.2.1. Boralex has been providing renewable energy for over 30 years as a developer, builder, owner and operator of hydro, onshore wind, solar PV and battery storage. A leader in the Canadian market and France's largest independent producer of onshore wind power, the company is also active in the United States and the United Kingdom. In the UK, Boralex is working towards the delivery of a wind and battery storage asset portfolio of 1 GW by 2030, i.e. ready-to-build and operational. This ambition represents inward investment of approximately £1bn, mainly in Scotland.

1.2.2. Over the past five years, Boralex's total installed capacity has more than doubled to over 3 GW worldwide. The development portfolio comprises over 6 GW in wind, solar projects and storage projects. Boralex's shares are listed on the Toronto Stock Exchange under the ticker symbol BLX. Further information can be found at www.boralex.com.

1.3. Site Description

1.3.1. The Site is located within the footprint of Limekiln Wind Farm, south of Reay, Caithness within the administrative boundary of The Highland Council. The Site consists of a combination of wind farm infrastructure and commercial forestry.

1.3.2. The overall Site area is approximately 32 hectares (ha) with access taken from the A836, utilising the existing wind farm access tracks. The site is rural in nature with a small number of neighbouring residential properties. The nearest residential properties include Borlum House, Milton and Loanscorribest, which are approximately 1.5 km north of the Proposed Development.

1.3.3. The proposed BESS would be situated on the reinstated temporary construction compound which was used for Limekiln Wind Farm. Existing wind farm tracks would be utilised therefore no new access tracks would be required for the Proposed Development. There are no National, European and International designated sites for nature conservation within the Site boundary.

1.4. Overview of the Proposed Development

1.4.1. The main components of the Proposed Development are:

- Up to 90 battery storage containers approximately 6.0 m long, 2.5 m wide and 3.0 m high;
- Electrical substation extension and associated infrastructure;
- Power Conversion Units (PCS's)
- MV/LV PCS transformers
- Control and switchgear building;
- MV/LV auxiliary transformer;
- Underground cable connection to 132 kV substation extension;
- 132 kV Breaker, 132/33 kV transformer and 33 kV breaker at the substation extension;
- Spare parts containers;
- Office / welfare facilities;
- Fire suppression systems;
- Water storage tanks;

- Back-up generator;
- Palisade fencing typically 3 m high;
- CCTV cameras, motion activated lighting and fencing;
- Site access and internal access tracks;
- Biodiversity mitigation and enhancement;
- Drainage (including SuDS);
- Temporary construction compound; and
- Maintenance vehicle parking.

1.4.2. The battery storage units would be located within a compound measuring approximately 115 m by 80 m which would be formed of crushed rock laid on permeable membranes. There would also be a potential future augmentation area which would be formed from crushed rock measuring approximately 80 m by 50 m. A temporary construction compound would be required during the construction phase, which would be located within the potential future augmentation area.

1.4.3. The compound would be enclosed by 3 m high palisade fencing. The CCTV cameras would be installed on 4 m high columns; the cameras would be mounted on the 3 m high palisade security fencing at each corner and at strategic intervals along the compound perimeter.

1.4.4. The maximum height of any structure within the BESS compound would be approximately 4 m. Lighting would be provided on site including lighting to the 4 m CCTV columns and units within the facility. The lighting would be motion sensor activated. Fire detection and suppression systems would also be installed within the facility.

1.4.5. There would be a Sustainable Drainage Systems (SuDS) attenuation basin adjoining the compound, which would be located to the north of the BESS facility.

1.4.6. The proposed Substation Extension would sit immediately adjacent to the operational Limekiln Wind Farm Substation, wrapping around its northern edge. The tallest elements in the Substation Extension would be approximately 7.5 m tall, which is consistent with the operational Substation infrastructure.

1.4.7. The Substation Extension would be connected to the BESS facility by way of an underground cable running alongside the Core Path CA11.03.

1.5. Need for the Development

1.5.1. The UK's energy network is undergoing a significant transition, comprising a reduced reliance on fossil fuel power plants as they reach the end of their operational lifecycles and an

increasing reliance on renewable energy sources. National and international legislation and policies are in place and set an ambitious target to reduce Scotland's emissions of all greenhouse gases to net zero by 2045.

1.5.2. Battery projects located in areas where there is a large amount of renewable energy generators, play a vital role in decarbonising the energy sector whilst maintaining reliable energy security for consumers. Our current national grid has located key generation assets (coal, gas, nuclear) and transmission cables to serve areas of high energy demand with commensurate supply. In contrast, renewable generation is located to maximise optimal weather conditions such as high wind locations in northern Scotland or in the North Sea.

1.5.3. As a result, we cannot get the power where we need it or maximise the use of our own renewable electricity generation. National Grid Electricity System Operator ('NGESO') currently pays renewable generators to turn off supply in Scotland, to prevent an overload of the system, and simultaneously instructs fast response generators (normally gas power plants) in areas of high consumption to switch on to balance supply and demand.

1.5.4. In relation to energy security, the Proposed Development also has the potential to supply the grid with voltage support services during low voltage periods or blackouts by supplying the network with quickly dischargeable energy. As with periods of low renewable energy supply, these scenarios have typically been managed by reliance on dispatchable fossil fuel energy generators (typically gas peaking plants).

1.5.5. The operation of batteries such as the Proposed Development offer a sustainable alternative to carbon-intensive energy sources to supply and maintain the grid, which reduces the energy network's reliance on fossil fuels and ultimately contributes to achieving the UK and Scottish Governments' greenhouse gas emissions targets, whilst enabling enhanced energy security and reduced energy costs for consumers.

1.6. Structure of the Environment Report

1.6.1. The Environmental Report comprises three parts:

- Volume 1 – Written Statement;
- Volume 2 – Figures and Visualisations; and
- Volume 3 – Technical Appendices

1.6.2. The chapters of the report are organised as follows:

- **Chapter 1:** Introduction – provides background information about the applicant and an overview of the proposed Limekiln Battery Energy Storage System;
- **Chapter 2:** Site Description – provides a general description of the Application Site itself and its local environment. Further detail on the Site can also be found in the baseline sections of each topic chapter;

- **Chapter 3:** Description of the Proposed Development – provides details of each element of the Proposed Development and information on how the project will be constructed and operated;
- **Chapters 4** – **14**: Technical Chapters – each of these chapters provides a description of the baseline environmental receptors, a description of the proposed mitigation and enhancement measures and an account of the predicted residual effects;

1.7. The Environmental Consultancy Team

1.7.1. **Table 1.5** below sets out the chapters in this report and the consultancy responsible for each topic.

Table 1.5 Environmental Topics and Contributors

Chapter	Assessment Topic	Contributor
1	Introduction	Pegasus Group
2	Site Description	Pegasus Group
3	Description of the Proposed Development	Pegasus Group
4	Forestry	McKay Forestry
5	Landscape and Visual Appraisal	SLR Consulting Limited
6	Ecology	Avian Ecology Ltd
7	Ornithology	Natural Research Projects Limited (NRP)
8	Cultural Heritage Desk Based Assessment	Headland Archaeology
9	Geology and Peat	SLR Consulting Limited
10	Hydrology and Hydrogeology	SLR Consulting Limited
11	Noise	The Northern Energy Initiative (TNEI)
12	Transport Statement & Construction Traffic Management Plan	Pell Frischmann
13	Socioeconomics	BiGGAR Economics
14	Outline Battery Safety Management Plan (oBSMP)	Abbott Risk Consulting Limited (ARC)

1.8. Obtaining Further Information

1.8.1. The Environmental Report and accompanying documentation are available online; please visit the project website for the Limekiln Battery Energy Storage System at www.limekilnwindfarm.co.uk. A copy of the report and all the application documents can also be obtained on a memory stick, free of charge, while stocks last.

1.8.2. A paper copy of the Environmental Report may be obtained at a cost of £200 + P&P. Please email the applicant at info@limekilnwindfarm.co.uk or write to Freepost Boralex Limited (no further details or stamps required) to request a copy or alternatively call our freephone number on 0800 980 4299.

2 Site Description

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2. Site Description

2.1. Site Context

2.1.1. The Site is located south of Reay in the Highland Council administrative area, within the footprint of operational Limekiln Wind Farm. **Figure 2.1** shows the Site boundary and **Figure 2.2** shows the location and wider context of the Site.

2.1.2. The proposed BESS compound would be located on the reinstated temporary construction compound which was used for the construction of Limekiln Wind Farm. The proposed Substation Extension would sit immediately adjacent to the operational Limekiln Wind Farm Substation, wrapping around its northern edge. Access to the BESS compound and Substation Extension area would utilise existing wind farm tracks, reducing disturbance to soils and minimising environmental impact.

2.1.3. The Applicant is seeking to optimise the use of the existing grid connection infrastructure associated with Limekiln Wind Farm to support greater grid efficiency and flexibility. By locating the Proposed Development in close proximity to the existing wind farm substation (the proposed grid connection point), the design maximises electrical efficiency and minimises the length of cabling required, thereby reducing potential environmental impacts.

2.1.4. The Site is situated within a large coniferous woodland plantation known as Limekiln, where the operational Limekiln and Limekiln Extension Wind Farms (together known as Limekiln Wind Farm) are operational. **Figure 2.3** shows the Proposed Development in relation to the operation Limekiln Wind Farm. The underlying landform comprises relatively low and gently undulating hills characteristic of the wider sweeping moorland. The Site rises from 50 m AOD along the northern boundary to 200 m AOD along the southern boundary, while the sites of the proposed BESS and Substation Extension are at approximately 90 m AOD and 80 m AOD respectively. The wider landform follows a south to north alignment marked by the orientation of the low hill ridges and intermediate valleys with the flow of the watercourses north toward the Atlantic Ocean.

The Site's location within the coniferous plantation means that it is well separated from the majority of visual receptors in the area. The nearest settlement of Reay is located approximately 3 km north of the proposed BESS and approximately 2 km north of the proposed Substation Extension with no visibility of the Proposed Development due to the screening effect of the intervening coniferous forestry. While a small number of isolated rural properties are located closer to the Site, they are situated over 1 km away from the Proposed Development and the intervening forestry prevents visibility. The closest main and minor roads are the A836, and the Reay to Shebster road, which are also approximately 3 km from the Proposed Development and with no visibility.

2.1.5. There are no residential properties located within 1 km of the Site, the nearest residential property is Borlum House, c.1.95 km distance from the centre of the Site. See **Table 2.1** which gives approximate distances from nearby residential properties to the proposed BESS compound and Substation Extension.

Table 2.1 Nearest Residential Properties located within close proximity

Property Name	Distance and Direction from the nearest edge of the BESS compound	Distance and Direction from the nearest edge of the Substation extension
Borlum House	1.44 km (north west)	2.0 km (north west)
Milton	1.81 km (north east)	2.3 km (north east)
Achins	2.25 km (north west)	2.9 km (north west)
Loanscorribost	1.66 km (north east)	1.9 km (north east)

Designations in the Wider Locality

2.1.6. The Site and its surroundings lie well separated from any national and local landscape designations. The closest designation to the Site is the Farr Bay, Strathy and Port Skerra Special Landscape Area (SLA) which lies approximately 8 km to the north-west of the Site, while the Dunnet Head SLA lies over 20 km to the east.

2.1.7. East Halladale Flows Wild Land Area (WLA) is a mapped interest, the northern part of which lies approximately 1.7 km to the west of the site.

2.1.8. The Proposed Development does not intersect or overlap with any international, national, or local ecological designations. The closest international designation is c.1.3 km north of the Proposed Development (North Caithness Cliffs Special Protection Area (SPA)). There are a further three international sites within 10 km, including the Flow Country World Heritage Site located c. 4.8 km west of the Proposed Development.

2.1.9. The nearest national designation site is Sandside Bay Site of Special Scientific Interest (SSSI). There are no other national designations within 2 km of the Site.

2.1.10. Sandside Bay SSSI is close to the Site boundary of the Proposed Development, c. 35 m from the northern point of the access track, it is located c. 2.3 km from the nearest area of the Proposed Development to be impacted by construction and so it is considered there will be negligible impacts to the SSSI from the Proposed Development.

2.1.11. There is one designated heritage asset, the Clach Clais an Tuire Standing Stone located within 2 km of the Proposed Development.

Landscape Character

2.1.12. The Application Site is located within the 'Sweeping Moorland and Flows' Landscape Character Type (LCT) (LCT 134), with the Farmed Lowland Plain LCT (LCT 143) set to the north, as identified by NatureScot in its 2019 classification. Some of the key characteristics of this landscape type set out in the accompanying description are as follows :

- The Sweeping Moorland and Flows LCT covers an expansive area stretching from Strath More in the west, to the east coast at Wick, and from Strath Fleet in the south, to the north coast at Reay.
- The Sweeping Moorland and Flows LCT is generally characterised by the broad expanse of open moorland, with one of its key characteristics described by NatureScot as; 'a strong sense of remoteness is associated within the largely uninhabited, inaccessible core flows and moorlands of this landscape'.

2.1.13. The Proposed Development is located in the Limekiln coniferous plantation on the northern fringe of the LCT. This area is characterised by the enclosure of forestry in contrast to the openness of the core flows and moorland to the south. Furthermore, the rotational felling and restocking presents a heavily managed and modified landscape in contrast to the natural landscape of the flows. Limekiln Wind Farm is also located in this LCT making large-scale energy development an established feature of the baseline character.

2.2. The Site

2.2.1. The Site as shown in **Figure 2.1** rises from 50 m AOD along the northern boundary to 200 m AOD along the southern boundary, while the sites of the proposed BESS and Substation Extension are at approximately 85 m AOD. The wider landform follows a south to north alignment marked by the orientation of the low hill ridges and intermediate valleys with the flow of the watercourses north toward the Atlantic Ocean.

2.2.2. The Site covers a total area of approximately 32 hectares (ha).

Land Use

2.2.3. The Site is located within the footprint of the Limekiln Wind Farm, which comprises a combination of operational wind energy infrastructure and commercial coniferous forestry. The land is currently managed for forestry purposes and as part of the operational wind farm. The Proposed Development will utilise existing wind farm tracks for construction and operational access; no new tracks are required. This minimises land disturbance and helps maintain the current land use.

2.2.4. The Site is well screened by surrounding coniferous plantation forestry, which provides effective visual containment and limits visibility from receptors in the wider area.

3. Description of the Proposed Development

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3. Description of the Proposed Development

3.1. Introduction

3.1.1. This chapter provides a description of the proposed Limekiln Battery Energy Storage System (BESS) and Extension to the existing Limekiln Wind Farm Substation (the 'Proposed Development'). The planning application is for the construction and operation of a BESS consisting of up to 90 battery energy storage units, electrical connection and control buildings, Substation Extension, underground cable, fencing and ancillary infrastructure.

3.1.2. The Proposed Development would import and export electricity, however it would not generate any additional electricity. The BESS will have a maximum export capacity of up to 70 MW. This project has been designed with a 4-hour discharge period.

3.1.3. The battery energy storage sector is continually evolving and designs continue to improve, both technically and economically. The most suitable technology can change with time and therefore the final technical choice for the development would be made before construction through a procurement process.

3.1.4. The planning application drawings and the description of the proposals in this chapter have been based on a typical arrangement that would be expected for a BESS proposal. The number and size of battery units, the building design and the extent of external equipment required may vary as a result of the procurement process.

3.1.5. At this stage it is anticipated that the battery technology to be deployed will consist of Lithium-Ion (LI-Ion) batteries. These batteries are used widely within energy storage technology because of their high energy density and charge / discharge cycle fatigue resistance compared to other technologies. Li-Ion batteries also have a fast response time which makes them preferable for power application in grid-scape deployment.

3.1.6. The Proposed Development would be a permanent use. The battery cells within the units would need replacing at various stages in the future. It is likely that there would be initial repowering exercises after 10 – 15 years and then again at 20 – 25 years.

3.1.7. When battery cells reach the end of their life, a recycling process would be followed with an approved recycling partner. The partner would transport the batteries to a suitably licensed recycling centre, where cells would be processed. Only hydrogen, oxygen, and limited volumes of carbon dioxide would be emitted from the recycling process.

3.2. Need for the Proposed Development

3.2.1. The United Kingdom's electricity network has historically relied on large, centralised power stations. However, numerous coal fired power stations have recently been decommissioned and gas fired power stations are increasingly being used intermittently when demand is high and electricity cannot be supplied by renewable sources. Existing nuclear power stations are reaching the end of their design lives and there will be further delays before new nuclear plants come online.

3.2.2. There is an ever-increasing reliance on renewable forms of electricity generation, such as wind and solar, to meet the United Kingdom's electricity demands. The amount of renewable electricity generated from wind and solar is, however, intermittent due to weather dependency. As a consequence, electricity demand and supply are becoming more challenging to balance.

3.2.3. National and international legislation and policies are in place and set an ambitious target to reduce Scotland's emissions of all greenhouse gas emissions to net zero by 2045.

3.2.4. Battery projects located in areas where there is a large amount of renewable energy generators, play a vital role in decarbonising the energy sector whilst maintaining reliable energy security for consumers. Our current national grid has located key generation assets (coal, gas, nuclear) and transmission cables to serve areas of high energy demand with commensurate supply. In contrast, renewable generation is located to maximise optimal weather conditions such as high wind locations in northern Scotland or in the North Sea.

3.2.5. As a result, we cannot get the power where we need it or maximise the use of our own renewable electricity generation. National Grid Electricity System Operator ('NGESO') currently pays renewable generators to turn off supply in Scotland, to prevent an overload of the system, and simultaneously instructs fast response generators (normally gas power plants) in areas of high consumption to switch on to balance supply and demand.

3.2.6. Batteries are essential in overcoming this challenge and play a vital role in ensuring the full benefits of existing and future renewable energy generation and the successful transition to a net-zero future. Batteries import large amounts of renewable energy from surrounding wind or solar farms when supply is typically at its highest and in excess of demand, storing it, and then exporting it back into the grid when demand is high, but supply is low. The location of the battery storage infrastructure is driven by its proximity to the existing Limekiln Wind Farm grid connection.

3.2.7. In relation to energy security, the Proposed Development also has the potential to supply the grid with voltage support services during low voltage periods or blackouts by supplying the network with quickly dischargeable energy. Essentially the BESS would import and store electricity from the network when there is a surplus of generation and then export this again when there is a deficit. This balancing function reduces the amount of time that renewable generation needs to be 'curtailed' (i.e. switched off) reducing the need to generate electricity from fossil fuel sources; primarily gas fired power stations.

3.2.8. The operation of batteries such as the Proposed Development offer a sustainable alternative to carbon-intensive energy sources to supply and maintain the grid, which reduces the energy network's reliance on fossil fuels and ultimately contributes to achieving the UK and Scottish Governments' greenhouse gas emissions targets, whilst enabling enhanced energy security and reduced energy costs for consumers.

3.2.9. The BESS has been largely designed to fulfil a balancing function. The use of a 4-hour discharge design parameter enables the BESS to provide a sizeable amount of balancing. The Site would connect to on-site Limekiln Wind Farm Substation which would be extended (hereafter referred to as the 'Substation Extension'), and thereafter connects to the transmission network at Dounreay Substation. The BESS project is designed to utilise the spare capacity on the existing overhead line to Limekiln Wind Farm, thus no infrastructure works are required from SSEN to connect the BESS project, and the cable corridor to Dounreay is therefore not assessed as part of the application.

3.2.10. The changing generation mix (explained above) and increasing intermittency is also decreasing the level of system inertia. Lower system inertia affects the ability of the system to manage the electricity network frequency within normal operating limits (within +/- 1 % of 50 hz). If the network is not maintained within the required frequency tolerance, system stress can result in widespread power supply issues and damage network infrastructure.

3.2.11. The BESS would have the ability to discharge electricity extremely quickly and therefore it could, at least in part, be operated so that it serves a frequency response purpose, as well as a balancing function.

3.3. Proposed Development Layout

3.3.1. The overall layout of the Proposed Development is shown in Figures 'Site Plan' and 'Site Plan Detail'. The footprint of the BESS compound including a potential future augmentation area is approximately 1.2 ha. The footprint of the Substation Extension is approximately 0.3 ha.

3.3.2. The BESS compound would measure 115 m x 80 m, and the neighbouring potential future augmentation hardstand would measure 80 m x 50 m.

3.3.3. The proposed Substation Extension would sit immediately adjacent to the operational Limekiln Wind Farm Substation, wrapping around its northern edge.

3.3.4. The approximate grid reference of the centre of the BESS compound is (easting) 298150 (northing) 962102. The approximate grid reference of the proposed Substation Extension is (easting) 297634 (northing) 962781.

3.4. Description of the Proposed Development Elements

Energy Storage Units

3.4.1. The main BESS compound is likely to contain up to 90 energy storage units, which would be installed typically in sets of two units, in a grid arrangement, as shown in Figure 'Indicative BESS Layout'. Each unit would be approximately 6 m long, 2.5 m wide and 3 m high.

3.4.2. Figure 'Indicative BESS Container Details' shows a typical energy storage unit. The units will consist of steel containers which are designed to be secure and protect the contents from weather. The containers will have an appropriate RAL light grey and / or green finish, which will be agreed with the local planning authority.

3.4.3. The container units will house rows of battery modules arranged in racks. The battery cells are likely to be of the Li-Ion type.

3.4.4. The battery units are likely to incorporate a liquid cooling system rather than an air conditioning-based cooling system. It is therefore unlikely that there would be HVAC (Heating Ventilation and Air Conditioning) units on top or on the side of the container units.

3.4.5. It is likely that each unit would have a vent which would be flush with the side of the unit. As explained in more detail below the units will also include fire detection and suppression systems.

3.4.6. It is likely that the units will sit on small, concrete footings or bases that will be approximately 0.5 m high.

3.4.7. It is proposed that the final approval of the appearance and specification of the energy storage units should be made the subject of an appropriate planning condition.

Inverter and Transformer Units

3.4.8. At the BESS compound, the Direct Current (DC) battery voltage needs to be converted into Alternating Current (AC) using inverters and then transformed to a network voltage. Each group of four energy storage units would be associated with a single combined inverter and transformer unit (Power Conversion System, PCS), which means that circa 18 of these would be required, as shown in Figure 'Indicative BESS Layout'.

3.4.9. The combined inverter and transformer units would typically be 6.1 m long, 2.4 m wide and 2.9 m high. An indicative elevation is shown in Figure 'Indicative Power Conversion System Details'.

Switchgear and Control Building

3.4.10. As shown in Figure 'Indicative BESS Layout' there would be one switchgear and control building situated on the BESS compound. They are typically 21.5 m long, 6.0 m wide and have a height to the ridgeline of the roof of 4.0 m. Figure 'Indicative Control Room Plan and

Elevations' provides a typical elevation for the building. The control building would be for the battery facility operator. Part of this building would house switchgear and other connection equipment. It would also contain the control room which would include the supervisory control and data acquisition (SCADA) and the battery management system (BMS) equipment. There would be an office with stores and welfare facilities within another part of the building. No staff would be based at the Proposed Development. Four parking places would be provided adjacent to the battery facility operator's building for visiting maintenance personnel.

3.4.11. The Proposed Development would not have a foul sewer connection. Foul drainage from staff welfare facilities on site would be disposed of either by a packaged biological foul treatment plant with discharge to the surface water system or to a storage tank for offsite disposal via road tanker.

3.4.12. The battery units would be connected to the onsite switchgear and control building via cables which would be buried in trenches of around 0.5 m to 1 m in depth, within the compound.

Potential Future Augmentation Area

3.4.13. The storage capacity and maximum output from the battery units is likely to diminish after a period of about 10 years. There are various methods of maintaining the output including: progressive replacement of battery cells within units, replacement of whole units within the main facility (commonly known as repowering) or installing additional battery units within or next to the main facility.

3.4.14. The decision on whether to install further battery units would be taken at a later date. As a precaution, a potential future augmentation area measuring 80 m by 50 m has been included in the BESS layout design and planning application. This is located immediately to the west of the main BESS compound.

Construction Compound

3.4.15. During the construction phase a temporary construction compound area will be required. This would be located within the potential future augmentation area. The compound would be used to store materials, provide vehicle parking, and would form a location for site cabins, offices and welfare facilities.

3.4.16. The construction plant and materials would remain for the anticipated 36-week duration of the groundwork and installation phases of construction but would be removed during the commissioning stage to leave a clear hardstanding.

Attenuation Basin

3.4.32. An attenuation basin has been included in the overall scheme layout and designed as a SuDS feature. Runoff from the impermeable elements of the BESS compound would be collected and directed into the pond which will provide treatment and attenuation prior to discharge to the receiving watercourse.

3.4.33. The pond would have graduated margins and will be natural in shape so that it is well integrated into the surrounding landscaping area.

3.4.52. The detailed design of the pond will be provided as part of a surface water drainage scheme which will be submitted to satisfy a planning condition.

Hardstanding

3.4.17. The BESS compound will be located on the reinstated temporary construction compound used previously for the Limekiln Wind Farm development.

3.4.18. The Substation Extension would be located adjacent to the operational Limekiln Wind Farm Substation, wrapping around its northern edge.

3.4.19. The BESS compound and Substation Extension hardstanding would be formed of crushed aggregate laid on permeable membranes. The aggregate will be sourced from local quarries and transported to the site via the A836, utilising the existing Limekiln Wind Farm access junction and existing internal track.

3.4.20. Cut and fill earthworks across the compound areas would be carried out at an early stage of the construction process to create a suitable level development platform. The earthworks would be designed to minimise the need for fill material to be brought to the site or for excess material to be removed from site, as far as practicable.

Outdoor Switchgear and Transformer

3.4.21. To connect the BESS development to the Grid, an outdoor switchgear and 132/33 kV transformer is required at the Substation Extension.

Grid Connection

3.4.22. The BESS project is designed to utilise spare capacity on the existing overhead line to Limekiln Wind Farm; thus no infrastructure works are required from SSEN to connect the BESS project, and the cable corridor to Dounreay is therefore not assessed as part of the application.

Fencing

3.4.23. The BESS compound and Substation Extension would be enclosed by 3 m high steel palisade fence, which would also be installed around the outer perimeter of the compound.

3.4.24. The exact colour of the fences would be agreed post consent but they are likely to be either dark green or brown. The position of the fences are shown in Figures ‘Indicative BESS Layout’ and ‘Indicative Substation Extension Layout’, and the details of the fences are shown in Figure ‘Indicative Fence Detail’.

Lighting

3.4.25. There would be no permanent visible lighting within the BESS compound or Substation area. The visible lighting within the main compound would solely consist of motion-sensitive lighting at the entrances, which would only be activated during occasional visits by maintenance personnel. This will be designed to be downward facing to minimise any light-spill beyond the enclosure.

3.4.26. There would also be invisible infra-red lighting which will be detectable by security cameras. It is proposed that a condition be attached to the planning permission requiring the submission and approval of a lighting scheme for the BESS. The indicative lighting scheme is shown in Figure 'Indicative Lighting and CCTV Column Details'.

Closed Circuit Television Masts

3.4.27. CCTV cameras would be installed on 4 m high columns; the cameras would be mounted on the 3 m high palisade security fencing at each corner and at strategic intervals along the BESS compound and Substation Extension perimeter.

3.4.28. The masts would accommodate infrared night-time cameras, as well as standard cameras, to maintain security surveillance during hours of darkness.

3.4.29. The detailed design of the CCTV masts and equipment would be submitted at a later stage to satisfy a planning condition. Figure 'Indicative Lighting and CCTV Column Details' shows the indicative CCTV column details.

Site Access and Internal Access Tracks

3.4.30. Access to the BESS compound and Substation Extension would utilise the existing wind farm tracks. Therefore no new tracks are proposed outside of the confines of the compounds. An internal access track is proposed within the BESS compound and Substation Extension; the access is required for future maintenance and repair if required.

Forestry Felling

3.4.31. The proposed BESS would be situated within a large commercial conifer plantation on the reinstated temporary construction compound used for the construction of Limekiln Wind Farm. This area was felled during the construction phase and was due to be replanted under the Limekiln Wind Farm's Long-Term Forestry Plan.

3.4.32. The Substation Extension also lies within the plantation, in an area that has already been felled as part of the Limekiln Wind Farm construction. Some additional felling would be required but would be minimal.

3.4.33. The route of the underground cable between the BESS and Substation Extension has been designed to minimise impact on forestry. Minimal tree felling would be required to install the underground cable alongside the core path.

3.4.34. If the Proposed Development is consented, compensatory planting would be undertaken to mitigate any permanent woodland loss. See Chapter 4 Forestry for further information.

Educational Signs

3.4.35. No landscaping has been proposed for the Proposed Development due to being situated within the proximity of Limekiln Wind Farm and a large forestry plantation.

3.4.36. The Landscape Officer at the Highland Council major developments pre-application meeting suggesting the BESS could be made a point of interest along the core path. Educational signs have been proposed along the core path to help inform the public about the Proposed Development and its purpose.

3.5. Construction of the Proposed Development

3.5.1. The start of construction would depend on the planning process, and the procurement stage.

3.5.2. The on-site construction period is estimated to be approximately 6 - 12 months, however, this could be longer if there is a delay between the ground works and the installation stage due to the lead in time for the delivery of the battery units and inverters.

3.5.3. The construction activities are listed below in the approximate order that they would take place, albeit that the duration of some activities will overlap.

Ground Works

- Formation of the construction compound (potential future augmentation area) immediately to the west of the main BESS compound.
- Levelling and preparation of the main BESS platform.
- Formation, levelling and preparation of the Substation Extension platform and preparation of foundation footings.
- Preparation of battery unit and other foundation footings within the BESS compound.
- Preparation of the transformer and other electrical components within the Substation Extension.
- Trenching and laying of cables.
- Formation of compounds with imported aggregate.
- Construction and electrical fit out of buildings and enclosures.
- Erection of the palisade fences around perimeters.

Installation

3.5.4. Delivery of the battery units, inverters and transformers using heavy goods vehicles, while the 132/33 kV transformer, which constitutes an abnormal load due to its size and weight, will be transported using a specialist low-loader. All components will be offloaded and installed on-site using a mobile crane.

Temporary Core Path Diversion

3.5.5. During the installation of the underground cable, it is proposed to temporarily divert the core path CA11.03 route from the Substation Extension area through the wind farm to rejoin at the BESS compound. The Highland Council has been consulted on this temporary diversion and have indicated that no significant impacts are predicted.

Commissioning

- Installation of underground electrical cable to the Substation Extension.
- Setting, testing and monitoring initial operation of the battery facility.

Proposed Site Re-instatement and Enhancement

- Forestry replanting onsite with productive conifer species matching the Long Term Forestry Plan (LTFP) Restocking Plan;
- Offsite compensatory planting for the remaining felled area;
- Restoration and enhancement of plantation woodland edge habitats following felling;
- Restoration of remaining area around Substation Extension to manage heathland and associated habitats;
- Hedgerow planting around the BESS compound;
- Allow heathland to expand into open areas around the BESS compound and underground cable route areas;
- Bird boxes (including owl boxes) and bat boxes; and
- Refugia piles for reptiles and amphibians.

3.5.6. The typical construction plant to be used would include: excavators, graders and haulage vehicles, mobile and tower cranes, heavy and light goods vehicles.

3.5.7. The crushed rock used to form the BESS compound and Substation Extension hardstandings will be imported from local quarries. The material for the foundations will be imported ready mixed concrete. Material excavated during the ground works phase will be reused within the site.

3.5.8. Normal construction working hours would be Monday to Friday 08:00-18:00 and Saturday 08:00-13:00. No Sunday, bank holiday or night working is proposed except as described below. Up to an hour before and after the normal construction working hours, the following activities may be undertaken:

- arrival and departure of the workforce at the site and movement around the project site that does not require the use of plant;
- site inspections and safety checks; and
- site housekeeping that does not require the use of plant.

3.5.9. Non-noisy activities such as fit-out within buildings may be undertaken outside of those hours where these would not cause disturbance off-site. It is possible that certain construction activities that cannot be interrupted, such as a continuous concrete pour, may be required for the foundation slabs of the development platforms.

3.5.10. Directional task lighting may be required during normal construction hours in winter. Outside normal construction working hours, motion-activated directional security lighting may be used at the site.

3.5.11. A Construction Environmental Management Plan (CEMP) will be prepared and agreed prior to any work commencing on site. A Construction Traffic Management Plan (CTMP) will also be produced prior to the commencement of construction.

3.6. Operation of the Proposed Development

3.6.1. The BESS is likely to operate intermittently on a 24-hour, seven day a week basis, although operation during the middle of the night would be less likely to occur, as electricity demand is lower at this time.

3.6.2. The BESS or Substation Extension would not require a permanent manned presence. Maintenance would be overseen by suitably qualified personnel who would visit the development as required. This would typically be less than twice per month. Online monitoring of performance and identification of issues would be provided on a 24-hour basis.

3.6.3. Typical traffic to the site would be up to two vans per month. During the normal course of operations, no heavy good vehicles (HGV) are anticipated to be required. There would, however, be some additional HGV movements if any part of the BESS required replacement during the operational life of the development.

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4. Forestry

4.1. Introduction

4.1.1. This chapter identifies the likely impacts on Forestry receptors associated with the construction and operation of the Proposed Development and provides details of control measures where appropriate. The specific objectives of the chapter are to:

- describe the baseline forest environment;
- identify the potential direct and indirect impacts on forest receptors; and
- describe any mitigation or control measures proposed to address likely impacts.

4.2. Methodology

Information Source

4.2.1. Woodland assessment through desk study specifically included:

- Scottish Forestry Map Viewer, Scottish Forestry (SF) is the Scottish Government agency responsible for forestry policy, support and regulation, the map viewer enables view of what forest management plans or felling approvals are in place or have now expired.
- Datasets including the Native Woodland Survey of Scotland (NWSS) provide a baseline survey of all native woodlands, nearly native woodlands and Plantations on Ancient Woodland Sites (PAWS) sites in Scotland showing type, extent and condition of those woods.
- Datasets for Ancient Woodland Inventory (Scotland) (AWI) categorise ancient woods recorded as being of semi-natural origin on either the 1750 Roy maps OR the 1st Edition Ordnance Survey maps of 1860.
- The Land Information Search (LIS) is a map-based tool that allows search for data such as Sites of Special Scientific Interest and Native Woodland that may fall within the area of interest.
- Sub compartment shapefiles provided by the forest manager.

4.3. Limitations and Assumptions

4.3.1. The open data forestry shapefiles have been used to identify the woodlands within the study area. There are minor differences between these, the Ordnance Survey mapping and aerial imagery.

4.3.2. No site walkover was undertaken to verify the current tree cover.

4.4. Study Area

4.4.1. The Forestry Study Area is illustrated in **Figure 4.1 Forestry Study Area.**

4.5. Legislation, Planning Policy and Guidance

4.5.1. The key legislation, policy and guidance listed below has been considered in the assessment:

- The Scottish Government's Policy on Control of Woodland Removal (2009) (CoWRP);
- Scottish Government's policy on control of woodland removal: implementation guidance (2019);
- UK Forestry Standard 5th Edition (2023); and
- National Planning Framework 4 (NPF4) (2023) (see below);

4.5.2. Policy 6: Trees, woodland and forestry of NPF4 notes that development proposals should not be supported where they would result in:

- any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition;
- adverse impacts on native woodlands, hedgerows and individual trees of high biodiversity value or identified for protection in the Forestry and Woodland Strategy;
- fragmenting or severing woodland habitats, unless mitigation measures are identified and implemented; and
- conflict with Restocking Direction, Remedial Notice or Registered Notice to Comply issued by the Scottish Government Forestry Regulator, Scottish Forestry

4.6. Baseline

4.6.1. The Proposed Development lies within a single commercial conifer plantation. The access utilises the Limekiln Wind Farm track from outwith the forest.

4.6.2. Scottish Forestry Map Viewer identifies the Limekiln Plantation Long Term Forest Plan (LTFP) (Reference 16FGS09175) approved by Scottish Forestry on 28th August 2017. The contract ends on 28th August 2027. Felling Permission is from 2022 to 2027. The extent of the plan is 1,240.08 ha.

4.6.3. This LTFP has been amended taking account of the Limekiln Wind Farm as a Consented Development.

4.6.4. Limekiln Plantation is predominantly Sitka spruce (*Picea sitchensis* (Bongard) Carrière) and Lodgepole pine (*Pinus contorta* Douglas ex Loudon) in mixture established over 1989 and 1990. The forest area includes 300.21 hectares of open ground and 134.86 of peatlands designated as SSSI, SAC and SPA. The baseline species is shown in **Figure 4.2 Forestry Baseline Species**.

4.6.5. The forest is adjacent to the Broubster forest (1,379 hectares) and Achaveilan North forest (116 hectares) within a planted coniferous complex totalling approximately 3,120 hectares.

4.6.6. There are no ancient woodland sites identified in AWI.

4.6.7. One small area of NWSS extends into the northern boundary of the plantation (National Grid Reference: NC 973 631). This upland birchwood is outwith the Site.

4.7. Future Baseline

4.7.1. In the absence of this Proposed Development the plantation would be managed on a commercial forestry basis with an operational wind farm embedded.

4.8. Impact and Features Scoped Out

4.8.1. Based on the baseline characterisation, the following receptors have been scoped out of the subsequent assessment. Natural heritage is detailed in Chapter 6. Ecology and Chapter 7. Ornithology. Forest landscape is covered by Chapter 5: Landscape and Visual.

4.9. Embedded Mitigation

4.9.1. Embedded mitigation through design has avoided ancient woodlands and native woodlands.

4.9.2. Existing forest and wind farm access tracks are to be used to access the Proposed Development.

4.9.3. Compensatory planting (CP) is accepted to mitigate any proposed permanent woodland loss. CP will follow the CoWRP Implementation Guidance which includes design to meet UKFS.

4.10. Appraisal

Construction Phase

4.10.1. To construct the Proposed Development including the proposed underground cable route there would be a requirement to fell and remove 2.59 ha of productive conifer, Sitka spruce and Lodgepole pine in mixture. These forestry compartments are planned Phase 3 felling, 2028 to 2032 in the LTFP. **Figure 4.3 Forestry Felling.**

Operational Phase

4.10.2. No further tree felling would be required.

4.10.3. Replanting in situ with Norway spruce (*Picea abies* (L.) Karsten) as the LTFP would take place during the operational phase. This replanting of the proportion of the felled area would leave 1.88 ha as unplanted open ground as safety buffers around the completed Proposed Development. This unplanted area (1.88 ha) would be taken forward as the area for off-site compensatory planting. **Figure 4.4 Forestry Replanting.**

4.11. Mitigation

4.11.1. Compensatory planting would be provided with an equivalent woodland area, on appropriate site types and with at least the equivalent woodland-related net public benefits, in line with the CoWRP Implementation Guidance.

4.11.2. The Highland Council (THC) have a strong preference that compensatory planting takes place in the Highland Region.

Table 4.1 Recommended Mitigation

Potential Impact	Mitigation Measure
Permanent removal of 1.88 ha of productive conifer.	Compensatory planting of equivalent woodland area (1.88 ha) with at least the equivalent woodland-related net public benefits.

4.12. Residual Effects

4.12.1. Given that compensatory planting would take place, then in a Scotland wide context there would be no loss of woodland and there would be no residual effect.

4.12.2. With compensatory planting taking place in the Highland Region there would be no loss of woodland to the Region and there would be no residual effect.

4.13. Conclusion

4.13.1. The Proposed Development utilises the existing access tracks however there is a requirement to fell and remove 2.59 ha of productive conifer for the construction of the Proposed Development.

4.13.2. No ancient or native woodland has been identified within felling areas.

4.13.3. Replanting on site would take place for 0.71 ha with productive conifer species matching the LTFP Restocking Plan. 1.88 ha of felled area would be left unplanted as open ground as a safety buffer.

4.13.4. The Applicant is committed to providing compensatory planting of equivalent woodland area (1.88 ha) with at least the equivalent woodland-related net public benefits.

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5. Landscape and Visual Appraisal

5.1. Introduction

5.1.1. This Landscape and Visual Appraisal (LVA) has been conducted by Chartered Landscape Architects at SLR Consulting Limited (SLR) on behalf of Boralex Limited to evaluate the potential effects on the landscape and visual resource associated with the construction, operation and decommissioning of the Battery Energy Storage System (BESS) and Substation Extension (the Proposed Development), associated with the operational Limekiln Wind Farm, south of Reay in Caithness. The LVA has been directed by James Welch FLI BA Hons, Chartered Landscape Architect and Director at SLR.

5.1.2. The purpose of the LVA is to provide a landscape appraisal, which outlines the existing landscape and visual baseline and appraises the landscape and visual effects of the Proposed Development, to inform the material planning considerations in the determination of a Section 36 application.

5.1.3. A formal Screening Opinion under Regulation 8 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 was submitted to the Energy Consents Unit (ECU) on 22 April 2025. The Screening Opinion received from the Energy Consents Unit on 6 June 2025 confirmed that an Environmental Impact Assessment was not required. A supporting Planning Statement has been prepared by David Bell Planning and submitted alongside this LVA. This covers the key planning policies and considerations relevant to the Proposed Development and its consideration.

5.1.4. The LVA considers effects on the landscape resource and the visual amenity within the study area (Figure 5.1). Cumulative effects arising from the addition of the Proposed Development to other large scale energy infrastructure are also considered. The specific objectives of the chapter are to:

- describe the landscape and visual baseline;
- describe the appraisal methodology and criteria used in the appraisal of effects;
- describe the potential effects, including direct, indirect, and cumulative effects;
- describe the mitigation measures proposed to address likely landscape and visual effects; and
- assess the residual effects remaining following the implementation of mitigation.

5.1.5. This Chapter is supported by the Technical Appendix (TA) listed below which is referenced throughout the Chapter.

- Appendix 5.1: Appraisal Criteria

5.1.6. The LVA is also supported by the following set of figures and visualisations, which contain GIS maps, photographs, and photowires to illustrate various aspects of the LVA. These figures have supported the professional judgement that is applied within the appraisal:

Appendix 5.2

- Figure 5.1 - Site Location and Context
- Figure 5.2 - Bare Earth Zone of Theoretical Visibility (ZTV) plan
- Figure 5.3 - Screened Zone of Theoretical Visibility (ZTV) plan
- Figure 5.4 – Landscape Character Types with Screened ZTV overlaid
- Figure 5.5 – Landscape Designations with Screened ZTV overlaid
- Figure 5.6 – Visual Receptors with Screened ZTV overlaid

Appendix 5.3

- Figure 5.7 Viewpoint 1 - CA11.03 Limekiln Forest Core Path (Substation Extension)
- Figure 5.8 Viewpoint 2 - CA11.03 Limekiln Forest Core Path (BESS compound)
- Figure 5.9 Viewpoint 3 - Beinn Ratha
- Figure 5.10 Viewpoint 4 - Borlum Hill
- Figure 5.11 Viewpoint 5 - Reay Footpath
- Figure 5.12 Viewpoint 6 - Shebster
- Figure 5.13 Viewpoint 7 - Clach Clais an Tuirc (Cultural Heritage viewpoint only)

5.1.7. The Zone of Theoretical Visibility (ZTV) illustrations have been produced on two different bases to inform the appraisal. In common with normal practice, a bare earth ZTV has been prepared to illustrate the worst case situation. This illustration takes no account of the existing forestry screening that exists in the Limekiln Forest and adjoining plantations, which in reality will provide a degree of screening to both the Substation Extension and BESS compound.

5.1.8. To capture this screening, a screened ZTV has also been prepared which models existing forestry at a height of 10 m and assumes this is present in the terrain model. The forestry on the Site has been modelled having regard to the Forestry Management Plan, including the removal of all felling planned in Phases 1 and 2, up to 2027 (which includes recent felling to accommodate the wind farm). This provides the most realistic impression of the likely screening that will be derived from retained forestry on the Site. It is evident from the screened ZTV that visibility of the Proposed Development will be substantially contained by surrounding forestry, which reflects SLR's assessment on the ground, during fieldwork.

5.2. Proposed Development

5.2.1. A full description of the Proposed Development is set out in the Environmental Report (ER) Chapter 3, with a summary provided here to provide context to the LVA.

5.2.2. The Proposed Development Site ('the Site') is located within the footprint of the operational Limekiln Wind Farm, south of Reay, Caithness within the administrative boundary of The Highland Council. The Site consists of a combination of operational wind farm infrastructure and actively managed commercial forestry, as shown on Figure 5.1 in Appendix 5.2.

5.2.3. The overall Site area is approximately 32 hectares (ha) with access taken from the A836, utilising the existing wind farm access tracks. The Site is rural in nature with a small number of neighbouring residential properties. The nearest residential properties include Borlum House, Milton and Loanscorribest, which are approximately 2 km north of the Proposed Development.

5.2.4. A Core Path (ref CA11.03-Limekiln Forest) passes alongside the proposed BESS site, which would be situated on the reinstated temporary construction compound which was used for Limekiln wind farm. Existing wind farm tracks would be utilised therefore no new access tracks would be required for the Proposed Development. The battery storage units would be located within a compound measuring approximately 115 m by 80 m which would be formed of crushed rock laid on permeable membranes. The maximum height of any structure within the facility would be approximately 4 m. Lighting would be provided on site including lighting to the 4 m CCTV columns and lighting on the units within the facility. The lighting would be motion sensor activated.

5.2.5. The proposed Substation Extension would sit immediately adjacent to the operational Limekiln Wind Farm Substation, wrapping around its northern edge as shown in Figure 5.1. The tallest elements in the Substation Extension would be 7.5 m tall, which is consistent with the operational Substation infrastructure.

5.2.6. The Substation Extension would be connected to the BESS facility by way of an underground cable running alongside the Core Path.

5.2.7. The photowires that are provided in Appendix 5.3 illustrate the proposed Substation Extension and BESS compound as separate three-dimensional boxes, accurately representing the maximum parameters of the development in both locations. The photowires do not attempt to illustrate the actual appearance of these elements but enable an opinion to be formed on the likely visibility and magnitude of change that will occur at each viewpoint.

5.3. Scope of the Appraisal

5.3.1. The appraisal covers the potential landscape and visual effects of the Proposed Development during its construction phase and operational phases. A study area of 5 km buffered from the Proposed Development has been defined as the basis of this LVA (the 'Study Area'). The extent of the Study Area has been informed by professional experience of similar development, previous work undertaken for this scale of development and landscape character and terrain. Consideration of any evolving cumulative context is included throughout the appraisal, where relevant.

Methodology

5.3.2. The LVA methodology draws upon the established guidance in the Landscape Institute's Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd edition 2013, the LI Technical Guidance Note LITGN-2024-01 (August 2024) and previous experience of undertaking similar appraisals. Appendix 5.1 sets out criteria for the appraisals of sensitivity and magnitude of change of the landscape and visual receptors identified in the LVA, and for the appraisal of levels of effect.

5.3.3. The following extract, taken from the GLVIA 3 gives guidance on the terminology to be used in non-EIA Landscape and Visual Impact Appraisals, such as this LVA:

'*In carrying out appraisals, the same principles and process as LVIA may be applied but, in so doing, it is not required to establish whether the effects arising are or are not significant given that the exercise is not being undertaken for EIA purposes. The reason is that should a landscape professional apply LVIA principles and processes in carrying out an appraisal and then go on to determine that certain effects would be likely be significant, given the term 'significant' is enshrined in EIA Regulations, such a judgement could trigger the requirement for a formal EIA. The emphasis on likely 'significant effects' in formal LVIA stresses the need for an approach that is proportional to the scale of the project that is being assessed and the nature of its likely effects. The same principle - focussing on a proportional approach – also applies to appraisals of landscape and visual impacts outside the formal requirements of EIA.*'

5.3.4. In this LVA, effects are appraised to be either 'negligible', 'minor', 'minor-moderate', 'moderate' 'moderate-major', or 'major.' The level of effect is appraised through a combination of two considerations - the sensitivity of the landscape element, landscape character receptor or visual receptor, and the magnitude of change that would result from the Proposed Development. This evaluation is carried out for each of the receptors described within the baseline section of the report, with the exception of those receptors that are scoped out of detailed appraisal.

Categories of Effect

5.3.5. In the appraisal, the potential effects of the removal and addition of elements within the landscape that are associated with the Proposed Development are considered in relation to effects on landscape elements, landscape character and visual amenity.

5.3.6. Effects on landscape elements are restricted to the area within the Site boundary and are direct effects upon the fabric of the Site. Landscape elements are components of the landscape such as hedgerows, or woodland that may be physically affected by the Proposed Development.

5.3.7. Effects on landscape character arise either though the introduction of new elements that physically alter the pattern of elements that makes up landscape character, or through visibility of the Proposed Development, which may alter the way in which the pattern of elements is perceived. This category of effects is made up of landscape character receptors which fall into two groups: landscape character types and areas covered by a landscape planning designation.

5.3.8. Effects on visual amenity is an appraisal of how the Proposed Development will affect the views of residents, recreational users, and road users around the Site. The appraisal of effects on visual receptors is informed by six viewpoints that have been selected to represent the visibility for the Proposed Development from the visual receptors around the Study Area. Further information on these viewpoints is provided in the baseline section of this appraisal.

Appraisal of the Levels of the Effect

Sensitivity

5.3.9. Sensitivity is an expression of the ability of a landscape or visual receptor to accommodate the Proposed Development. The sensitivity is determined through a combination of the value of the receptor, and the susceptibility of the receptor to the Proposed Development.

5.3.10. Levels of sensitivity - high, medium to high, medium, medium to low, low, and negligible are applied in order that the judgement used in the process of appraisal is made clear. The criteria used to determine sensitivity differ for the effects on landscape elements, landscape receptors and visual receptors. These criteria are explained in full in Appendix 5.1.

Magnitude of Change

5.3.11. Magnitude of change is an expression of the extent of the effect on the landscape and visual receptors that will result from the introduction of the Proposed Development. The magnitude of change is appraised in terms of the size and scale of the effect. The geographical extent of the area influenced is described in relation to the magnitude of change.

5.3.12. Levels of magnitude of change - high, medium to high, medium, medium to low and low - are applied in order that the judgement used in the process of appraisal is made clear. The criteria used to determine magnitude of change differ for the effects on landscape receptors and visual receptors, as well as any cumulative effects on both. These criteria are explained in full in Appendix 5.1.

Level of Effect

5.3.13. To ascertain the level of effect, the sensitivity rating is combined with the magnitude of change rating, through the application of professional judgement to conclude whether the level of the effect is major, moderate, or minor or sits between these thresholds as outlined above. A major effect occurs where the Proposed Development would provide a defining, or material, influence on a landscape element, landscape character receptor or visual receptor. A minor effect occurs where the effect of the Proposed Development is not material, and the baseline characteristics of the landscape element, landscape character receptor, or visual receptor continue to provide the definitive influence. A moderate effect occurs where the Proposed Development has a notable influence on a landscape element, landscape character receptor or visual receptor, but where the baseline characteristics continue to provide the definitive influence.

5.3.14. It is relevant to emphasise that a non-EIA appraisal should not form any conclusions around the significance of any environmental effects, as to do so may trigger a requirement for an EIA level assessment.

Guidance

5.3.15. The LVA follows the Appraisal Criteria set out in Appendix 5.1 devised specifically for the assessment of energy developments, which is in line with the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute and IEMA, 2013) ('GLVIA3'), the key source of guidance for LVIA and LVA.

5.3.16. Other sources of guidance used and referenced in the LVA include the following:

- Landscape Institute (2019). Visual Representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19.
- Landscape Institute (2019). Technical Guidance Note 2/19 Residential Visual Amenity Assessment.
- Landscape Institute (2021). Technical Guidance Note 2/21 Assessing landscape value outside of national designations.
- Landscape Institute, Technical Guidance Note LITGN – 2024-01 (GLVIA3 Clarifications), Published August 2024.
- NatureScot (2017). Visual Representation of Wind Farms Version 2.2.
- NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments.
- NatureScot (2020). Assessing Impacts on Wild Land Areas Technical Guidance.
- NatureScot (2017). Siting and Designing of Windfarms in the Landscape: Version 3a.

5.4. Landscape and Visual Baseline

5.4.1. The baseline study records the existing conditions of the Site and Study Area, and includes an evaluation of which receptors should be carried forward to a detailed appraisal on the basis of the potential for material effects arising from the Proposed Development. The process enables an understanding of the baseline characteristics of the Site, outlining what it is that makes the Site and surroundings distinctive as well as describing the important components or characteristics which comprise the existing landscape and how strongly they are represented across the Site and wider Study Area. It is instrumental in the identification of the landscape elements, landscape designations, landscape character types and visual receptors which are included in the subsequent appraisal.

5.4.2. The baseline study is presented in five sections:

- The Proposed Development Site and Wider Context
- Landscape Character
- Landscape Planning Designations and Wild Land
- Principal Visual Receptors and Viewpoints, and
- Future Baseline.

5.4.3. In each section of the baseline description, receptors are screened in relation to the likelihood of material landscape and visual effects arising from the Proposed Development and, applying Professional judgement, are either scoped-in or scoped-out of the appraisal of effects. This is to provide a proportionate appraisal that focuses on relevant considerations for planning purposes.

Field Survey

5.4.4. To inform the LVA, field survey was undertaken in April and July 2025. Viewpoint photography was captured during field survey visits in periods of good visibility. Field surveys were carried out throughout the study area, although surveys were concentrated within the areas shown on the ZTV to gain theoretical visibility of the Proposed Development.

5.4.5. Field survey included visits to viewpoints as well as travel around the study area to consider potential effects and cumulative effects on landscape character and on the experience of views seen from travel routes through the landscape. Field survey has allowed the landscape character and the visual amenity of the study area to be experienced in a range of different conditions. The field survey allows the assessors to judge the likely scale, distance, extent, and prominence of the Proposed Development directly.

5.4.6. The landscape of the Site was assessed for any particular features that contribute to the landscape character of the Site or are important to the wider landscape setting. The landscape character types for the study area were reviewed and the key characteristics of the landscape were identified. The field surveys provided an experience of the character

types of the study area and verification of how these areas might be affected by the Proposed Development. Visual amenity was surveyed including both static and sequential views, from receptors representative of the range of views and viewer types likely to experience the Proposed Development. Views from a variety of distances, aspects, elevations, and extents were included. Receptor types include settlement; recreational routes; transport routes; hilltops; visitor locations; areas of cultural significance; a range of landscape character types; and landscape designations.

The Site and Wider Context

5.4.7. The Proposed Development Site is situated in Caithness, approximately 12 km west of Thurso and 2 km south of the North Atlantic coast. It is located within a large coniferous woodland plantation known as Limekiln Forest, where Limekiln Wind Farm has recently become operational. The underlying landform comprises relatively low and gently undulating hills characteristic of the wider Sweeping Moorland and Flows LCT. Limekiln rises from 50 m AOD along the northern boundary to 200 m AOD along the southern boundary, while the site of the BESS is at approximately 85 m AOD. The wider landform follows a south to north alignment marked by the orientation of the low hill ridges and intermediate valleys with the flow of the water courses north toward the Atlantic Ocean. The Site in relation to the LVA Study Area is shown on Figure 5.1 in Appendix 5.2.

5.4.8. There is a central ridge which runs through Limekiln, connecting the high points at Cnoc an Fhraoich (approx. 180 m AOD) and Cnoc an Airigh (approx. 140 m AOD). Reay Burn and Sandside Burn lie to the west of the central ridge and Achvarasdal Burn lies to the east. Smaller burns form tributaries flowing down into the shallow valleys of the larger water courses. One small lochan occurs along the ridge close to Cnoc nan Airigh, with bigger lochs occurring in the forestry to the east of the Site. The most distinctive landform feature is a small knoll, Creag Leathan, which sits at the northern end of Limekiln. The slightly steeper slopes and conical form make it apparent in views from the settlements and roads to the north. Borlum Hill which lies to the north of Limekiln forms a similar but smaller knoll, along with other smaller knolls along this northern edge.

5.4.9. The land is currently used for commercial forestry and wind farm development, with unforested areas only occurring through planned felling across the upper slopes of Creag Leathan and where key holes and strips have been removed for the construction of wind turbines and their access tracks. Wind farm and forestry tracks cut through the forest cover, encircling the central ridge and extending south to the disused property at Gleann Dubh. A Core Path (ref Limekiln Forest CA11.03) follows a circular route within the plantation, leaving and entering the forest at the northern edge close to the operation Limekiln Wind Farm Substation. The Core Path is a relevant consideration as it passes close to both the proposed Substation Extension and BESS compound sites, the latter which sits on an area of ground which was a construction compound for the Limekiln Wind Farm during construction and which has been cleared of vegetation.

5.4.10. A ridge of slightly higher hills wraps around the west and the south of Limekiln with high points at Beinn Ratha, 242 m AOD, to the west and Beinn nam Bad Mor, 290 m AOD, to the south. The landscape in these directions comprises open sweeping moorland which is characterised

by the relatively low and gently undulating landform and distinct absence of development, other than the occasional track and occasional abandoned buildings.

5.4.11. To the north of Limekiln Forest the landscape comprises improved agricultural land and small settlements. The small settlement of Reay is situated along the main north coast road (A836) and other individual properties are scattered along this northern edge. The Dounreay Nuclear Power Plant lies to the north-east, situated on the coast with its domed building forming a distinctive landmark feature. To the east, the predominance of agricultural land, along with the extent of small settlements, isolated farm steads and minor roads, establish the rural and settled nature of this landscape. Large scale development occurs at Baillie Hill Wind Farm, 4.5 km to the north-east and Forss Wind Farm, 8.3 km to the north-east, where the turbines form a distinct focus in the landscape.

5.4.12. The BESS compound will be located on the reinstated temporary construction compound previously utilised for the construction of Limekiln Wind Farm, and the Substation Extension will be located adjacent to the existing substation located in an area of clear-felled forestry. Access to the BESS and Substation Extension will use existing wind farm tracks. This approach will reduce the disturbance to the existing soils and landcover. The physical effects on the Site will, therefore, only relate to the loss of soils and vegetative cover associated with the northern part of the Substation Extension. This will involve the removal of a very small area of coniferous plantation in an area subject to a continuous cycle of clear felling and restocking.

5.4.13. The effect of the loss of this small area of clear-felled forestry where the northern part of the Substation Extension will be located, will not lead to a material or defining effect to the fabric of the Site.

5.4.14. Direct landscape effects on the fabric of the Site are therefore scoped-out from the detailed appraisal.

Landscape Character

5.4.15. The landscape appraisal considers the effect of the Proposed Development on the Landscape Character Types (LCTs) within the Site and the surrounding area. In early 2019, NatureScot published an update to the characterisation of Scotland's landscape as a digital resource. The information builds on the characterisation studies published in the 1990s. NatureScot describes this 2019 characterisation as superseding the 1990s landscape character descriptions and mapping. NatureScot's 2019 Character Assessment forms the most up to date characterisation study for the Site and study area and its landscape character boundaries and descriptions of key landscape characteristics form the basis of character assessment in this LVIA. The LCTs found in the study area are shown on Figure 5.4 in Appendix 5.2.

5.4.16. The two LCTs that may be considered relevant to the appraisal are the Sweeping Moorlands and Flows LCT (LCT 134), in which the Site is located, and the Farmed Lowland Plain LCT (LCT 143), which lies to the immediate north of Limekiln Forest. The other LCTs in the study area will not be affected owing to their separation distance from the Proposed Development,

the relatively small scale of the Proposed Development and the screening effect of the coniferous plantation.

5.4.17. The Sweeping Moorland and Flows LCT covers an expansive area stretching from Strath More in the west, to the east coast at Wick, and from Strath Fleet in the south, to the north coast at Reay. The Sweeping Moorland and Flows LCT is generally characterised by the broad expanse of open moorland, with one of its key characteristics described as follows; '*a strong sense of remoteness is associated within the largely uninhabited, inaccessible core flows and moorlands of this landscape'*. NatureScot's description also recognises the variation in character that occurs across an expansive LCT with the following statement; '*coniferous forestry has a strong presence in some areas, particularly the more modified outer fringes, interrupting the continuity of the moorland cover.*'

5.4.18. The Proposed Development is located in the Limekiln coniferous plantation on the northern fringe of the LCT. This area is characterised by the enclosure of forestry in contrast to the openness of the core flows and moorland. Furthermore, along with the operational Limekiln Wind Farm, the rotational felling and restocking presents a heavily managed and modified landscape in contrast to the natural landscape of the flows. Limekiln Wind Farm makes large-scale energy development an established feature of the baseline character.

5.4.19. The Farmed Lowland Plain LCT occurs to the immediate north of Limekiln and extends towards the northern coastline. Despite the relative proximity of this LCT to the Proposed Development, the screening effect of the intervening landform and coniferous plantation, as demonstrated by the screened ZTV in Figure 5.3, combined with the relatively small scale/ low lying nature of the Proposed Development and the baseline influence of existing development (including Limekiln Wind Farm and the settled northern coastline), will prevent material effects on landscape character within the Farmed Lowland Plain from arising. This has been verified through fieldwork and on this basis LCT 143 is scoped-out from the detailed appraisal.

5.4.20. The only relevant landscape character type for consideration in the appraisal is:

- Sweeping Moorlands and Flows LCT (LCT 134)

Landscape Planning Designations and Wild Land

5.4.21. The Site and its surroundings lie well separated from any national or local landscape designations. The closest designation to the Site is the regionally valued Farr Bay, Strathy and Port Skerra Special Landscape Area (SLA) which lies approximately 8 km to the north-west of the Site, while the Dunnet Head SLA lies over 20 km to the east. It is considered that no effects on the special landscape qualities of these designations will arise owing to a combination of the substantial separation distances, the relatively small scale and height of the Proposed Development and the enclosure of the Site by localised landform features and coniferous plantation.

5.4.22. Landscape Planning Designations have therefore been scoped-out from the detailed appraisal.

5.4.23. East Halladale Flows Wild Land Area (WLA) is a mapped interest, the northern part of which lies approximately 1.7 km to the west of the Site, as shown on Figure 5.5. The effect of the Proposed Development on the defined wildness qualities of this WLA will be substantially moderated by the screening effect of the coniferous plantation, the presence of the Limekiln Wind Farm and the associated wind farm and forestry tracks. This context will moderate the influence of the Proposed Development and will limit the effects on the East Halladale Flows WLA. Furthermore, National Planning Framework 4 (NPF4) advises in Policy 4(g), in relation to Wild Land, that "*Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration.*"

5.4.24. On this basis, effects on the East Halladale Flows WLA have been scoped-out from the detailed appraisal.

Principal Visual Receptors and Viewpoints

Zone of Theoretical Visibility (ZTV) Analysis

5.4.25. Two different types of ZTV have been prepared to inform the Appraisal. A bare ground ZTV in Figure 5.2 demonstrates the worst-case basis of visibility of the Proposed Development by taking no account of any physical features within the Study Area other than the landform profile. As the Site occupies a commercial forestry plantation, it is considered that the bare ground ZTV overstates the likely visibility of the Proposed Development. To address this a screened ZTV has been prepared (Figure 5.3) which includes an Ordnance Survey dataset of existing trees and forestry within the Study Area, which is included in the terrain model. A nominal height of 10 m has been attributed to this dataset to provide an indication of the potential screening that may be derived from existing trees and forestry. The forestry dataset within Limekiln Forest has been adjusted to reflect the programme of felling that has recently taken place and it also assumes that all trees projected for felling up until 2027 (Phases 1 and 2) will be removed, as shown on Figure 5.1. This represents some significant areas of the southern part of Limekiln Forest and the screened ZTV therefore presents a cautious reflection of likely screening, by removing both of these phases.

5.4.26. The screened ZTV is shown with the representative viewpoints marked up on Figures 5.3 and alongside landscape character, designations and visual receptors on Figures 5.4 to 5.6. The landform of the Site and surrounding area, combined with the extensive forestry cover, has a notable influence on the extent of visibility across the wider study area and the pattern of theoretical visibility is consequently limited in geographical extent, as shown in Figure 5.3. At close range (within 1-2 km), visibility is substantially contained by the Limekiln Forest, with the exception of close range views from the Core Path that passes the existing substation and proposed BESS compound site. Beyond the 2 km range, medium to low levels of visibility are present on elevated ground lying to west of the Site (as shown in the visualisations at viewpoints 3 and 5), with very limited areas of visibility arising to the east, with the exception of a small patch of visibility on Hill of Shebster.

5.4.27. Supporting photowires have been prepared to illustrate how the views from representative viewpoints may change and they also help to illustrate where the Proposed Development will be screened by intervening landform and/ or vegetation. The presence of and notable absence of visibility of the operational Limekiln Wind Farm Substation provides a helpful

reference or benchmark to demonstrate the high degree of containment afforded to the Proposed Development.

Settlements and Residential Properties

5.4.28. While settlements are relatively limited in the Study Area due to the remote nature of the hinterland, there are some villages and rural clusters along the coastal edge where views from them may be affected by the Proposed Development. Settlements in the study area are shown on Figure 5.3 and include Reay, Isauld and Shebster at approximately 2 km to 3 km from the Proposed Development. These separation distances, combined with the screening effect of the localised landform undulations and coniferous plantation, as well as the relatively small scale and height of the Proposed Development, make visibility highly unlikely as demonstrated by the very limited ZTV shading across these communities shown in Figure 5.3. Despite the limited potential that residents or visitors in these settlements will be affected by the Proposed Development, viewpoints have been included south of Reay and towards Shebster to illustrate the constrained nature of visibility.

5.4.29. In addition to the small settlements in the north of the study area, there are also a small number of closer range residential properties including Achins and Borlum House at distances of approximately 2.1 km and 2.4 km respectively. The extent of intervening coniferous plantation between the Proposed Development and these properties will also make visibility highly unlikely such that the views and visual amenity of residents are unlikely to be affected by the Proposed Development.

Transportation Routes

5.4.30. There are a number of routes, including roads, cycle routes and walking routes, passing though the Study Area, from which views may be affected by the Proposed Development. The A836 is the main coastal route (also designated as the North Coast 500 route), which follows a west / east direction through the north of the study area, passing through Reay and Isauld. A minor road branches off the A836 towards Shebster which allows more open views across to the Limekiln Forest, although visibility of the Proposed Development is contained by the forest plantation, while to the south, there are very few roads owing to the remote and undeveloped nature of the landscape within the WLA.

5.4.31. The routes included in the appraisal are listed below, and the potential visual effect of the Proposed Development on each of them is appraised. The routes are shown in Figure 5.6.

Recreational Routes and Core Paths

5.4.32. Figure 5.6 shows the extent of Core Paths in the Study Area. The principal route of relevance to the appraisal is the Core Path circuit through Limekiln Forest (CA11.03), together with its connecting routes into the village of Reay. Three representative viewpoints have been identified to represent people using these routes (Viewpoints 1, 2 and 5). The Core Path through the forest currently passes close to a number of Limekiln Wind Farm wind turbines as well as the operational substation at the north west end of the Application Site. The experience for users of this circular route is already heavily influenced by energy infrastructure and the introduction of the BESS compound (on a site used as a temporary

construction compound for the wind farm) will further intensify this experience. THC indicated in its Pre Application response that an interpretation board alongside the BESS site could be beneficial where it provided information about the BESS process, and how this interfaces with the wind farm. The Applicant is willing to provide this facility and suggests a Planning Condition is prepared to provide for it.

5.4.33. Other local recreational routes in the Study Area include informal walking routes to the summits of Beinn Ratha (Viewpoint 3) and Borlum Hill (Viewpoint 4). It is also the case that the minor road network shown on Figure 5.6, including the popular North Coast 500 route, is likely to be used for informal recreation, including cycling. There is very limited visibility of the Proposed Development from these routes.

5.4.34. Six viewpoints for the landscape and visual appraisal have been selected following site based analysis, and with prior knowledge of the area from undertaking the LVIA for the Limekiln Wind Farm application. The viewpoints used in the appraisal have been selected to cover points of specific importance such as recognised viewpoints, settlements, important routes, and attractions, and to inform the definition of the likely extent of visual effects arising from the Proposed Development. A variety of visual receptors from different compass directions and distances have also been represented in the selected views.

5.4.35. The table below lists the viewpoints and provides information on their location, the receptors which may experience views at these locations, viewpoint distance, elevation, and view direction to the Proposed Development. Viewpoint locations are shown in conjunction with the bare earth and screened ZTVs in Figures 5.2 and 5.3. Photowire visualisations have been prepared for these viewpoints (Appendix 5.3) to meet the requirements of NatureScot's visualisation standards (Visual Representation of Wind Farms Version 2.2, December 2017).

LVA Viewpoints

VP No	VP Name	Grid Ref		Receptor Type / LCT / Designation	Distance to BESS / Substation
1	CA11.03 Limekiln Forest (Substation Extension)	297545E	962761N	Walkers	0.04 km
2	CA11.03 Limekiln Forest (BESS compound)	298291E	961870N	Walkers	0.24 km
3	Beinn Ratha	295425E	961306N	Walkers	2.58 km
4	Borlum Hill	297438E	963524N	Walkers	0.76 km
5	Reay Footpath	296198E	964088N	Walkers / Residents	1.93 km
6	Shebster	299313E	964815N	Residents / Road-users	2.63 km

Cumulative Interactions

5.4.36. This Appraisal considers the likely cumulative effects of the Proposed Development in addition to other relevant energy related development. Given the limited geographical influence of the Proposed Development on the surrounding area, the principal cumulative interaction will take place with the operational Limekiln Wind Farm and its existing substation infrastructure.

5.4.37. The operational wind farm and its infrastructure has a significant influence on the immediate character of the Limekiln Forest and surrounding area, as is expected for a development of that scale and extent. In contrast, the proposed Substation Extension will represent a modest and direct extension to the existing Substation, which will only slightly increase its presence in the forest. The vertical height of the Substation Extension (at a maximum height to the top of the buzz bars of 7.5 m) will be discernibly lower than, and contained by, the surrounding forestry.

5.4.38. At 4.0 m to its highest point, the proposed BESS compound will occupy a separate location within the Forest and will marginally increase the presence of energy infrastructure, adding only slightly to the overall combined influence of the operational wind farm.

5.4.39. These cumulative changes will principally be experienced from within the Limekiln Forest, and most likely by users of the circular Core Path network as they move sequentially through the Forest. It is considered unlikely that changes proposed will have a material cumulative effect on how the local landscape character in LCT 134 is perceived, except at close range from within the Limekiln Forest. On this basis, an appraisal of the likely cumulative effects on the NatureScot landscape character types is scoped out from the Appraisal. Cumulative visual effects are considered within each of the Viewpoint appraisals.

Future Baseline

5.4.40. In order to ensure that the Proposed Development is appraised against a realistic baseline scenario, i.e. what the baseline conditions are likely to be once the Proposed Development is operational, a description of the likely future baseline conditions is provided within this section.

5.4.41. The main driver of future change in respect of the landscape and visual resource is climate change. Aspects that may cause change are likely to take two forms; measures to mitigate against the adverse effects of climate change and measures put in place to try and limit the future effects of it. The most evident land use change likely to occur in the Highlands will be the further development of renewable energy in the form of offshore and onshore wind farms, tidal and wave power projects and associated infrastructure including substations and BESSs.

5.4.42. In the absence of the Proposed Development proceeding on the Site, the land will most likely be reinstated from the construction compound of the Limekiln Wind Farm and returned to forestry plantation. There are currently no other wind farm developments within close proximity to the Proposed Development, there are however further applications within the wider Caithness area. The need for further renewable energy development to achieve net zero carbon emission targets may also result in a need for further grid infrastructure development to connect to the national grid and consumers. Whilst it is acknowledged that

there is anticipated to be some change in the future baseline, the LVA has not appraised these changes due to the uncertainty surrounding the nature, type and timing of changes to the baseline, as well as the localised nature of the effects of the Proposed Development.

5.4.43. A more predictable change to the future baseline is likely to arise through the progressive felling and replanting of commercial forestry within the Limekiln Forest, as the Forestry Management Plan is implemented. The screened ZTVs take a precautionary approach by removing all of the Phase 1 and Phase 2 projected felling to 2027 from the terrain model, but it is likely that further change will result in future years as other coupes are removed and replanted. The Management Plan is submitted alongside the Application for information, to show how the long term management of the forest may alter the future baseline on the Site.

5.5. Potential Landscape and Visual Effects

5.5.1. The effects of the construction, operation and decommissioning of the Proposed Development on the landscape and visual resource would arise principally from the construction and operation of the BESS compound and Substation Extension. The temporary construction compound and delivery vehicles would also have effects on the landscape and visual resource during the anticipated 6-12 month construction period of the Proposed Development. The operational lifespan of the Proposed Development is indefinitely (allowing for replacement of the BESS batteries every 15 years or so). In the event that it is decommissioned at some point in the future, it is understood that this process would take approximately 12 months and involve activities similar in nature to that of construction, resulting in similar effects.

5.5.2. Due to the relatively small scale of the Proposed Development, there is the potential that the effect during the construction (and decommissioning) phases could give rise to a greater magnitude of change than the operational phase. The effects of the construction and operational phases are, therefore, considered separately. Furthermore, as the construction and decommissioning effects are likely to be similar in nature and give rise to a similar magnitude of change, the appraisal for the construction phase also covers the assessment for the decommissioning phase.

5.6. Mitigation

5.6.1. The design process for the layout of the Proposed Development is a vital part of the environmental process and is where the biggest contribution can be made to mitigate potential landscape and visual effects, creating a development which is appropriate for the existing landscape character and visual features of an area. The design of the Proposed Development has evolved as part of an iterative process which has aimed to provide a satisfactory design solution taking account of environmental, technical and economic constraints and landscape and visual mitigation measures have been a central consideration in this iterative design process. The siting of the Proposed Development within the core of the Limekiln Forest has been intentional to secure embedded mitigation. All of the effects appraised in the LVA should be considered residual.

Mitigation of Physical Landscape Effects

5.6.2. Ground disturbance will be minimised by the location of the BESS, on the former site of the Limekiln Wind Farm construction compound and the use of the existing wind farm tracks to access both the BESS and Substation Extension. Soil materials excavated would be retained for re-use on areas to be re-vegetated following the construction phase.

Mitigation of Landscape Character and Visual Effects

5.6.3. The site selection rationale and design process for the Proposed Development is described in Chapter 3: Description of the Proposed Development. The BESS and Substation have been located and designed to minimise the effect on the surrounding landscape and visual resource, by locating the BESS and Substation Extension within existing areas of coniferous plantation, on brownfield sites, situating these developments at relatively low elevations and integrating them into the local landscape setting by respecting existing ground levels, and in the case of the Substation Extension, by positioning it immediately adjacent to the operational substation.

5.7. Detailed Appraisal of Residual Effects

Scoped-in Receptors

5.7.1. The baseline review of the Site and its surrounding landscape character, landscape designations and visual receptors concludes that the following receptors should be appraised in respect of likely effects from the Proposed Development. All other landscape and visual receptors are not considered likely to experience material effects as a consequence of the Proposed Development:

- Sweeping Moorlands and Flows LCT (LCT 134)
- Viewpoint 1: CA11.03 Limekiln Forest (Substation Extension)
- Viewpoint 2: CA11.03 Limekiln Forest (BESS compound)
- Viewpoint 3: Beinn Ratha
- Viewpoint 4: Borlum Hill
- Viewpoint 5: Reay Footpath
- Viewpoint 6: Shebster

Sweeping Moorlands and Flows (LCT 134)

Baseline Characteristics

5.7.2. The Sweeping Moorland and Flows LCT occurs extensively across much of Caithness and Sutherland and is characterised by broad expanses of relatively low-lying and gently undulating open moorland. The landform is typically below 150 m with the high points formed by occasional, small, isolated hills, such as Beinn Ratha (242 m AOD). The water-logged peaty soils give rise to landcover comprising mosses and wetland grasses, although some extensive areas of coniferous woodland and improved grazing occurs around the more settled margins. There is very little settlement in this LCT and at the core there is a sense of remoteness, albeit often with some influence from wind farm development, electricity transmission lines and/or coniferous woodland.

5.7.3. The Proposed Development is located in the Limekiln Forest coniferous plantation on the northern fringe of the LCT. This area is characterised by the enclosure of forestry in contrast to the openness of the core flows and moorland to the south. Furthermore, the rotational felling and restocking presents a heavily managed and modified landscape in contrast to the natural landscape of the flows. The recently constructed Limekiln Wind Farm is also located in this LCT making large-scale energy development an established feature of the baseline character. This northern part of the LCT lacks the sense of remoteness and naturalness, experienced in those undeveloped and unmodified parts of the LCT to the south.

5.7.4. Development in the Farmed Lowland Plains LCT to the north of the Sweeping Moorland and Flows LCT has an influence on landscape character. This includes the Dounreay Nuclear Power Facility, Vulcan NRTE, SSE Substation and Forss Business and Technology Park, along with rural settlement and roads, and the wider modification of the landscape for agricultural practices. Baillie Hill and Forss Wind Farms occur in this Farmed Lowland Plain LCT, to the north-east of the operational Limekiln Wind Farm.

Sensitivity

5.7.5. The value of this LCT is medium to medium-high. There are no national or regional landscape designations covering this LCT which would otherwise denote a particular recognised landscape value. The south-eastern part of the LCT is covered by the East Halladale Flows Wild Land Area (WLA), as shown on Figure 5.5. This is a Mapped Interest relating to wildness qualities and this raises the value of this part of the LCT to medium-high. The remaining parts of the LCT are considered to have a medium value, including the northern part where the Site is located.

5.7.6. The susceptibility of this LCT to the effects of BESS and Substation Extension development is medium.

5.7.7. The combination of the value of the Site and its susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium**.

Magnitude of Change and Level of Effect

5.7.8. **Magnitude of Change:** The ZTV pattern in Figure 5.4 shows that visibility of the Proposed Development would be limited within a 2 km radius from the Proposed Development, due largely to containment by the retained areas of forestry. Pockets of high to medium visibility would arise in the immediate surroundings of the BESS compound and Substation Extension where these elements would be experienced at close range during construction and operation, in the context of the operational Limekiln Wind Farm and ongoing forestry management.

5.7.9. Beyond the 2 km range the ZTV indicates swathes of low visibility across higher ground to the south west; west and north west of the Site, affecting sweeping open moorland parts of the LCT as well as higher levels of visibility arising across a small area on the western side of Hill of Shebster. This visibility will be experienced in the context of the operational wind farm, as well as other human influences in the adjoining LCT 143. The small scall and limited extent of the Proposed Development will limit the magnitude of effect in this context.

5.7.10. Taking these factors into account the magnitude of change on the defining characteristics of the LCT is considered to be **medium to low** during construction (and decommissioning) and **low** during operation of the Proposed Development.

5.7.11. **Level and nature of effect:** The level of effect on character of LCT 134, Sweeping Moorland and Flows as related to the Site would be **Moderate/Minor** during construction reducing to **Minor** during operation of the Proposed Development. These effects would occur where visibility arises within approximately 2 km of the Site.

Definitions of these effects are provided in Appendix 5.1: Table TA4.

5.7.12. Across other parts of the LCT within the Study Area the appraised effect would be lower, or non-existent, where ZTV coverage indicates no visibility would arise. This is generally because of increased separation distance from the Proposed Development and/ or an absence of visibility.

Cumulative Effects on LCT 134

5.7.13. Where visibility of the Proposed Development arises, it will be most likely be experienced in the context of the Limekiln Wind Farm and its infrastructure. The Substation Extension will almost always be experienced in the context of the operational wind farm substation, due to immediate proximity. The operational wind farm already has a defining influence on the character of the north eastern extremity of LCT 134 and the addition of the Proposed Development will marginally increase the perceived influence of energy related development within localised parts of the LCT, specifically where experienced at close range (c500 m). The cumulative effect is considered to be of a low order of magnitude and the overall cumulative effect is likely to be **Minor**.

Viewpoint 1: CA11.03 Limekiln Forest (Substation Extension)

Baseline Visual Amenity

5.7.14. The viewpoint is located on the Core Path (Ref CA11.03) which is a circular walk through the Limekiln Forest, as shown in Figure 5.1. The path links to other Core Paths which connect to the village of Reay, to the north of the Application Site. It is not known how popular the walk around Limekiln Forest is, but the relatively close proximity to the village suggest it has the potential to appeal to locals as a convenient and accessible route for walking and recreation.

5.7.15. While heavily influenced by the sense of enclosure provided by the expansive areas of forestry, the recent construction of the Limekiln Wind Farm has had a material effect on the character and visual amenity of the circular route, through the introduction of 19 wind turbines and associated infrastructure in the Forest. The viewpoint is located at a point on the circuit where the Core Path passes the recently constructed substation serving the wind farm and this has fundamentally changed the perception along a short section of the route, extending to approximately 200 m in length.

5.7.16. The existing substation introduces energy infrastructure at close range in a part of the forest which has been cleared, along with a large number of other coupes which have been taken out to facilitate turbine bases. This have resulted in parts of the Forest having a more open character, while replanting takes time to establish, and this is beneficial to the amenity of the route in some places where longer range views to Beinn Ratha have been opened up, for example.

Sensitivity

5.7.17. The value of this Core Path is medium-high. While there are no national or regional landscape designations covering the Limekiln Forest, which would otherwise denote a particular recognised landscape value, it is considered likely to have local value as an amenity for residents of Reay to use for recreational purposes.

5.7.18. The susceptibility of people using the Core Path is generally medium-high, but given the proximity to and visual impact from the operational substation as a baseline feature, susceptibility to the Proposed Development is moderated along this stretch of path. Susceptibility is considered to be medium.

5.7.19. The combination of the medium-high value of the Site and its medium susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium-High**.

Magnitude of Change and Level of Effect

5.7.20. **Magnitude of Change**: The photowire for Viewpoint 1 in Appendix 5.3 indicates the location of the extent of the BESS compound (blue parameters) and Substation Extension (pink parameters) modelled at the respective heights of 4 m and 7.5 m. The Proposed Development

would be seen in the same field of view as the operational substation, but would extend its footprint to the north. Due to the closer proximity of the Substation Extension to the viewpoint, it would appear appreciably larger than the operational substation as a result. The BESS compound would not be seen in this view from the Core Path (and consequently is illustrated by Viewpoint 2).

5.7.21. The Proposed Development would be set back into and surrounded by retained forestry plantation, which would provide a degree of containment and integration, reflecting the siting of the existing substation. It would nonetheless be a prominent new element in views from the Core Path, affecting a stretch of some 200 m in length. The magnitude of change is considered to be **high** during construction (and decommissioning) and **medium-high** during operation of the Proposed Development.

5.7.22. **Level of Effect**: The level of effect on the visual amenity and view at Viewpoint 1, Core Path would be **Major** during Construction and **Major/ Moderate** during operation of the Proposed Development.

Cumulative Visual Effects

5.7.23. The close integration of the Proposed Development (Substation Extension) with the operational substation would serve to minimise cumulative effects, albeit there would be an incremental increase in the scale and extent of the energy infrastructure in this location. The degree of containment afforded by the surrounding forestry would largely contain the cumulative effects to the immediate locality of the Substation Extension. The operational substation already has a defining influence on the view and the addition of the Proposed Development will marginally increase the perceived influence of energy related development. The cumulative effect is considered to be of a medium to low order of magnitude and the overall cumulative effect is likely to be **Moderate.**

Viewpoint 2: CA11.03 Limekiln Forest (BESS compound)

Baseline Visual Amenity

5.7.24. The viewpoint is located on the Core Path (Ref CA11.03) which is a circular walk through the Limekiln Forest, as shown in Figure 5.1. The path links to other Core Paths which connect to the village of Reay, to the north of the Application Site. It is not known how popular the walk around Limekiln Forest is, but the relatively close proximity to the village suggest it has the potential to appeal to locals as a convenient and accessible route for walking and recreation.

5.7.25. While heavily influenced by the sense of enclosure provided by the expansive areas of forestry, the recent construction of the Limekiln Wind Farm has had a material effect on the character and visual amenity of the circular route, through the introduction of 19 wind turbines and associated infrastructure in the Forest. The viewpoint is located to the south of the BESS compound, at a point on the circuit where the Core Path enters a newly cleared area of forest, overlooking the restored former construction compound for the Limekiln Wind Farm. The process of forest management and wind farm construction has fundamentally changed the perception along a short section of the route, extending to approximately 400 m in length.

5.7.26. The cleared area of the Site has resulted in parts of the Forest having a more open character, while replanting takes time to establish, and this is beneficial to the amenity of the route in some places where longer range views out have been opened up, for example, and as can be seen in the baseline photograph.

Sensitivity

5.7.27. The value of this Core Path is medium-high. While there are no national or regional landscape designations covering the Limekiln Forest, which would otherwise denote a particular recognised landscape value, it is considered likely to have local value as an amenity for residents of Reay to use for recreational purposes.

5.7.28. The susceptibility of people using the Core Path is generally medium-high, but given the proximity to and visual impact from the operational Wind Farm as a baseline feature, susceptibility to the Proposed Development is moderated along this stretch of path. Susceptibility is considered to be medium.

5.7.29. The combination of the medium-high value of the Site and its medium susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium-High**.

Magnitude of Change and Level of Effect

5.7.30. **Magnitude of Change:** The baseline photography and photowire for Viewpoint 2 in Appendix 5.3 indicates the location of the extent of the BESS compound (blue parameters) and Substation Extension (pink parameters) modelled at the respective heights of 4 m and 7.5 m. The proposed BESS compound would be seen in views heading north along the path at this location. The Substation Extension would be concealed by forestry. The viewpoint is elevated above the Proposed Development and overlooks the now restored construction compound for the Limekiln Wind Farm, set against a backdrop of retained forestry. The operational wind turbines have a discernible presence in views south and east from the viewpoint.

5.7.31. The Proposed Development would be set back into and surrounded by retained forestry plantation, which would provide a strong degree of containment and integration. It would nonetheless be a prominent new element in views from the Core Path, affecting a stretch of some 400 m in length. The magnitude of change is considered to be **high** during construction (and decommissioning) and **medium-high** during operation of the Proposed Development.

5.7.32. **Level of Effect:** The level of effect on the visual amenity and view at Viewpoint 2, Core Path would be **Major** during Construction and **Major/ Moderate** during operation of the Proposed Development.

Cumulative Visual Effects

5.7.33. The close integration of the Proposed Development (BESS compound) within Limekiln Forest would serve to minimise cumulative effects, albeit there would be an incremental increase in the scale and extent of the energy infrastructure in this location where the BESS is seen alongside the operational Limekiln Wind Farm. The degree of containment afforded by the surrounding forestry would largely contain the cumulative effects to the immediate locality of

the forest clearing and BESS compound. The Proposed Development will marginally increase the perceived influence of energy related development. The cumulative effect is considered to be of a medium to low order of magnitude and the overall cumulative effect is likely to be **Moderate**.

Viewpoint 3: Beinn Ratha

Baseline Visual Amenity

5.7.34. This viewpoint is located at the summit of Beinn Ratha and was selected to represent the view experienced by hill walkers. There is no formal parking or defined route to guide walkers. The hill is not difficult to climb although the boggy ground conditions may discourage some walkers, especially as there is no path. Although there is little evidence to suggest this is a frequently climbed hill, it does provide one of the few clear vantage points readily accessible from this section of the northern and settled coastline.

5.7.35. The summit of Beinn Ratha is at an elevation of 242 m AOD and although not a high hill, within the context of the surrounding Sweeping Moorland, high enough to afford a 360-degree panoramic view of the surrounding landscape and seascape. The character of the view varies with the greatest visual interest occurring to the west and south where the large expanse of the Sweeping Moorland and Flows LCT appears wild and remote. The attention of the viewer tends to be drawn in these directions.

5.7.36. The view towards the Proposed Development is characterised by the Limekiln Wind Farm and Limekiln Forest coniferous plantation which forms an almost continuous blanket covering across the low hills of the moorland, albeit with large patches of recent felling and replanting. The cultivated origins of the plantations are evident through the use of a single species, the predominance of a single age crop, the often straight geometric edges and the pattern of subdivisions created by forest tracks and fire breaks. The forestry presents a contrasting darkness to the lightness of the open moorland and detracts from the overall character and continuity of the wider landscape.

5.7.37. The coastal edge presents an aspect of contrasting character to this view. Its character appears flatter and more settled with the green of improved pasture and faint outline of field patterns denoting the agricultural land use. Small scale development can be seen concentrated in the settlement of Reay and scattered across the rural landscape. The larger scale developments of Baillie Hill and Forss wind farms are evident; Baillie Hill set in the Mixed Agriculture and Settlement LCT at a range of 7.49 km such that the turbines appear as medium scale structures; and Forss set in the Open Intensive Farmland on the coast at a range of 10.53km such that the turbines appear as small scale structures. Dounreay Nuclear Power Plant is also visible and marks this coastal edge as an area occupied by industrial development.

Sensitivity

The value of the view is medium-high. Although there are no scenic designations covering this view, either at the national or regional level, the view is covered by the East Halladale WLA. It is also of importance at the local level as it provides one of the few relatively easily

accessible vantage points from which to view this local landscape. It should be noted that there is little evidence to suggest that the hill is frequently used by hill walkers.

The susceptibility of the view is medium, with the view to the east and north-east being tempered by the presence of the commercial forestry which denotes the extent to which this landscape has been modified, as well as the presence of large scale developments including Limekiln Wind Farm, operational Baillie Hill and Forss wind farms and Dounreay Nuclear Power Plant.

The combination of the value of the view and susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium-High**.

Magnitude of Change and Level of Effect

5.7.38. **Magnitude of Change:** The photowire for Viewpoint 3 in Appendix 5.3 indicates the location of the extent of the BESS compound (blue parameters) and Substation Extension (pink parameters) modelled at the respective heights of 4 m and 7.5 m. The Proposed Development would be seen in the same field of view as the northern part of the operational Limekiln Wind Farm and positioned within the northern extent of the Limekiln Forest. Baillie Wind Farm provides a more distant background to the view, with Dounreay and Forss Wind farm seen further north associated with the coastline.

5.7.39. The Proposed Development would be set back against areas of retained forestry and would be a small element in the panoramic views available from the summit of Beinn Ratha. The magnitude of change is considered to be **low** during both construction (and decommissioning) and during operation of the Proposed Development.

5.7.40. **Level of Effect:** The level of effect on the visual amenity and view at Viewpoint 3, Beinn Ratha would be **Moderate/Minor** during construction and operation of the Proposed Development.

Cumulative Visual Effects

5.7.41. The Proposed Development will be experienced in the context of the Limekiln Wind Farm and its infrastructure, which is a defining element in the view east from Beinn Ratha. The Substation Extension will be experienced in the context of the operational wind farm substation, due to immediate proximity. The operational wind farm already has a defining influence on the view and the addition of the Proposed Development will marginally increase the perceived influence of energy related development. The cumulative effect is considered to be of a low order of magnitude and the overall cumulative effect is likely to be **Moderate/ Minor**.

Viewpoint 4: Borlum Hill

Baseline Visual Amenity

5.7.42. Borlum Hill is a small hill located on the northern edge of the Limekiln coniferous plantation. The viewpoint has been selected to represent the close range views of locals who may use the area to the north of the Proposed Development for walking. Although it does not appear to be frequently used, there are enough tracks across the hill slopes to suggest some people

do visit this low hill top. Walking does not appear to be encouraged as there is no provision for parking, no sign-posting or formal path and access from the track to the east needs to be made by crossing a burn and a fence.

5.7.43. At a height of approximately 80 m AOD, the hill presents an easy, but steep climb and affords a short-range panorama over the local area. The view south is characterised by the expansive coniferous plantation which covers much of the immediate landscape, together with the operational Limekiln Wind Farm, as shown in the baseline view. The underlying landform is low and gently undulating with a series of small open knolls rising up from the forest cover along this northern edge. The visual interest in this view is limited, with Beinn Ratha to the right presenting one of the few distinctive landform features.

5.7.44. To the north, the view extends out across the coastal edge to the North Atlantic, with Orkney visible in clear weather, to the north-east. The coastal edge is typified by its settled nature, with the land improved for pasture and a concentration of properties in the settlement of Reay and dispersed throughout the wider rural landscape. Large scale development is visible in the form of Dounreay Nuclear Power Plant, visible next to the coast, and Baillie Hill wind farm, partially concealed by Shebster Hill to the east. Baillie Hill Wind Farm is seen as 21 turbines set at a range of 4.79 km such that it forms a contained group of medium scale structures, which act as the focus of the view.

Sensitivity

5.7.45. The view and the viewpoint are not covered by any national or regional designations which would otherwise denote a special value. While there is little evidence to suggest this is a frequently visited viewpoint, the hilltop is, nonetheless, in easy reach of the village of Reay and does present a view of local value.

5.7.46. Limekiln Wind Farm presents the defining feature of the view, with coniferous plantation also visible to the south and the settlement of Reay visible to the north. The susceptibility of viewers to the effects of the Proposed Development is moderated by the extent to which this settled landscape has been modified by developments including Limekiln Wind Farm to the south, Dounreay Nuclear Power Plant to the north-east and Baillie Hill Wind Farm to the east. Susceptibility is considered to be medium.

5.7.47. The combination of the medium value of the view and susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium**.

Magnitude of Change and Level of Effect

5.7.48. **Magnitude of Change**: The photowire for Viewpoint 4 in Appendix 5.3 indicates the location of the extent of the BESS compound (blue parameters) and Substation Extension (pink parameters) modelled at the respective heights of 4 m and 7.5 m. The Proposed Development would be seen in the same field of view as the operational Limekiln Wind Farm and positioned within the core of the northern extent of the Limekiln Forest, substantially concealed by the plantation. Only the uppermost parts of the Proposed Development would be seen located within the Forest.

5.7.49. The Proposed Development would be a small element in the panoramic view available from the summit of Borlum Hill. The magnitude of change is considered to be **low** during both construction (and decommissioning) and during operation of the Proposed Development.

5.7.50. **Level of Effect**: The level of effect on the visual amenity and view at Viewpoint 4, Borlum Hill would be **Minor** during Construction and operation of the Proposed Development.

Cumulative Visual Effects

5.7.51. The Proposed Development will be experienced in the immediate context of the Limekiln Wind Farm, which is a defining element in the view south from Borlum Hill. The operational wind farm already has a defining influence on the view and the addition of the Proposed Development will marginally increase the perceived influence of energy related development. The cumulative effect is considered to be of a low order of magnitude and the overall cumulative effect is likely to be **Minor**.

Viewpoint 5: Reay Footpath

Baseline Visual Amenity

5.7.52. Reay Footpath forms part of the Core Path circuit known as Achins and Borlum Circuit (CA11.09) and has been selected to represent the view which could potentially be experienced by residents of Reay from properties along the southern boundary of the settlement or from streets which afford open views towards the south. Views from the southern edge of Reay will be partially obscured by close range landform and forestry. To enable a more open view, the viewpoint is located approximately south of Reay, on the track that extends in this direction. Two properties sit at the start of the track, although neither face towards the development.

5.7.53. The focus of the view is the northern edge of Limekiln Forest which contains Limekiln Wind Farm, seen beyond the band of coniferous woodland to the south of the viewpoint. Beinn Ratha, forms a feature to the right of the view on account of its distinctive form and higher elevation in comparison to the low sweep of the surrounding landscape. With the exception of the forestry on the lower slopes, Beinn Ratha is one feature in this landscape which appears relatively un-modified by human intervention. The track, the wall and fencing, the electricity transmission line, the forestry and the improved pasture are all evidence of human influences in this landscape. In particular, the electricity transmission line introduces a feature which contrasts with the otherwise rural character of the landscape, appearing man-made, large in scale, and with their vertical stature contrasting with the largely horizontal emphasis of the landscape.

5.7.54. The view is typical of the Farmed Lowland Plain LCT 143 with small fields of rough grazing for sheep bounded by fences or stone walls. The coniferous plantation at Limekiln has encroached into this agricultural area and is visible as a broad band stretching across the middle ground of the view. Apart from Limekiln Wind Farm; Beinn Ratha and Borlum Hill, there are few distinctive features. The view does, however, have a local value in terms of the visual amenity of residents and the open outlook this view offers from their properties and gardens.

Sensitivity

5.7.55. The value of this view is medium. The view itself is unexceptional, comprising predominantly low-lying farmland and woodland plantations, typical of this area. The view is not extensive and in its contained extent, Beinn Ratha forms the most notable feature. This landscape is not designated at either the national or regional level. This denotes a lack of scenic value which moderates the overall value of the viewpoint.

5.7.56. There are no other wind farms visible from this viewpoint. Electricity transmission towers are visible in this view and these detract from what would otherwise be a rural landscape with only small-scale human artefacts, such as walls and fencing, evident. The absence of wind turbines in the baseline view increases the susceptibility of residents to the proposed introduction of these structures as they will appear as new elements at contrast with the existing character. Susceptibility is considered to be medium-high.

5.7.57. The sensitivity of this view is medium-high on account of the importance of the visual amenity of residents in Reay. Their views have the potential to be longer in duration especially in instances where the Proposed Development aligns with views from the internal living spaces of residents. These views are not of an undeveloped landscape; Limekiln Wind Farm and electricity transmission towers and lines are already visible in views from the southern boundary edge. These tall vertical structures establish energy infrastructure as a feature of the baseline, and this moderates the sensitivity of the view.

5.7.58. The combination of the medium value of the view and medium-high susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium-High**.

Magnitude of Change and Level of Effect

5.7.59. **Magnitude of Change**: The photowire for Viewpoint 5 in Appendix 5.3 indicates the location of the extent of the BESS compound (blue parameters) and Substation Extension (pink parameters) modelled at the respective heights of 4 m and 7.5 m. The Proposed Development would be concealed behind the northern edge of Limekiln Forest plantation and there would currently be no visibility of it. Should the forestry be removed then visibility would increase, albeit the BESS compound is likely to shielded by the layering of forestry between the proposed Substation Extension and BESS site. No part of the operational substation is currently seen in this view. The Limekiln Forest Management Plan indicates the Long Term retention of the forestry edge along the northern edge of the plantation and the current level of screening is likely to be retained.

5.7.60. The Proposed Development would not be seen from this location, although some visibility may be open up further west along the path, according to the ZTV. It is also possible that some construction equipment may be seen during the construction phase. Taking a precautionary approach, the magnitude of change is considered to be **low** during construction (and decommissioning) and **negligible** during operation of the Proposed Development.

5.7.61. **Level of Effect**: The level of effect on the visual amenity and view at Viewpoint 5, Reay Footpath would be **Moderate/Minor** during Construction and **Minor** during operation of the Proposed Development.

Cumulative Visual Effects

5.7.62. The Proposed Development will not be experienced in the context of the Limekiln Wind Farm, or other energy infrastructure in the foreground of the view, and the level of cumulative effect will be **Negligible** at this viewpoint.

Viewpoint 6: Shebster

Baseline Visual Amenity

5.7.63. This viewpoint at Shebster has been selected to represent the visual amenity of residents occupying properties in this small community, as well as the visual amenity of road users travelling along the minor road between the B874 at Glengolly and the A836 at Isauld. The viewpoint is taken close to the bus shelter on the northern side of the road. This minor road also forms part of the National Cycle Route.

5.7.64. Shebster is a small cluster of properties situated principally along the northern edge of the minor road. The majority of the properties face south with views over the immediate fields towards the forestry at East Shebster. Views towards Limekiln Wind Farm and Limekiln Forest coniferous plantation occur at an oblique angle such that they are unlikely to be apparent from within the properties but will be apparent from gardens and from the minor road to west-bound road-users. The coniferous plantation marks a dark green and bold edge along the skyline ridge, its man-made origins evident in the straight boundary edges and single species crop.

5.7.65. The existing development, visible in the view and around the viewpoint, is relatively small in scale and typical of a rural location such as this, although the recent completion of the Limekiln Wind Farm provides a readily discernible human influence on the skyline to the south west. In the opposite direction to the view, large scale development is visible in the form of Baillie Hill wind farm. It is set behind the hill ridge to the north-east of the community and although the properties do not face out onto it, it will be readily visible from the road and potentially visible from gardens and rear views from properties.

Sensitivity

5.7.66. The value of this view is medium. The surrounding landscape is not covered by any regional or national scenic designations which would otherwise denote a special value. The view presents a typical mix of farmland and forestry and lacks any special landscape features which would otherwise give it more distinction. It is, nonetheless, a landscape of local value and the view out towards the Sweeping Moorland, albeit diminished in character by the farmland and forestry, contributes to the setting of the settlement of Shebster. The view in the opposite direction is defined by the presence of Baillie Hill wind farm which establishes

wind farm development as a feature of the wider view and this reduces the susceptibility of residents to the Proposed Development.

5.7.67. The susceptibility of the resident's is high because of the importance of their visual amenity, whereby views have the potential to be experienced over longer durations. The susceptibility of the road-users is medium (car drivers) and medium-high (cyclists) because of the relative speed at which they will be travelling and, therefore, the transitory nature of the views and the inability to focus on the surrounding landscape with the same degree of attention as static viewers.

5.7.68. The combination of the medium value of the view and medium to high susceptibility to the Proposed Development results in an overall sensitivity rating of **Medium-High**.

Magnitude of Change and Level of Effect

5.7.69. **Magnitude of Change**: The photowire for Viewpoint 6 in Appendix 5.3 indicates the location of the extent of the BESS compound (blue parameters) and Substation Extension (pink parameters) modelled at the respective heights of 4 m and 7.5 m. The Proposed Development would be concealed within the Limekiln Forest plantation and there would currently be no visibility of it. Should the forestry on Site be removed then visibility could increase, albeit the BESS compound and Substation Extension are likely to shielded by the depth and layering of forestry between the Proposed Development and Shebster, which includes forestry outside the Limekiln Forest. No part of the operational substation is currently seen in this view. It is reasonable to assume that some level of forestry will remain on the intervening ground during rotational felling and replanting. The magnitude of change during both construction and operation is **negligible**.

5.7.70. **Level of Effect**: Taking account of the separation distance and absence of visibility, the level of effect is considered to be **Minor** during construction (and decommissioning) and during operation of the Proposed Development.

Cumulative Visual Effects

5.7.71. The Proposed Development will not be experienced in the context of the Limekiln Wind Farm, or other energy infrastructure in the view, and the level of cumulative effect will be **Negligible** at this viewpoint.

5.8. Conclusions

5.8.1. Chartered Landscape Architects at SLR Consulting Ltd. have conducted a Landscape and Visual Appraisal (LVA). The methodology follows that set out in GLVIA, 3rd edition and photomontage visualisations accord with the Landscape Institute guidance note - Visual Representation of Development Proposals, Technical Guidance Note 06/19.

5.8.2. No part of the Proposed Development is located within a landscape designated for its scenic value and quality. The Site has been carefully identified in order to minimise potential adverse landscape and visual (and other environmental) effects by positioning it within the operational Limekiln Wind Farm site and, in the case of the Substation Extension, immediately adjacent to the operational substation for the wind farm. This has had the beneficial effect of choosing a site which benefits from a high level of screening when viewed from outside the confines of the Limekiln Forest and in providing a logical rationale for the siting and design of the Proposed Development.

5.8.3. The appraisal has found that the only locations where high levels of landscape and visual effect may arise is within the Application Site itself, where the BESS compound and Substation Extension can be experienced at close range from the Core Path. Beyond the boundaries of the Site the Proposed Development is neither prominent or intrusive and the screened ZTV demonstrates how beneficial the choice of site is.

5.8.4. On the basis of this appraisal, it can be concluded that the Proposed Development will have highly localised landscape and visual effects on the Site and surrounding area and will be well related to the established wind farm energy infrastructure operating in the Limekiln Forest plantation.

Appendix 5.1: Appraisal Criteria

Table TA1: Landscape Elements - (Criteria for Sensitivity and Magnitude of Change)	
Sensitivity Criteria	**Magnitude of Change Criteria**
The **sensitivity of a landscape element** is determined by a combination of the value of the landscape element and its susceptibility to accommodate the proposed development. **Value** of the landscape element: • Its importance in the pattern of elements that constitutes the landscape character of the area and whether or not landscape elements are part of a designated landscape. • The quality of the landscape element, that reflects its condition and state of repair. **Susceptibility** to change: • The ability of the individual element or feature to accommodate the proposed development without undue consequences for maintenance of the baseline. Professional judgement is used based on: • The degree to which the element can be restored, replaced or substituted.	The **magnitude of change on landscape elements** is an expression of the scale of the change that will result from the proposed development and is dependent on a number of variables regarding the size or scale of the change and its geographical extents, based on the following criteria: • The extent of the existing landscape elements that will be lost, the proportion of the total extent that this represents as a contribution of that element to the character of the landscape. • The degree to which the aesthetic or perceptual aspects of the landscape are altered either by the removal or existing components of the landscape or by addition of new ones. • Whether the effects change the key characteristics of the landscape which are critical to its distinctive character.

Table TA.2: Landscape Character - (Criteria for Sensitivity and Magnitude of Change)	
Sensitivity Criteria	**Magnitude of Change Criteria**
The **sensitivity of a landscape character receptor** is determined by a combination of the value of the landscape character receptor and its susceptibility to accommodate the proposed development. **Value of the landscape character receptor**: • Its importance in terms of any designations that may apply. • Its quality in terms of scenic quality, sense of place, rarity and representativeness. • The experience of the landscape in relation to perceptual responses, cultural associations, its iconic status, its recreational value, and the contribution of other values such as nature conservation or archaeology. **Susceptibility to change**: • The specific nature of the proposed development, its size, scale, location, context and characteristics. • The degree to which the receptor may accommodate the influence of the proposed development. • The extent to which the proposed development will influence the character of the landscape receptors across the study area.	The **magnitude of change on landscape character receptors** is dependent on a number of variables regarding the size or scale of the change and its geographical extents, based on the following criteria: • The extent of existing landscape elements that will be lost, the proportion of the total this represents and the contribution of that element to the character of the landscape; • The degree to which the pattern of elements that makes up the landscape character will be altered by the proposed development, by removal or addition of elements in the landscape; • The extent to which the effects change the key characteristics of the landscape, identified in the baseline study, which may be critical to the distinctive character of the landscape; • The distance between the landscape character receptor and the proposed development. Generally, the greater the distance, the lower the scale of change; and • The proportion of the proposed development that will be seen. The geographic area over which the landscape effects will be experienced (within the study area) is also considered, which is distinct from the size or scale of effect.

Table TA 3: Visual Receptors and Views - (Criteria for Sensitivity and Magnitude of Change)	
Sensitivity Criteria	**Magnitude of Change Criteria**
The **sensitivity** of a view is determined by a combination of the value of the view and the susceptibility of the visual receptors to the change that the proposed development will have on the view: **Value of the view**: a reflection of the recognition and importance attached either formally through identification on mapping or being subject to planning designations, or informally through the value which society attaches to the view(s). The value of a view is classified as high, medium-high, medium, medium-low or low and the basis for the appraised level is made clear using evidence and professional judgement. **Susceptibility to change**: the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the proposed development. Professional judgement is used based on: • Nature of the viewer: the occupation or activity which they are engaged in at the viewpoint or series of viewpoints. • The principal visual characteristics: those features which define the view. • Experience of the viewer: The experience of the visual receptor relates to the extent to which their focus is directed on the view, the duration and clarity of the view and whether it is a static or transitory view.	The **magnitude of change** on views is dependent on a number of variables: • The distance between the visual receptor and the development; generally, the greater the distance, the lower the magnitude of change; • The scale and character of the context within which the development will be seen, as this will determine the degree to which the development can be accommodated in the existing outlook. The scale of the landform and the patterns of the landscape, the existing land use and vegetation cover, and the type of development and settlement seen in the baseline view will all be relevant; • The extent of the development that will be seen; • The position of the development in relation to the principal orientation of the receptor. If the development is seen in a specific, directional vista from a receptor the magnitude of change will generally be greater; and • The width of the view available and the proportion of the view that is affected by the development. Generally, the more of a view that is affected, the higher the magnitude of change will be.

Table TA.4: Level of Effect		
Level of Effect	**Definition of Landscape Effect**	**Definition of Visual Effect**
Major	Where the proposed changes are sufficiently large to substantially alter the character, scale or pattern of the landscape. Substantial alteration to landscape features or valued aspects of a landscape.	Where the proposed changes are sufficient to substantially alter a nationally important view, or view of high scenic quality.
Major - Moderate	Where the proposed changes noticeably contrast with the underlying character of an area or substantially alter a locally important landscape feature / valued aspect of the landscape.	Where the proposed changes to views contrast with the existing view and/ or substantially alter a locally important view, or view of scenic quality.
Moderate	Where the proposed changes contrast with the underlying character of an area or noticeably alter a landscape feature or aspect of landscape.	Where the proposed changes to views contrast with the existing view or noticeably alter a view.
Moderate - Minor	Where proposed changes are readily apparent and at slight variance with the underlying character of an area and/ or landscape features.	Where proposed changes to views are noticeable and at slight variance with the existing view.
Minor	Where proposed changes are intermittent and at slight variance with the underlying character of an area or landscape features.	Where proposed changes to views are intermittent and at slight variance with the existing view.
Negligible	Where proposed changes have an indiscernible effect on the character of an area or landscape features.	Where proposed changes have an indiscernible effect on views/ visual amenity.

6.0 Ecology

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6.0 Ecology

6.1. Introduction

6.1.1. This chapter provides baseline information and an assessment of potential effects on non-ornithological ecological features arising from Limekiln Battery Energy Storage System (BESS) (hereafter referred to as the 'Proposed Development') upon ecology during construction and operation.

6.1.2. Impacts and effects on ornithological features are assessed with Chapter 7 – Ornithology.

6.1.3. This chapter (and its associated figures) is intended to be read as part of the wider Environmental Report.

6.1.4. Figures associated with this chapter are:

- Figure 6.1 – Phase I habitat survey results
- Figure 6.2 – Statutory site plan

6.1.5. The objectives of this Ecological Assessment are to:

- Provide baseline information on the current habitats and ecological features both within the Site and in the immediately surrounding area;
- Identify the proximity of any designated sites for nature conservation interest and provide an assessment of any potential effects the Proposed Development may have on these;
- Identify the presence or potential presence of any protected species or habitats and provide an assessment of any potential effects the Proposed Development may have on these; and,
- Provide recommendations for further pre-construction checks and / or mitigation measures, if required as well as providing an outline of proposed habitat enhancements.

6.1.6. The assessment has been informed by desk-based review of relevant ecological information and an extended habitat survey. Reference is made to relevant legislation, planning policy and guidance, as appropriate.

6.1.7. Consideration has been given to the potential presence of rare, protected, or notable habitats and species, and the location of nearby features including designated sites for nature conservation. Mitigation and enhancement measures to achieve an overall biodiversity gain are also proposed.

6.1.8. Throughout this report, common names for species are favoured over scientific names unless there is potential for confusion and in which case scientific names are also presented.

6.2. Site Overview

6.2.1. 'The Site' of the Proposed Development is located within the red line boundary illustrated on **Figure 2.1**.

6.2.2. The Site lies entirely within the existing and operational Limekiln Wind Farm development (Energy Consents Unit reference: ECU00002070 and EC00003303). Access tracks are therefore pre-existing, and areas of bare earth are present which were formerly used as a borrow pit for the construction of the wind farm. An existing Substation is present, and the tracks are bordered by open areas and plantation woodland.

6.2.3. The surrounding wider landscape supports similar plantation woodland and open areas typical of commercial forests in the region.

6.3. Legislative Framework, Planning Policy and Guidance

Legislation

6.3.1. Reference has been made to the following key pieces of legislation, listed in **Table 6.1 and Table 6.2.**

Table 6.1: Key legislation - International.

International
• Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (hereafter referred to as the 'the Ramsar Convention'); • Convention on the Conservation of European Wildlife and Natural Habitats 1979 (hereafter referred to as the 'the Bern Convention'; • UNESCO convention on the protection of the World Cultural and Natural Heritage (1972); • Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds); and, • Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora).

Table 6.2: Key legislation - National.

National
• The Conservation of Habitats and Species Regulations 2017, (as amended) and the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (collectively 'the Habitats Regulations'); • The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; • The Nature Conservation (Scotland) Act 2004; • The Protection of Badgers Act 1992 (as amended in Scotland); • The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003; • The Invasive Alien Species (Enforcement and Permitting) Order 2019; • The Electricity Act 1989 (Schedule 9); • The Wildlife and Countryside Act 1981 (as amended in Scotland); and, • The Wildlife and Natural Environment (Scotland) Act 2011.

Policy and Guidance

6.3.2. Reference has been made to the following key pieces of policy and guidance, listed in **Table 6.3**.

Table 6.3: Policy.

National and Local
• The National Planning Framework 4 (Scottish Government, 2023); specifically 'Policy 3 – Biodiversity', 'Policy 4 – Natural Places' and 'Policy 5 – Soils'. • Scottish Government (2022) The Scottish Biodiversity Strategy to 2045; • NatureScot (2023a) Advising on peatland, carbon-rich soils and priority peatland habitats in development management; • NatureScot (2020) The Scottish Biodiversity List; • CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine; • NatureScot (2023b) Developing with Nature guidance; • NatureScot (2024a) Planning and development: enhancing biodiversity; • NatureScot (2024b) Standing Advice for Planning Consultation – Protected Species. • Highland-wide Local Development Plan (The Highland Council, 2012). • Highland Nature: Biodiversity Action Plan 2021-2026 (Highland Environment Forum, 2021). • Highland Statutorily Protected Species Supplementary Guidance (The Highland Council, 2013a).

6.3.3. This report is provided in accordance with the provisions of British Standard 42020:2013 Biodiversity: Code of Practice for Planning and Development.

6.4. Methodology

Desk Study

6.4.1. A desk study was undertaken to identify existing information on the presence of designated sites for nature conservation, protected and notable species and habitats within proximity to the Site as follows:

- Statutory designated sites for nature conservation related to ecology, within 5 km of the Site, extending to 10 km for internationally protected sites with mobile qualifying species. Statutory sites are presented in **Figure 6.2**.
- Non-statutory designated sites for nature conservation within 2 km of the Site;
- Existing records of priority habitats, protected and notable faunal species, within 2 km of the Site, extended to 5 km for bat roosts and annex 1 / schedule 1 raptors; and
- Existing records of ancient woodland and ancient or veteran trees, within 2 km of the Site.

6.4.2. The following key sources were consulted:

- NatureScot[1] and Joint Nature Conservation Committee (JNCC) websites[2];
- The Multi Agency Geographic Information for the Countryside (MAGIC) website[3];
- Ancient Woodland Inventory (NatureScot's OpenData website[4]); and
- Highland Biological Recording Group (HBRG[5]).

6.4.3. Reference was also made to Ordnance Survey (OS) maps of the wider area and online aerial images (www.google.co.uk/maps) in order to determine any features of nature conservation interest in the wider area, including potential ponds and watercourses.

6.4.4. Documents produced for the operational Limekiln Windfarm Extension and Limekiln Windfarm Section 36c (S36c) Application (together, Limekiln Wind Farm) were also

[1] https://sitelink.nature.scot/home
[2] http://jncc.defra.gov.uk/
[3] https://magic.defra.gov.uk/MagicMap.aspx
[4] https://opendata.nature.scot/datasets/ancient-woodland-inventory/explore?location=57.009453%2C-2.298541%2C12.97
[5] https://www.hbrg.org.uk/

referenced to review potential presence of protected species and habitats on Site. These include the following:

- Limekiln Windfarm Extension Environmental Impact Assessment Report (EIA-R) Chapter 11. Ecology[6], including:
    - Appendix 11.B Badger survey
    - Appendix 11.C Otter Survey
    - Appendix 11.D Water Vole Survey
    - Appendix 11.E Pine Marten Survey
    - Appendix 11.F Fish Survey
    - Appendix 11.G Bat Survey
    - Appendix 11.H Aquatic Invertebrate Survey
    - Appendix 11.I Habitat and Vegetation Survey of Additional Land; and,
    - Appendix 11.J Outline Habitat Management Plan
- Limekiln Windfarm S36c Application EIA-R Chapter 11 – Ecology[7], including:
    - Appendix 11.A NVC Survey Report
    - Appendix 11.B – Protected Species Report;
    - Appendix 11.C 2012 Limekiln Wind Farm Bat Survey Report
    - Appendix 11.D 2019 Bat Survey (Limekiln Wind Farm Extension)
    - Appendix 11.F – Species Protection Plan;
    - Appendix 11.G – Habitat Management Plan;

Field Surveys

6.4.5. An extended Phase 1 habitat survey was undertaken on 29th May 2025 by E. Richens who is a suitably experienced and qualified field ecologist. The survey followed UK industry

[6] Infinergy (2020) *Limekiln Wind Farm Extension EIA Report. Chapter 11. Ecology.* Available at: https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00002070
[7] Infinergy (2021) *Limekiln Wind Farm Section 36C Variation EIA Report. Chapter 11. Ecology.* Available at: https://www.limekilnwindfarm.co.uk/downloads/

standard JNCC Phase 1 Habitat Methodology (JNCC, 2010) and with reference to Chartered Institute of Ecology and Environmental Management (CIEEM) guidance (2017[8]).

6.4.6. The survey covered the Site, as presented in **Figure 2.1**.

6.4.7. Habitats were mapped and described through the use of target notes. The survey was extended to include the additional recording of specific features indicating the presence, or likely presence, of protected species, invasive species and other species of potential conservation value.

Limitations

6.4.8. An extended Phase 1 habitat survey does not constitute a detailed botanical survey or faunal species list or provide a full protected species survey but, enables competent ecologists to ascertain an understanding of the ecology of the site in order to:

- Broadly identify the nature conservation value of a site and assess the significance of any potential impacts on habitat/species recorded; and/or,
- Confirm the need and extent of any additional specific ecological surveys that are required to identify the true nature conservation value of a site (if any).

6.4.9. The extended Phase 1 habitat survey visit was undertaken in May 2025 with no access restrictions and therefore within the optimal period for botanical surveys (approximately April to September) which means that there are no constraints associated with the timing of the survey.

6.5. Baseline and Assessment

6.5.1. This section seeks to identify the potential for effects to occur on habitats and protected and notable species which could be considered as reasonably likely to occur as a result of the Proposed Development. The Site's proximity to statutory and non-statutory designated sites and potential effects on their qualifying interests is discussed. Measures are proposed for the protection of sensitive habitats and species, and recommendations are made for further pre-construction surveys and mitigation, if required.

6.5.2. The Proposed Development has been designed to minimise the potential for effects on sensitive ecological features; thereby ensuring existing wildlife corridors and habitat connectivity are maintained and enhanced. Significant biodiversity gain will also be provided,

[8] CIEEM. (2017). *Guidelines for Preliminary Ecological Appraisal, 2nd edition*. Chartered Institute of Ecology and Environmental Management, Winchester.

as noted in section 1.5, and will be implemented by a Habitat Enhancement and Management Plan (HEMP).

Designated Sites for Nature Conservation

Statutory Designated Sites

6.5.3. Statutory designated sites identified within the appropriate search radius (as specified in Section 1.4.1) and of biodiversity interest are presented in **Table 1.4**, alongside their qualifying interests. The location of each designated site in relation to the Proposed Development is shown on **Figure 6.2:** Statutory Designated Sites.

6.5.4. Sites designated only for ornithology features are discussed within Chapter 7 – Ornithology.

Table 6.4. Statutory Designated Sites with Ecological Interest

(SAC: Special area of Conservation, Ramsar: Ramsar Convention Wetland of International Importance, SSSI: Site of Special Scientific Interest)

Statutory Site Name	Approx distance and direction from the Site	Qualifying Features
Sandside Bay SSSI	35 m north of the access track part of the Site	• Sand dunes
Red Point Coast SSSI	1.18 km north of the access track part of the Site.	One terrestrial habitat and one biological feature: • Terrestrial Habitat: Maritime Cliff • Biological Feature: Scottish primrose *Primula scotica.*

Caithness and Sutherland Peatlands SAC and Ramsar	2.03 km south west	Annex I habitats that are a primary reason for selection of the site: • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or the *Isoëto-Nanojuncetea* • Natural dystrophic lakes and ponds Acid peat-stained lakes and ponds • Blanket bog Annex I habitats present as a qualifying feature, but not a primary reason for selection of the site: Northern Atlantic wet heaths with *Erica tetralix* • Transition mires and quaking bogs • Depressions on peat substrates of the *Rhynchosporion* Annex II species that are a primary reason for selection of this site: • Otter *Lutra lutra* • Marsh saxifrage *Saxifraga hirculus*
East Halladale SSSI	2.5 km south west	• Blanket Bog
Broubster Leans SAC and SSSI	4.41 km east	Annex I habitats that are a primary reason for selection of the site: • Transition Mires • quaking bogs.

6.5.5. Sandside Bay SSSI is located 35 m north of the Site boundary and is designated for the habitat feature sand dunes. Due to the close proximity of the SSSI to the Proposed Development, there is potential for indirect impacts to features for which the SSSI was designated; however the nearest part of the Site to the SSSI is the existing access track and no construction operations are required in this location.

6.5.6. All works will be confined to the Site boundary and as such no direct impacts are anticipated. While located in relatively close proximity to the Site, the only works proposed nearby to Sandside SSSI are use of an existing access route. The BESS compound and Substation Extension are located over 2 km from the Sandside Bay SSSI and as such no impacts are anticipated from these elements of works during either construction or operation.

6.5.7. All vehicles entering or leaving the Site will be required to follow good practice pollution control and prevention measures, including dust suppression management, pollution prevention and runoff control measures. The adoption of such measures will ensure there are no indirect effects during the construction phase. Such measures can be detailed within a CEMP for the Proposed Development, which would be controlled by a suitably worded planning condition.

6.5.8. No discernible impacts are anticipated to occur on any other statutory designated site for nature conservation given the spatial separation distances, nature of the development and absence of available habitat for qualifying interest features.

Non-statutory Designated Sites

6.5.9. Data received from HBRG confirmed that the Site is not located within any non-statutory designated site for nature conservation, and there were no non-statutory designated sites within a 2 km radius of the Site**.** Given there are no non-statutory designated sites located in proximity to the Proposed Development, no impacts are anticipated.

Priority Habitats and Peatland

Existing Information

6.5.10. Information gathered in support of the operational Limekiln Wind Farm identified wet heath habitat within woodland rides. This is a habitat listed on the SBL, however it was stated that wet heath communities are likely due to drying of former bog habitat resulting from forestry operations.

6.5.11. During the extended Phase 1 habitat survey wet heath was identified. This is described 'Habitats' below.

6.5.12. A peat assessment has been undertaken in support of the Proposed Development (see Chapter 9 Geology and Peat) and has concluded that the BESS, underground cable routing and existing road infrastructure are situated on non-peaty soils, however the Substation Extension is located on soils which *'represent a mixed peat spoil from past land-use on the site'* and that *'peat impacts… are therefore considered minimal due to the already disrupted and mixed nature of organic soils present*.'

Ancient and Irreplaceable Habitats

6.5.13. No ancient and irreplaceable habitats have been recorded within the Site. As such, no impacts are anticipated on ancient and irreplaceable habitats.

Habitats

Existing Information

6.5.14. Baseline information collected in support of the Limekiln Wind Farm Extension (Limekiln Windfarm Extension EIA-R 2020, Chapter 11. Ecology[9]) indicated that land within the Site consisted predominantly conifer plantation with areas of wet modified bog habitat (NVC: M25a) and dry modified bog habitats (NVC: M15b/ M25a mosaic) located at woodland edges and adjoining access routes. Small areas of acid flush (M6c/M25a mosaic) and wet dwarf-shrub heath (M15b) were also present.

6.5.15. Limekiln Windfarm has created additional access roads and upgraded existing access routes. Under the Limekiln Windfarm Habitat Management Plan areas of forestry within the Site are largely due to be re-stocked, other than where permanent infrastructure is now located. No specific proposals are made to habitats bounding access routes and forestry.

Extended Habitat Survey

6.5.16. Habitats within the Site comprise predominantly J4 bare ground, in the form of the existing access track and working areas associated with the operational Limekiln Wind farm. Other habitats recorded within or immediately adjacent to the Site include wet heath (D2), coniferous woodland (A1.2.2), recently felled woodland (A4.2) and neutral grassland (B2.1).

6.5.17. Plantation coniferous woodland (including felled woodland) for the purposes of forestry is typically of low ecological value, however adjacent habitats are of greater ecological value locally. As mentioned above, the presence of areas of wet heath are considered likely to result from drying of bog habitats associated with forestry operations. Such habitats are restricted to the edges of plantation blocks, rides and land adjoining access tracks.

6.5.18. A summary of phase 1 habitats recorded in the study area is provided in **Table 1.5** and are shown in **Figure 6.1**.

Table 6.5 Habitats recorded during the extended phase 1 habitat survey.

Phase 1 Habitat	Notes
J4 Bare Ground	An existing access track forms the majority of the Site, along with compound and work areas. The latter area comprises a complex mix of mineral soils, peat soils and rock fragments.

[9] Infinergy (2020) *Limekiln Wind Farm Extension EIA Report. Chapter 11. Ecology.* Available at: https://www.energyconsents.scot/ApplicationDetails.aspx?cr=ECU00002070

A1.2.2 Coniferous plantation woodland	The southern area surrounding the Site is largely made up of densely planted sitka spruce, Scots pine and occasional larch species, around 15-20 m in height. Understorey is very limited, some lanky moss and glittering woodmoss but mainly dead needles.
A4.2 Recently felled coniferous woodland	Recently felled woodland is found on both sides of the access track in marginal areas roughly 15 m-50 m wide. Largely brash and bare earth. Likely felled sitka spruce.
B2.1 unimproved neutral grassland	Adjacent to the main track, this habitat largely constitutes unimproved grassland. Species noted included; cocksfoot, Yorkshire fog, meadow foxtail, crested dog's tail, meadow fescue, sweet vernal grass. Amongst these are also herbs including sorrel, creeping thistle, white clover and Persian speedwell. At the immediate track margin, some local enrichment has occurred resulting in more common daisy, white clover, common mouse-ear chickweed and a few examples of white campion. A drainage ditch runs alongside part of the access track, within this habitat, and contains common cotton grass, small lousewort and early growth of field horsetail.
D2 Wet heath	Bordering the coniferous plantation, this habitat comprises small gorse species, some purple moor-grass, cow-horn bog-moss, some dog lichen in damper areas, as well as young saplings (no taller than 5ft) of sitka spruce. Common heather, cross-leaved heath, marsh hair moss, big shaggy-moss, small lousewort and common milkwort are also present throughout the area.

6.5.19. Habitats outside of the Site are predominantly plantation woodland and similar shrub heath. All works will be confined to the Site boundary and as such there will be no direct impacts to off-Site habitats.

6.5.20. Existing access tracks will be utilised by the Proposed Development, and so no additional impacts are anticipated to occur with regards to these.

6.5.21. The built footprint of the BESS compound will predominantly occur on previously disturbed land which is currently bare ground following wind farm construction. Expansion of the Substation area and the proposed cable route will be located principally in areas of existing plantation woodland and will result in the loss of a small amount of wet dwarf shrub heath (approx. 0.02 ha) which is heavily degraded, and discrete areas of plantation woodland of low ecological value (totalling approx. 2.59 ha). Replanting of coniferous woodland is to take place in 0.71 ha of the Site, with the remaining 1.88 ha (approx.) taken up by proposed infrastructure and easements which must be maintained as open ground.

6.5.22. Wet dwarf shrub heath is common at the locality with most track side areas comprising of it, the loss is considered not significant in the context of the local area, however the requirement

to maintain open ground in areas of felled forestry provides opportunities for habitat enhancement.

Protected and Notable Species

Existing Records

6.5.23. HBRG returned two records of protected or notable species within 2 km of the site, these were pine marten (2021) and pygmy shrew (2019), both recorded 1.62 km west of the Site.

6.5.24. HBRG did not hold any other records of protected or notable species within 2 km of the Site within the last 10 years.

6.5.25. Documentation which supported the operational Limekiln Wind Farm revealed the presence of pine marten, water vole and common lizard in the wider Limekiln wind farm development site.

Extended Habitat Survey

6.5.26. During the extended baseline habitat survey, no evidence was found of any protected or notable faunal species within the Site boundary.

6.5.27. Although not recorded during the extended habitat survey, there is the potential for species of reptile to be present on the edges of the Site.

6.5.28. Habitats surrounding the Site including plantation woodland are suitable for red squirrel. No evidence of red squirrel was noted in the extended Phase 1 habitat survey, no records have been returned in the last 10 years, and they were not considered within the Limekiln Wind Farm application. The species is therefore considered to be absent.

6.5.29. There are no suitable structures or trees that have potential to support roosting bats within the Site, or ponds that could be used by notable amphibians. There is suitable habitat for badger to establish a sett, though no evidence of badger was noted on Site or on the Limekiln Wind Farm and no records of badger were returned. Similarly pine marten may utilise woodland surrounding the Site; however habitats within the Site are considered unlikely to be important for the species.

6.5.30. The Site is considered unsuitable for otter, water vole and fish given the lack of suitable watercourses. Along the access track, there are occasional sections of unvegetated dry ditch but as these did not hold water at the time of survey and were are considered unsuitable for otters, water voles and fish. Use of the watercourses in the surrounding area by these species cannot be discounted (particularly as water vole were identified during baseline data gathering for the Limekiln Wind Farm).

6.5.31. Woodland edge habitats in which the Site is located could be utilised by foraging bats, however relatively small scale tree loss within an area of existing commercial forestry in which regular felling occurs is not considered to negatively impact the local bat population. No features suitable for roosting bats were identified during the extended habitat survey, however a pre-construction check will be undertaken to ensure this remains the case.

6.5.32. Lighting and noise during construction of the Proposed Development will be controlled through the CEMP, including the avoidance of general lighting and use of task specific lighting where it is required, ensuring light spilt to adjacent woodland habitat is avoided and implementation of general good practice measures to control noise such as turning of plant when not in use.

6.5.33. During operation there will be no requirement to be permanently or routinely lit, with lighting only to be used in the event emergency access is required outside of daylight hours. Any permanent lighting would be fitted with suitable cowls or hoods to minimise light spill to adjacent habitats. As such, there are no impacts anticipated to foraging or commuting bats.

6.5.34. There is no evidence that the Site is regularly used by, or is of importance to, any other protected faunal species.

6.5.35. The Proposed Development, and the associated construction works, are of a limited scale, particularly in the context of the operational Limekiln Wind Farm development.

6.5.36. Taking into consideration the small scale of Proposed Development, measures for protection of ecological interests to be included in a CEMP (including pollution prevention, control of lighting and noise measures), it is considered unlikely that protected or notable species will be impacted by the Proposed Development.

6.5.37. Precautionary pre-construction surveys and protection measures implemented via a CEMP would prevent potential breaches of legislation pertaining to protected faunal species (such as reptiles) during construction. Pre-construction surveys will be required for badger, pine marten and roosting bats.

6.5.38. The small areas of removal of habitat on site should be removed under Reasonable Avoidance Measures (RAMs) during the construction stage. This will safeguard reptiles and other protected or notable species including amphibians and terrestrial mammals, if present on site. RAMs will include clearing areas of longer vegetation in a two-stage cut; first to a height of 100-150 mm above ground level, then to ground level prior to construction works commencing. This will encourage any reptiles potentially present to move away from the works area to safety. Hand searches of suitable vegetation by a suitably qualified ecologist will also be required to prevent accidental killing or injuring of reptiles if they are present.

6.6. Biodiversity Enhancement

6.6.1. Significant habitat and species enhancement proposals include:

- restoration of the remaining area surrounding the proposed Substation Extension to manage heathland and associated habitats;
- allow heathland to expand into cable route areas;
- restoration and enhancement of plantation woodland edge habitats following felling;
- Allow heathland to expand into open areas around the BESS;
- Hedgerow planting around the BESS compound, to include native fruit bearing species only with an aim of a species rich hedgerow;
- Bird boxes including owl boxes;
- Bat boxes; and
- Refugia piles for reptiles and amphibians.

6.6.2. These proposals will contribute to significant biodiversity enhancements on Site through the enhancement of existing habitats, and the introduction of native habitats not previously noted. It will increase foraging and commuting resources for protected and notable species including bats, birds, reptiles and pine marten.

6.6.3. A Habitat Enhancement and Management Plan (HEMP) will be finalised post consent and prior to the commencement of construction and can be controlled through a suitably worded condition of planning. The HEMP will seek to maximise opportunities for biodiversity enhancement and will incorporate the enhancement measures listed above.

6.7. Assessment summary

6.7.1. Table 6.7 below provides a summary of the findings of the assessment.

Table 6.7: Summary of assessment.

Feature	Summary of Mitigation	Summary Enhancement
Designated Sites	The Site does not form part of any statutory designated site for nature conservation. The closest designated sites are Sandside Bay SSSI (35 m) and Red Point Coast SSSI (both 1.18 km). To prevent impacts to Sandside Bay SSSI, a CEMP will be produced to include implementation of dust suppression measures, pollution prevention and surface water runoff management measures. No impacts on statutory or non-statutory designated sites for nature conservation are anticipated. Standard construction practices are recommended to be controlled through the CEMP.	None required.
Habitats	Existing features of biodiversity value will largely be retained and protected throughout the construction and operation phases. Pollution prevention measures will be implemented to prevent pollution and run-off occurring during the construction and specific control measures would be implemented to protect the watercourses/ditches off Site.	Enhancement of on-site heathland habitats, hedgerow creation and allowing expansion of existing heathland will provide biodiversity benefits and enhancements, along with the provision of bird and bat boxes, and refugia, which accords with NPF4. Enhancements will be implemented and monitored in line with an HEMP which will be agreed with Highland Council through a suitably worded planning condition.

Protected and notable species	No evidence of protected species were recorded on the Site during the habitat survey and the potential for the Site to support protected species limited by habitat diversity and previous construction works. Pre-construction surveys will be required for badger, pine marten and roosting bats. As a precautionary measure, construction works will be undertaken under RAMs which will be included in the CEMP.	Enhancement to benefit protected and notable species which may be present on site will include the installation of bat and bird boxes, including barn owl boxes, refugia piles for amphibians and reptiles, and hedgerow planting of fruit bearing native species to provide a foraging resource for a number of species.

References

- CIEEM (2017) Guidelines for Preliminary Ecological Appraisal. Second Edition.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine.
- Collins, J. (2023) Bat surveys for professional ecologists: good practice guidelines. 4th edition, Bat Conservation Trust.
- Goodship, N.M. and Furness, R.W. (2022) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.
- Hendry, K. Cragg-Hine, D. (2003) Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers. Ecology Series No. 7. English Nature. Peterborough. Highland Council (2023) Highland-wide Local Development Plan (adopted 2012). https://www.highland.gov.uk/info/178/development_plans/199/highland-wide_local_development_plan (Accessed 13/10/2023).
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- NatureScot (2025) Planning and development: standing advice and guidance documents.
- NatureScot (2023a) Developing with Nature guidance. Guidance on securing positive effects for biodiversity from local development to support NPF4 policy 3(c).
- NatureScot (2023b) Advising on peatland, carbon-rich soils and priority peatland habitats in development management.
- Scottish Government (2023) National Planning Framework 4. 13 February 2023.
- SEPA (2014) Land use planning system SEPA guidance Note 31
- SNH (2016) Carbon and Peatland map.
- Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Linley, P., McCulloch, N., Noble, D.G. and Win, I. (2021) The status of our bird populations: the fifth birds of conservation concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red list assessment of extinction risk for Great Britain. British Birds 114: 723-747.

7.0 Ornithology

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7. Ornithology

7.1. Introduction

7.1.1. This Chapter of the Environmental Report (ER) considers the potential effects of the Limekiln Battery Energy Storage System (BESS) (the 'Proposed Development') on ornithological features. It summarises the methods used to establish the bird populations within the Site and its surroundings, the results of the baseline surveys, and the process used to determine the sensitivity of the bird populations present. The ways in which birds might be affected (directly or indirectly) by the construction and operation of the Proposed Development are evaluated, prior to, and after, any mitigation measures are considered.

7.1.2. Particular attention has been paid to species of high or moderate Nature Conservation Importance. These include, but are not restricted to, species with national or international protection under the Wildlife and Countryside Act 1981 (and later amendments) and the EU Birds Directive (79/409/EEC).

7.1.3. Birds may be affected by the following phases of the Proposed Development:

- Construction: construction of tracks, BESS compound and temporary construction compound; and
- Operation: including associated maintenance activities.

7.1.4. The potential effects of the Proposed Development on birds are:

- direct habitat loss due to land take by the BESS, access tracks and ancillary structures;
- indirect habitat loss due to the displacement of birds as a result of construction and maintenance activities; and
- disturbance of bird behaviours due to construction and operational activities that do not result in displacement but may result in reduced productivity and/or survival.

7.1.5. This ER is based on information available at the time of writing and is supported by:

- Appendix 7.1: Ornithology Technical Report.

7.1.6. A detailed description of the Proposed Development is presented in **Chapter 3 (Description of the Proposed Development)**, while the layout of the Proposed Development is illustrated on **Figure 3.1**.

7.1.7. The ornithology ER was undertaken by Natural Research (Projects) Limited.

7.2. Legislation and Guidance

Legislation

7.2.1. The following legislation has been considered when undertaking this ER:

- The Wildlife and Countryside Act 1981 (as amended) ('WCA').
- The Conservation of Habitats and Species Regulations 2017 ('the Habitats Regulations').
- Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) ('Habitats Directive').
- The Nature Conservation (Scotland) Act 2004 (as amended); and
- The Council Directive on the Conservation of Wild Birds 2009/147/EC (The EU 'Birds Directive').

Guidelines

7.2.2. The following guidance has been consulted while undertaking this ER:

- Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., & Win I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.
- European Commission (2020). Natura 2000 Guidance Document: Wind energy developments and EU nature legislation. European Commission, Brussels.
- Scottish Executive Rural Affairs Department (SERAD) (2000). Habitats and Birds Directives, Nature Conservation; Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ("the Habitats and Birds Directives"). Revised Guidance Updating Scottish Office Circular No 6/1995.
- SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Version 3.
- SNH (2018). Assessing the cumulative impacts of onshore wind farms on birds. SNH Guidance Note.
- NatureScot (2025). Recommended bird survey methods to inform impact assessment of onshore windfarms, and
- NatureScot (2025). Assessing the significance of impacts on bird populations from onshore wind farms that do not affect protected areas.

7.3. Methodology

Study Area

7.3.1. The Study Area was defined with reference to the location of the Proposed Development and encompasses a series of buffers up to 500 meters (m) in radius. Buffer size relates to the sensitivity of the key species, to the potential effects associated with built development (**Figure 7.1**). The various survey areas, which make up the Study Area, are defined as follows:

- 'Site' refers to the area enclosed by the Proposed Development, and
- 'breeding bird survey area' and 'raptor survey area' refer to the Site plus an additional 500 m wide strip around the Site.

7.3.2. The Site is situated within a large coniferous woodland plantation known as Limekiln, where the consented Limekiln and Limekiln Extension Wind Farms (together known as Limekiln Wind Farm) are operational.

Desk-based Study

7.3.3. A desk-based study was undertaken to collate existing bird records/data. Distribution and abundance data were collected from published sources (e.g., Gibbons *et al*., 1993 and Forrester *et al*., 2007) and nature conservation organisations including NatureScot, RSPB, Highlands Raptor Study Group (HRSG) in relation to species with a moderate or high nature conservation value (SNH, 2017). Existing bird survey data collected in support of the Limekiln Wind Farm and the Limekiln Wind Farm Extension planning applications was also reviewed.

Survey Methodology

7.3.4. Baseline field surveys for the Proposed Development were carried out between April and May 2025. A detailed methodology for all surveys is provided in **Appendix 7.1** of this ER and is briefly summarised below.

- Breeding Bird Survey (four visits, April and May; within Site and 500 m buffer), and
- Scarce Breeding Bird Survey (April and May 2025; within Site and 500 m buffer).

Survey Limitations

7.3.5. Breeding Bird Surveys and Scarce Breeding Bird Surveys were not carried out in the vicinity of the proposed Substation Extension. This gap is not considered to be a limitation to the baseline survey findings to inform a robust assessment, for the reasons outlined below:

- The area where the Substation Extension is proposed has been heavily modified and disturbed due to ongoing construction works for the Limekiln Wind Farm and Limekiln Wind Farm Extension.
- The proposed Substation Extension area has already been cleared of vegetation and sits immediately adjacent to the operational Substation, construction compound and Site Offices.
- Breeding Bird Surveys and Scarce Breeding Bird Surveys undertaken in support of the Limekiln Wind Farm and the Limekiln Wind Farm Extension planning applications did not record any species of moderate or high Nature Conservation Importance in the area.
- Pre-construction surveys for the consented Limekiln Wind Farm and the Limekiln Wind Farm Extension did not record any species of moderate or high Nature Conservation Importance in the area.
- Pre-construction surveys will be required for the Proposed Development.

7.3.6. On the basis of the desk-based study and field survey work undertaken (Appendix 8.1), the professional judgement of the ER team and experience from other relevant projects it is considered that whilst some information gaps have been identified, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant environmental effects on ornithology.

7.4. Embedded Protection Measures

7.4.1. To avoid direct impacts to breeding birds during construction, removal of all vegetation will take place outside of the bird nesting season i.e. undertaken between September and March inclusive.

7.4.2. A Bird Protection Plan (BPP), devised in consultation with NatureScot, will be in place prior to the onset of construction activities. The BPP will describe survey methods for the identification of sites used by protected birds and will detail protocols for the prevention, or minimisation, of disturbance to birds as a result of activities associated with the Proposed Development. The BPP will be overseen by the Ecological Clerk of Works.

7.4.3. The BPP will describe surveys to locate the nests or other key sites (e.g., roosts) of birds listed in Schedules 1 and 1A of the WCA 1981, in advance of construction works progressing within the Site. In the event that an active nest or roost of a Schedule 1 or Schedule 1A species is discovered within distances given by Goodship & Furness (2022) (or within a 500m radius of the nest for Schedule 1 species not listed), a disturbance risk assessment will be prepared under the BPP and any measures considered necessary to safeguard the breeding attempt or roost (e.g., exclusion zones or restrictions on timing of works), will be submitted to NatureScot for agreement before recommencing work.

7.5. Baseline Conditions

Designated Sites

7.5.1. The Site is not located within or adjacent to any statutory sites designated for ornithological interest. Statutory designated sites for ornithological interest within 10km of the Site are listed in **Table 7.1**.

Table 7.1 Designated sites within 10km of the Proposed Development

Name	Designation	Designated for	Distance from Proposed Development
Caithness and Sutherland Peatlands	SPA	Black-throated diver Red-throated diver Common scoter Wigeon Golden eagle Hen harrier Merlin Short-eared owl Golden plover Wood sandpiper Greenshank Dunlin	2.4 km south-west
Caithness and Sutherland Peatlands	Ramsar	Under Ramsar Criterion 2: Red-throated diver Black-throated diver Golden plover Wood sandpiper Dunlin Under Ramsar Criterion 4: Wigeon Common scoter Greenshank	2.4 km south-west
East Halladale	SSSI	Breeding bird assemblage Golden plover Dunlin	2.4 km south-west
Loch Caluim Flows	SSSI	Breeding bird assemblage Golden plover Dunlin Greenshank	5.0 km south-east
Lambsdale Leans	SSSI	Breeding bird assemblage	9.3 km south-east

Name	Designation	Designated for	Distance from Proposed Development
Caithness Lochs	SPA	Whooper swan Greenland white-fronted goose Greylag goose	4.7 km east
Caithness Lochs	Ramsar	Under Ramsar Criterion 6: Whooper swan Greenland white-fronted goose Greylag goose	4.7 km east
Broubster Leans	SSSI	Breeding bird assemblage	4.7 km east
Loch Calder	SSSI	Whooper swan Greenland white-fronted goose Greylag goose	7.9 km east
North Caithness Cliffs	SPA	Breeding seabird assemblage Fulmar Guillemot Kittiwake Peregrine Puffin Razorbill	3.8 km north-west
Red Point Coast SSSI	SSSI	Guillemot	4.8 km north-west

7.5.2. The European Directive which is currently relevant in the context of SPAs is the Council Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive). In Scotland the Birds Directive has been transposed into the domestic legislation through the Habitats Regulations. Guidance for the implementation of the Habitats Regulations in Scotland is provided in Scottish Office Circular No. 6/1995 (revised by the Scottish Executive in June 2000) (SERAD 2000), and in the context of the protection of the Ramsar sites, the Scottish Government guidance published on 22 January 2019.

7.5.3. Whilst the Habitats Regulations provide that an assessment of the likely effects of a proposed development on an SPA is the responsibility of the competent authority – in this instance, Scottish Ministers, this section provides a summary examination of the relevant issues to enable the competent authority to undertake the appropriate assessments in respect of the Caithness & Sutherland Peatlands Special Protection Area (SPA) and Ramsar site, the Caithness Lochs SPA and Ramsar site and North Caithness Cliffs SPA in light of each site's conservation objectives.

7.5.4. Regulation 63 of the Habitats Regulations refers to three assessment steps; the outcome of the first two steps determining whether or not the third needs to be implemented. The three steps, set out below as questions, are:

Step 1: Is the proposal directly connected with or necessary to the management of the site?

Step 2: Is the proposal, alone or in combination, likely to have a significant effect on the site? If a significant effect is likely, then an appropriate assessment is necessary; and

Step 3: Can it be demonstrated in light of the conservation objectives that the proposal will not adversely affect the integrity of the site?

7.5.5. In respect of the Proposed Development, the following comments are made in light of the three steps referred to above, to assist Scottish Ministers with undertaking the appropriate assessment:

Step 1. The construction and operation of the Proposed Development is not directly connected with or necessary for the management of the Caithness & Sutherland Peatlands SPA, the Caithness Lochs SPA or the North Caithness Cliffs SPA, and therefore the next step needs to be considered.

Step 2. Caithness & Sutherland Peatlands SPA and Ramsar site.

7.5.6. Baseline studies recorded no qualifying species of this SPA and Ramsar site, and no breeding sites were found within 500 m of the Proposed Development. Hence, their reliance on habitats (e.g., for breeding or foraging) and airspace within the survey area was clearly very low, and the Proposed Development will have negligible effects on relevant SPA/Ramsar populations of these species. Consequently, given the favourable condition of each species within the SPA, there is considered to be no potential for any negative effect on these SPA/Ramsar populations as a result of construction or operational activities. Despite a link between the proposal's effects and the qualifying species of the SPA, likely significant effects are considered trivial or inconsequential and an appropriate assessment is therefore not required.

Step 2. Caithness Lochs SPA and Ramsar site.

7.5.7. The distance of the Proposed Development from the Caithness Lochs SPA and its location within commercial forest intrinsically lowers the likelihood that the Proposed Development would have a potential impact on the SPA interest (i.e., non-breeding greylag goose, Greenland white-fronted goose and whooper swan). These considerations in combination with the negligible population effects of any predicted mortality may suggest to the competent authority that the Proposed Development is not likely to have a significant effect under Step 2 of the assessment process and an appropriate assessment is therefore not required.

Step 2. North Caithness Cliffs SPA

7.5.8. The North Caithness Cliffs SPA is classified for its breeding populations of peregrine, common guillemot, northern fulmar, black-legged kittiwake, razorbill and Atlantic puffin. All these species, aside from peregrine, are exclusively coastal species and the Proposed Development is outside of the core foraging range of peregrine (SNH, 2016). For these reasons there is

considered to be no prospect of any effect on the qualifying interests of this SPA as a result of the Proposed Development. These considerations may suggest to the competent authority that the Proposed Development is not likely to have a significant effect under Step 2 of the assessment process and an appropriate assessment is therefore not required.

7.5.9. It follows, therefore, that there will be no detrimental effects on the respective SSSI designations that underpin the SPA and Ramsar designations.

Field Survey

Raptors and Owls

7.5.10. No species of moderate or high Nature Conservation Importance was recorded during baseline surveys (**Appendix 7.1**). Measures set out in the BPP (see **Embedded Protection Measures**) will ensure that there is no possibility that any potential effects will significantly affect scarce raptor or owl populations; therefore, all raptor and owl species are not considered further in this Chapter of the ER.

Other species

7.5.11. All of the passerine species recorded during baseline surveys (**Appendix 7.1**) are regionally widespread and common. The changes induced by the Proposed Development will be largely immaterial in terms of the regional effects on the conservation status of passerine birds. In view of their local numbers relative to wider abundance, and the low sensitivity of such passerines to the impacts of built development coupled with measures set out in the BPP (see **Embedded Protection Measures**), these species are not considered further in this Chapter of the ER.

7.6. Consideration of Potential Effects

Effects Scoped Out

7.6.1. On the basis of the desk study and field survey work undertaken, the professional judgement of the ornithology team, experience from other relevant projects, consultations and taking account of policy guidance, the following topic areas have been scoped out of further consideration:

- Effects on internationally and nationally designated sites: the distance to the nearest SPAs and SSSIs and/or the species' ecology and biology of the qualifying interests are such that no species cited in the designations for these areas will be affected by the Proposed Development.
- Effects on common crossbill and lesser redpoll: Baseline studies recorded both of these species, which are considered to be of high or moderate Nature Conservation Importance, in the vicinity of the Proposed Development. Although these species were present, they were recorded in relatively small numbers (**Appendix 8.1**). Hence, their

reliance on habitats (e.g., for breeding or foraging) was clearly very low, and the Proposed Development will have negligible effects on relevant populations of these species. Consequently, given regional abundance and/or behavioural sensitivity there is considered to be no potential for any adverse effect on regional populations of all bird species as a result of construction, operational or decommissioning activities.

- Effects on all bird species classified as of low Nature Conservation Importance.

Potential Construction Impacts

Disturbance of Breeding Birds

7.6.2. Construction of the Proposed Development is anticipated to last for approximately 9 months. Disturbance from construction will therefore potentially affect one bird-breeding season (April to August). Construction activity could result in unpredictable disturbance by personnel and machinery to specific areas of the Site. The result may be a reduction in breeding success, changes in range use or temporary or permanent displacement of individual birds.

7.6.3. The Proposed Development will result in the loss of some limited conifer woodland and scrub habitat that could be utilised by birds for nesting and foraging. If site clearance works / construction works are due to take place within the bird nesting season (April to August inclusive), a pre-commencement bird survey shall be carried out. If nesting birds are found, works in the vicinity of the nest shall be delayed until the young have fledged or the nesting attempt is otherwise complete.

7.6.4. The following good practice measures shall be employed to reduce the possibility of damage and destruction to occupied bird nests during the construction phase:

- Careful timing of construction activities, including restricting activities in sensitive areas as far as practicable in the early part of the breeding season until the location and breeding status of nesting birds has been established.

- If site clearance and construction activities are required to take place during the breeding bird season, from April to August inclusive, survey work shall be undertaken immediately prior to commencement of construction to ensure that nest destruction and disturbance to sensitive species is avoided. This would also apply if construction were ongoing at the start of a breeding season. The survey may need repeating if construction ceases in any given area for more than 48 hours as new breeding pairs may settle and start nesting in this time.

- A suitably qualified Ecological Clerk of Works (ECoW) should be employed for the duration of the construction period, although this may not necessarily be a full-time role throughout. Prior to the start of construction and / or the breeding bird season, the ECoW would make contractors aware of the ornithological sensitivities within the site. The ECoW would undertake surveys for nesting birds throughout the

construction period that falls within the nesting season and set up and monitor appropriate exclusion areas whilst nests of relevant species are in use.

7.6.5. With the above measures in place, no contravention of wildlife legislation is predicted.

Disturbance to Foraging Birds

7.6.6. Foraging birds will potentially be displaced from localised areas around the construction site; however, there is no evidence to suggest that the localised areas around the construction site are critical to the performance of any species. Furthermore, species of moderate or high Nature Conservation Importance, will be essentially behaviourally insensitive to the potential adverse effects of construction activities that are intrinsically short term, and so the magnitude of spatial effects will be negligible, at worst.

7.6.7. It is concluded that disturbance to foraging birds due to the construction of the Proposed Development will have no adverse effects on all bird species.

Direct Habitat Loss

7.6.8. As set out in **Chapter 3: Description of the Proposed Development**, the construction of the Proposed Development will result in a permanent direct loss of approximately 1.5 ha hectares of habitat. This habitat loss is very small and considered of negligible ornithological significance at the scale of the Peatlands of Caithness and Sutherland NHZ. The effect of this habitat loss is spatially negligible in relation to the breeding requirements of all potentially affected species. Hence, there will be no change in the conservation status of potentially affected species as a result of habitat loss and the effects of direct habitat loss on all ornithological interests are deemed negligible.

7.6.9. It is concluded that direct habitat loss due to the construction of the Proposed Development will have no adverse effects on all bird species.

Potential Operational Impacts

Displacement

7.6.10. No species of moderate or high Nature Conservation Importance would be breeding at distances at which operational displacement could potentially constitute an adverse effect. Furthermore, the Proposed Development is clearly not critical to the requirements of foraging for species of moderate or high Nature Conservation Importance. Even if operational displacement of foraging birds from a small area does occur, it will have minimal local adverse effects on the profitability of foraging and indiscernible effects on regional populations. The magnitude of operational disturbance effects on these species of moderate or high Nature Conservation Importance is considered to be negligible.

7.6.11. It is concluded the operation of the Proposed Development will have no adverse effects on all bird species.

Assessment of Cumulative Effects

7.6.12. In considering cumulative effects, it is necessary to identify any effects that are minor (or greater) in isolation but that may be major cumulatively.

7.6.13. Species for consideration were taken to be those species of moderate or high Nature Conservation Importance for which there was some indication of a potential effect as a result of the Proposed Development, which may be exacerbated cumulatively. However, no significant effects of the Proposed Development were identified, and all effects on all bird species were deemed to be of negligible significance. As such, the predicted in-isolation effects of the Proposed Development are considered to have no potential to contribute to cumulative effects and are therefore negligible across all species.

7.6.14. In conclusion, for all bird species, the cumulative effects of the Proposed Development in-combination with other projects in the NHZ are likely to be negligible.

7.7. Mitigation Measures

7.7.1. As there will be no significant effects on bird species mitigation is not required.

7.8. Residual Effects

7.8.1. As there was no requirement for mitigation, no significant residual effects have been identified.

7.9. Enhancement Measures

7.9.1. The following enhancement measures, are predicted to provide positive biodiversity enhancement for the benefit of bird species:

- Bird boxes will be installed on the outside of permanent buildings (e.g. substations) to encourage use by species such as common swift (*Apus apus*) and house martin (*Delichon urbicum*).
- Bird boxes will also be installed on suitable trees within woodland surrounding the BESS area. This will improve opportunity for habitation of notable and protected species that may be using the Site and surrounding area.
- A barn owl box will be installed in a suitable location near to open habitats north of the Site, where there is suitable barn owl foraging habitat. The nest box placement is likely to be on a tree at the northern end of the Site, north of proposed infrastructure.
- Planting of a native hedgerow boundary at the margins of the site with species including blackthorn (*Prunus spinosa*), broom (*Cytisus scoparius*), elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*) and dog rose (*Rosa canina*). By providing a variety of

native hedgerow species it would create a priority habitat within the site that would also provide shelter for nesting birds

7.10. Summary

7.10.1. It is concluded, overall, that the likely effects of the Proposed Development on all bird species are likely to be negligible.

7.11. References

Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D.S. (eds). (2007). The Birds of Scotland. The Scottish Ornithologists' Club, Aberlady.

Gibbons, D.W., Reid, J.B. & Chapman, R.A. (1993). The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991. T. & A.D. Poyser, London

Goodship, N.M. & Furness, R.W. (2022). Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. A report from MacArthur Green to NatureScot.

8 Cultural Heritage Desk Based Assessment

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8. Cultural Heritage Desk-Based Assessment

8.1. Non-Technical Summary

8.1.1. The archaeology and cultural heritage assessment considers potential direct and indirect physical impacts related to construction of the Proposed Development on the fabric of heritage assets within the Site. It also considers impacts on the settings of heritage assets within and outside the Site that could affect heritage assets' cultural significance.

8.1.2. A desk-based baseline assessment including a 'Stage 1' Setting Assessment was undertaken to identify known heritage assets and the potential for currently unrecorded heritage assets to be present within the Site, as well as assets in the wider landscape which may be impacted by the Proposed Development through changes to their setting.

8.1.3. The desk-based baseline assessment includes a Study Area that comprises a 2 km buffer zone beyond the proposed development area (Application Boundary), within which the archaeological and historical development of the site and surrounding area is discussed. In accordance with national and local planning policy and guidance, the possible impacts that the proposed development could have on known and potential below-ground archaeological remains within the Application Boundary are considered, and the setting of heritage assets is considered.

8.1.4. There are no designated heritage assets within the Application Boundary and three designated heritage assets within the 2 km Study Area (Figure 8.1 Designated Heritage Assets within the Study Area). These comprise Clach Clais an Tuire standing stone (SM441), Achvarasdal House Standing Stones (SM421) and Achvarasdal House Broch (SM514).

8.1.5. There are no non-designated heritage assets recorded by the Highland HER within the Application Boundary. There are 113 non-designated heritage assets within the Study Area (Figure 8.2 Non-Designated Heritage Assets within the Study Area). These are primarily located on the low-lying land to the north of the Application Boundary with only seven non-designated assets located across the moorland and plantation to the south. There are 51 non-designated assets related to prehistoric activity with hut circles and cairns the predominant asset types. Of the remaining non-designated assets, 53 are dated to the post-medieval period, mostly comprising enclosures, field boundaries and farmsteads. Nine of the non-designated assets are undated. As part of the assessment no additional heritage assets were identified.

8.1.6. Pre-application advice provided by The Highland Council (THC) indicated that the proposals had the potential to impact the setting of the scheduled monument: Clach Clais an Tuire, standing stone 1000m SE of Loanscorribest (SM441). In order to allow for an assessment of the level of impact the proposals would have on the setting of the monument THC requested a visualisation should be produced from the stone looking southwest between Creag Bheag

and Creag Mor (Cultural Heritage View Point (CHVP) 01). The visualisations (Chapter 5 – Landscape and Visual) supported the findings that there would be no visual change to the setting of the monument from construction of the BESS.

8.1.7. The Stage 1 setting assessment identified that the wider landscape setting contributed to the significance of 14 of the heritage assets within the Study Area. These had the potential to be subject to impact through change in their settings from the development. These comprised eight funerary cairns, five ritual monuments and one settlement asset.

8.1.8. This assessment found that the significance of the three scheduled monuments within the Study Area would not be affected as a result of visual changes within their setting resulting from the proposed BESS development. It was found that an adverse effect, through visual change within its setting of one non-designated assets (MHG738 Borag Knowe cairn). However, the construction of the substation Extension would not add significant change to the existing extant infrastructure in this location and therefore, this adverse effect is unlikely to be of such magnitude to warrant a refusal of consent for the proposed development. No further work is recommended in this regard.

8.1.9. The proposed BESS is planned to be constructed across an area of land that had previously been the construction compound during the development of the Limekiln Wind Farm and the Limekiln Wind Farm Extension. Access to the proposed BESS will also utilise existing access tracks constructed during the construction of the wind farm. Therefore, this assessment identifies that there is a nil potential for below ground archaeological remains to be present within the footprint of the proposed development from any period. As a results, no further archaeological mitigation is recommended during the construction of the facility.

8.1.10. It is not anticipated that the proposals to develop the BESS should represent a conflict with legislation or national or local planning policies. The likely development impacts are not considered sufficiently significant to warrant refusal of a planning application to develop the BESS. It is unlikely the local planning authority will require further archaeological investigation as a condition of consent.

Figure 8.1 Site plan showing the designated heritage assets within the study area

Figure 8.2 Site plan sowing the non-designated heritage assets within the study area

8.2. INTRODUCTION

Planning Background

8.2.1. The historic environment is defined as “the physical evidence for past human activity. It connects people with place, and with the traditions, stories, and memories associated with places and landscapes’ in ‘Our Past, Our Future: The Strategy for Scotland’s Historic Environment’ (2023, 10) and in National Planning Framework 4 (NPF4) as “the physical evidence for human activity that connects people with place, linked with the associations we can see, feel and understand” (Annex A – Glossary of Definitions). These documents present the Scottish Government’s strategy for the protection and promotion of the historic environment.

8.2.2. The Policy Intent of NPF4 Policy 7 is: “To protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places.”

8.2.3. This report describes and assesses the significance of known heritage assets and potential archaeological remains within the Application Boundary. It provides an assessment of the likely impact of the proposed development on the significance of heritage assets, including upon the contribution made by their setting, in order to identify potential historic environment planning constraints.

8.2.4. This approach is consistent with the requirements of national and local planning policies on the historic environment in the planning process (see Part 2).

Consultation

8.2.5. Pre-application advice was sought by the client from The Highland Council (Ref:24/04672/PREMAJ; 25 February 2025). The response from The Highland Council included advice related to built and cultural heritage.

8.2.6. It was stated in the response that:

The proposals have the potential to impact the setting of the scheduled monument: Clach Clais an Tuire, standing stone 1000m SE of Loanscorribest (SM441). The location of the BESS within the proposal's red line boundary suggests that it would be visible in views from the monument, approximately 1.3 km to the southwest.

In order allow for an assessment of the level of impact the proposals would have on the setting of the monument (Clach an Tuire standing stone – SM441), a visualisation should be produced from the stone looking southwest between Creag Bheag and Creag Mor. Ideally, this should be a photomontage, but a wireframe may suffice if views are currently obscured. Although the current forestry plantation obscures parts of this view, forestry is not considered as appropriate mitigation or screening in the assessment of setting impacts.

8.2.7. A scoping request for an Environmental Impact Assessment was submitted by Boralex (22 April 2025) to the Energy Consents Unit of the Scottish Government. In this request it was stated that:

The setting assessment (for Clach an Tuire standing stone) will form part of a cultural heritage desk-based assessment (this report) and heritage statement in support of the application. This report will take into account all relevant national and local planning regulation and guidance and will include consultation with all relevant stakeholders.

It is not anticipated that proposals to develop the site should represent a conflict with legislation or national or local planning policies relating to the historic environment. The likely development impacts are not considered sufficiently significant to warrant an EIA.

8.2.8. A screening opinion was received from Scottish Ministers (06 May 2025) in respect of a proposed application under section 36 of the Electricity Act 1989 (“the Electricity Act”) to

construct and operate a battery energy storage system. In the response the Scottish Ministers have adopted the opinion that the proposal does not constitute EIA development, and that the application submitted for this development does not require to be accompanied by an EIA report.

Site Location and Description

8.2.9. The proposed BESS facility is to be located on land previously used as a construction compound to facilitate the construction of Limekiln Wind Farm and Limekiln Wind Farm extension. The Application Boundary extends approximately 32 hectares (ha) with access taken from the A836, utilising the existing Limekiln Wind Farm access tracks. The Application Boundary for the site is shown in Figure 2.1.

8.2.10. Prior to the construction of the wind farm the land comprised areas of open moorland and commercial forestry. The Application Boundary is larger than the final development footprint. This is to allow flexibility in final design, which will be influenced by ongoing assessment work and feedback from consultation.

8.2.11. The site is rural in nature with a small number of neighbouring residential properties. The nearest residential properties include the village of Reay and New Reay 2 km to the north. At a wider topographical scale, the landscape comprises undulating moorland interspersed with commercial forestry. The main waterways across the area include the Sandside Burn to the west and the Achvarasdal Burn to the east, both of which flow into the Sandside Bay to the north.

8.3. Legislation, Policy And Guidance

Statutory Protection

8.3.1. Scheduled Monuments and Listed Buildings are protected by statute.

8.3.2. The relevant heritage legislation in the context of the present site is described in table 8.1 below.

Table 8.1 Historic Environment Statutory Legislation

Legislation	Key Issues
Historic Environment Scotland Act 2014	The Act defines the role of the public body, Historic Environment Scotland (HES), and the processes for the designation of heritage assets, consents and rights of appeal.
Ancient Monuments and Archaeological Areas Act 1979	It is a criminal offence to carry out any works on or near to a Scheduled Monument without Scheduled Monument Consent. Development must preserve in-situ protected archaeological remains and landscapes of acknowledged significance and protect their settings.

The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997	Provides for statutory protection of listed buildings and conservation areas. No physical works can be carried out in relation to a listed building and its curtilage without listed building consent. It introduces a requirement to have special regard to the desirability of preserving the building or its setting in considering any Development which may affect these. In conservation areas, the designation introduces general controls to conserve character and appearance within the conservation area.
Town and Country Planning (Scotland) Act 1997; Planning etc (Scotland) Act (Scotland) 2006	Establishes framework for determining planning applications, the role of the local planning authority and the role of Development (Structure and Local) Plans within the process.

National Planning Framework

8.3.3. NPF4 Part 1 A National Spatial Strategy for Scotland 2045 describes how the future spatial development of Scotland can contribute to planning outcomes. It shows where there will be opportunities for growth and regeneration, investment in the low carbon economy, environmental enhancement, and improved connections across the country.

8.3.4. Historic Environment Policy for Scotland (HEPS) defines the Historic Environment and Scottish Government Policy. It sets out the vision and key principles on how to care for and protect Scotland's historic environment including designations of ancient monuments, principles for scheduling and listing, contexts for conservation areas, marine protected areas, gardens and designated landscapes, historic battlefields and consents and advice. HEPS provides further policy direction to NPF4 and sets out high level policies and core principles for decision-making affecting the historic environment.

8.3.5. The Scottish Government's planning policies in relation to the historic environment are set out in NPF4 Part 2 National Planning Policy (The Scottish Government, February 2023) Policy 7: Historic assets and places

8.3.6. "Policy Principles include:

- *Policy Intent: To protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places.*
- *Policy Outcomes: The historic environment is valued, protected, and enhanced, supporting the transition to net zero and ensuring assets are resilient to current and future impacts of climate change; Redundant or neglected historic buildings are brought back into sustainable and productive uses; Recognise the social,*

environmental and economic value of the historic environment, to our economy and cultural identity.

- *Local Development Plans: LDPs, including through their spatial strategies, should support the sustainable management of the historic environment. They should identify, protect and enhance valued historic assets and places. "*

8.3.7. NPF4 Policy 7 applies these principles to designated and non-designated assets. Those relevant to the current assessment are as follows:

NPF4 – Part 2: Historic Assets and Places Policy 7

"a) Development proposals with a potentially significant impact on historic assets or places will be accompanied by an assessment which is based on an understanding of the cultural significance of the historic asset and/or place. The assessment should identify the likely visual or physical impact of any proposals for change, including cumulative effects and provide a sound basis for managing the impacts of change.

Proposals should also be informed by national policy and guidance on managing change in the historic environment, and information held within Historic Environment Records.

h) Development proposals affecting scheduled monuments will only be supported where:

i. direct impacts on the scheduled monument are avoided;

ii. significant adverse impacts on the integrity of the setting of a scheduled monument are avoided; or

iii. exceptional circumstances have been demonstrated to justify the impact on a scheduled monument and its setting and impacts on the monument or its setting have been minimised.

o) Non-designated historic environment assets, places and their setting should be protected and preserved in situ wherever feasible. Where there is potential for non-designated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeological resource at an early stage so that planning authorities can assess impacts. Historic buildings may also have archaeological significance which is not understood and may require assessment.

Where impacts cannot be avoided, they should be minimised. Where it has been demonstrated that avoidance or retention is not possible, excavation, recording, analysis, archiving, publication and activities to provide public benefit may be required through the use of conditions or legal/planning obligations.

When new archaeological discoveries are made during the course of development works, they must be reported to the planning authority to enable agreement on appropriate inspection, recording and mitigation measures."

Local Planning Policy

8.3.8. The Highland Council are currently preparing a new Local Development Plan for the Highlands'. The local historic environment policies relevant to this assessment can be found

in the Highland Local Development Plan, which was formally adopted in 20161. The relevant policies are;

Policy 57 Natural, Built and Cultural Heritage

8.3.9. This states:

'All development proposals will be assessed taking into account the level of importance and type of heritage features, the form and scale of the development, and any impact on the feature and its setting, in the context of the policy framework. The following criteria will also apply:

1. For features of local/regional importance we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource.

2. For features of national importance, we will allow developments that can be shown not to compromise the natural environment, amenity and heritage resource. Where there may be any significant adverse effects, these must be clearly outweighed by social or economic benefits of national importance. It must also be shown that the development will support communities in fragile areas who are having difficulties in keeping their population and services.

3. For features of international importance developments likely to have a significant effect on a site, either alone or in combination with other plans or projects, and which are not directly connected with or necessary to the management of the site for nature conservation will be subject to an appropriate assessment. Where we are unable to ascertain that a proposal will not adversely affect the integrity of a site, we will only allow development if there is no alternative solution and there are imperative reasons of overriding public interest, including those of a social or economic nature. Where a priority habitat or species (as defined in Annex 1 of the Habitats Directive) would be affected, development in such circumstances will only be allowed if the reasons for overriding public interest relate to human health, public safety, beneficial consequences of primary importance for the environment, or other reasons subject to the opinion of the European Commission (via Scottish Ministers). Where we are unable to ascertain that a proposal will not adversely affect the integrity of a site, the proposal will not be in accordance with the development plan within the meaning of Section 25(1) of the Town and Country Planning (Scotland) Act 1997.

8.3.10. In due course the Council also intends to adopt the Supplementary Guidance on the Highland Historic Environment Strategy. The main principles of this guidance will ensure that:

[1] https://www.highland.gov.uk/info/178/development_plans/199/highland-wide_local_development_plan

- Future developments take account of the historic environment and that they are of a design and quality to enhance the historic environment bringing both economic and social benefits;
- It sets a proactive, consistent approach to the protection of the historic environment.

Guidance

8.3.11. Standards and Guidance published by the Chartered Institute for Archaeologists (CIfA) have been followed in preparing this assessment, in particular the 'Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment' (2014, updated 2020), the 'Standard and guidance for historic environment desk-based assessment' (2014, updated 2017 & 2020) and Code of Conduct (2014, revised 20192).

8.3.12. HES also provides guidance on how to apply NPF4 Policy 7 in a series of documents entitled 'Managing Change in the Historic Environment' (MCHE). These provide guidance to planning authorities and stakeholders regarding key issues relating to development, the planning process, and key issues pertaining to the historic environment.

8.3.13. Most relevant to this assessment are the guidance notes covering Setting (June 2016 updated 2020).

8.3.14. HES published Designation Policy and Selection Guidance (DPSG, 2019) to accompany HEPS. DPSG outlines the policy and selection guidance used by HES when designating sites and places of national importance.

8.3.15. Planning Advice Note (PAN) 2/2011: Planning and Archaeology provides local government officers with technical advice to planning authorities and developers on dealing with archaeological remains. Among other issues it considers the balance in planning decisions between the preservation in situ of archaeological remains and the benefits of development; setting; the circumstances under which developers can be required to provide further information, in the form of a field evaluation to allow planning authorities to reach a decision; and measures that can be taken to mitigate adverse impacts.

8.3.16. This DBA has also been prepared with reference to IEMA, IHBC and CIfA's July 2021 publication Principles of Cultural Heritage Impact Assessment in the UK3. This document

2 https://www.archaeologists.net/sites/default/files/Code%20of%20conduct%20revOct2019_0.pdf
3 https://www.archaeologists.net/sites/default/files/j30361_iema_principlesofchia_v8.pdf

presents the principles of and suggests good practice for assessment of the impact of a development proposal on cultural heritage assets.

Professional Standards and Acknowledgements

8.3.17. Headland Archaeology (UK) is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA), an audited status which confirms that all work is carried out in accordance with the highest standards of the profession.

8.3.18. Headland Archaeology (UK), as part of the RSK Group, is recognised by the Institute of Historic Building Conservation (IHBC) under their 'Historic Environment Service Provider Recognition' scheme. This quality assurance standard acknowledges that RSK works to the conservation standards of the IHBC, the UK's lead body for built and historic environment practitioners and specialists.

8.3.19. Headland Archaeology (UK) operates a quality management system to help ensure all projects are managed in a professional and transparent manner, which enables it to qualify for ISO 9001 (Quality Management), ISO 45001 (health and safety management) and ISO 14001 (environmental management).

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8.4. Aims and Objectives

8.4.1. The aim of this DBA is to inform determination of a planning application for development of a BESS facility and an extension to the existing Limekiln Wind Farm Substation, in relation to its likely impact on the historic environment. The assessment aims to identify all known heritage assets potentially affected by the proposed development, and the potential for currently unknown heritage assets.

8.4.2. The purpose is to gain an understanding of the historic environment resource to formulate an assessment of the potential for heritage assets to survive within the Application Boundary, their significance, and strategies for further evaluation, mitigation or management as appropriate.

8.4.3. The CIfA's Standard and Guidance for Historic Environment Desk-Based Assessment (20204) defines a DBA as '…a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed

4 https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf

research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the Study Area, including appropriate consideration of the settings of heritage assets and, in England, the nature, extent and quality of the known or potential archaeological, historic, architectural and artistic interest. Significance is to be judged in a local, regional, national or international context as appropriate.'

8.4.4. NPF4 Policy 7.a requires that "Development proposals with a potentially significant impact on historic assets or places will be accompanied by an assessment which is based on an understanding of the cultural significance of the historic asset and/or place." This DBA therefore determines, as far as is reasonably possible from existing records, the nature, extent and significance of the historic environment within a specified area, and the impact of the proposed development on the significance of the historic environment or will identify the need for further evaluation to do so.

8.4.5. The objectives are therefore to:

- Collate all available written, graphic, photographic and electronic information relevant to the Application Boundary;
- Describe the nature, extent and significance and importance of the historic environment within the area potentially affected by the development, identifying any uncertainties in existing knowledge;
- Determine the potential for previously unknown archaeological remains;

  Identify heritage assets beyond the Application Boundary that may be affected by development within their setting, to describe their significance and the contribution made by their setting, and assess how this significance may be affected by the proposed development; and
- Understand and identify the likelihood that the planning authority may require further investigations.

8.5. Methodology

Stages of Assessment

8.5.1. This historic environment impact assessment is carried out in the following stages:

- Definition of baseline conditions, comprising desk-based study and visits to heritage assets if necessary, leading to the identification of the cultural significance and importance of heritage assets potentially affected;
- Assessment of impacts (physical (direct/indirect) and setting) of the proposed development on cultural significance of heritage assets; and
- Proposal of further assessment and/or mitigation measures to minimise adverse impacts.

Identification of Heritage Assets

Desk Based Assessment and Field Visits

Study Area

8.5.2. The Study Area for this assessment comprises a 2 km buffer surrounding the Application Boundary, within which the archaeological and historical development of the site and surrounding area has been considered for the purposes of assessment of archaeological potential.

Data Sources

8.5.3. The assessment has been based on a study of all readily available documentary sources, following the CIfA Standards and Guidance. The following sources of information were referred to:

- Designation data downloaded from the Historic Environment Scotland website in April 2025;
- Historic Environment Record (HER) data, digital extract received from Highland Council HER; Downloaded March 2025
- The National Record of the Historic Environment (NRHE), including the Canmore database and associated photographs, prints/drawings and manuscripts held on the trove.scot platform managed by HES;
- Historic Landuse Assessment data, viewed through the HLAMap website;
- Historic maps and plans held the National Library of Scotland;
- Geological data available online from the British Geological Survey5;
- Readily available published sources and unpublished archaeological reports.
- A zone of theoretical visibility (ZTV).

8.5.4. Heritage assets within the Study Area are shown on Figures 8.1 and 8.2, with detailed descriptions compiled in a Gazetteer (Appendix 8.1).

8.5.5. Designated heritage assets are labelled with the reference number assigned to them by HES (prefixed SM for Scheduled Monuments, and LB for Listed Buildings); non-designated assets

5 http://mapapps.bgs.ac.uk/geologyofbritain/home.html

are labelled with the reference number in the HER or the NRHE. Previously unrecorded heritage assets within the Application Boundary have been assigned a number (prefixed HA for Heritage Asset). A single asset number can refer to a group of related features, which may be recorded separately in the HER and other data sources.

Field Visit

8.5.6. A field visit was undertaken on 22nd May 2025, during which notes were made regarding site characteristics, any visible archaeology and geographical/geological features which may have a bearing on previous land use and archaeological survival, as well as those which may constrain subsequent archaeological investigation.

8.5.7. Records were made regarding extant archaeological features, such as earthworks or structural remains, any negative features, local topography and aspect, exposed geology, soils, watercourses, health and safety considerations, surface finds, and any other relevant information.

Historic Map Regression

8.5.8. The historic Ordnance Survey (OS) mapping sequence corresponding with the Application Boundary was consulted to collect information on former land use and development throughout the later historic periods.

Potential for Unknown Heritage Assets

8.5.9. The likelihood that undiscovered heritage assets may be present within the Application Boundary is referred to as archaeological potential. Overall levels of potential can be assigned to different areas of the Application Boundary, while recognising that the archaeological potential of any area will relate to particular historical periods and types of evidence.

8.5.10. The following factors are considered in assessing archaeological potential:

- The distribution and character of known archaeological remains in the vicinity, based principally on an appraisal of data in the HER;
- The history of archaeological fieldwork and research in the surrounding area, which may give an indication of the reliability and completeness of existing records;
- Environmental factors such as geology, topography and soil quality, which would have influenced land-use in the past and can therefore be used to predict the distribution of archaeological remains;
- Land-use factors affecting the survival of archaeological remains, such as ploughing or commercial forestry planting; and
- Factors affecting the visibility of archaeological remains, which may relate to both environment and land-use, such as soils and geology (which may be more or less conducive to formation of cropmarks), arable cultivation (which has potential to show cropmarks and create surface artefact scatters), vegetation, which can conceal

upstanding features, and superficial deposits such as peat and alluvium which can mask archaeological features.

8.5.11. The likelihood that the Application Boundary may contain undiscovered heritage assets, their likely location and potential density, and their likely level of importance is assessed, described, and justified.

Limitations of Baseline Data

8.5.12. Information held by public data sources is generally considered to be reliable; however, the following general points are noted:

- Documentary sources are rare before the medieval period;
- Whilst it is accepted that historic documents may be biased depending on the author, with content seen through the lens of context, wherever such documentary sources are used in assessing archaeological potential professional judgment is used in their interpretation in that the functionality of the document is considered;
- HER records can be limited because opportunities for research, fieldwork and discovery depend on the situation of commercial development and occasional research projects, rather than the result of a more structured research framework. A lack of data within the HER records does not necessarily equal an absence of archaeology;
- Where archaeological sites have been identified solely from aerial imagery without confirmation from archaeological excavation or supporting evidence in the form of find-spots for example, it is possible the interpretation may be revised in the light of further investigation;
- The significance of sites can be difficult to identify from HER records, depending on the accuracy and reliability of the original source;
- There can often be a lack of dating evidence for archaeological sites; and
- Any archaeological field visit has inherent limitations, primarily because archaeological remains below ground level may have no surface indicators.

Terminology – ‘Significance’ and ‘Importance’

Cultural Significance

8.5.13. Cultural heritage impact assessment is concerned with effects on cultural significance, which is a quality that applies to all heritage assets, and as defined by Historic Environment Scotland (Environmental Impact Assessment Handbook, NatureScot & HES 2018, v5 Appendix 1 page 175), relates to the ways in which a heritage asset is valued both by specialists and the public. The cultural significance of a heritage asset will derive from factors including the asset’s fabric, setting, context and associations. This use of the word ‘significance’, referring to the range of values attached to an asset, should not be confused with the unrelated usage in EIA where the significance of an effect reflects the weight that should be attached to it in a planning decision.

8.5.14. Cultural significance is assessed in relation to the criteria in DPSG Annexes 1-6, which are intended primarily to inform decisions regarding heritage designations but may also be applied more generally in identifying the 'special characteristics' of a heritage asset, which contribute to its significance and should be protected, conserved and enhanced according to the NPF4 Policy Principles. DPSG Annex 1 is widely applicable in assessing the cultural significance of archaeological sites and monuments, for instance, while the criteria in Annex 2 can be used in defining the architectural or historic interest of buildings, whether listed or not. Cultural significance of assets is considered in terms described in DPSG Annex 1:

- **Intrinsic Characteristics** - those inherent in the monument i.e., "*how the physical remains of a site or place contribute to our knowledge of the past*";
- **Contextual Characteristics** – those relating to the monument's place in the landscape or in the body of existing knowledge i.e., "*how a site or place relates to its surroundings and/or to our existing knowledge of the past*"; and
- **Associative Characteristics** – subjective associations, including those with current or past aesthetic preferences i.e., "*how a site or place relates to people, practices, events and/or historic and social movements*".

Assessment of Importance

8.5.15. Relative importance of each identified heritage asset potentially affected by the proposed development has been determined to provide a framework for comparison between different heritage assets and to inform subsequent stages of archaeological assessment and the development of any appropriate mitigation which may be required (See Table 8.2 below).

8.5.16. The importance of a heritage asset is the overall value assigned to it based on its cultural significance, reflecting its statutory designation or, in the case of non-designated assets, the professional judgement of the assessor. Heritage assets of national importance and international importance are assigned a high and very high level respectively. Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas are, by definition, of national importance.

8.5.17. The criterion for Listing is that a building is of 'special architectural or historic interest'; following DPSG Annex 2.19, Category A refers to 'outstanding examples of a particular period, style or building type', Category B to 'major examples of a particular period, style or building type', and Category C to 'representative examples of a particular period, style or building type'.

8.5.18. Heritage Assets are defined as "Features, buildings or places that provide physical evidence of past human activity identified as being of sufficient value to this and future generations to merit consideration in the planning system" (NatureScot & HES 2018, Environmental Impact Assessment Handbook, v5, p.122). Thus, any feature which does not merit consideration in planning decisions due to its cultural significance may be said to have negligible heritage importance; in general, such features are not considered as heritage assets and are excluded from the assessment.

8.5.19. Heritage assets for which a level of importance cannot be defined based on current information are defined as 'Uncertain' Importance.

Table 8.2 Criteria for Assessing the Importance of Heritage Assets

Importance of the Asset	Criteria
Very High (International)	World Heritage Sites and other assets of equal international importance, that contribute to international research objectives
High (National)	Scheduled Monuments, Category A Listed Buildings, Inventory Gardens and Designed Landscapes, Inventory Battlefields, Historic Marine Protected Areas, some conservation areas and non-designated assets that meet the relevant criteria for designation in the opinion of the assessor. Category B or C-listed buildings where the existing designation does not adequately reflect their value, in the opinion of the assessor, and other assets of equivalent importance that contribute to national research objectives
Medium (National or Regional)	Category B Listed Buildings, some conservation areas and non-designated assets of similar value in the opinion of the assessor. Category C-listed buildings where the existing designation does not adequately reflect their value, in the opinion of the assessor, and other assets that contribute to regional research objectives
Low (Local)	Category C Listed Buildings and locally listed (non-designated) heritage assets, except where their particular characteristics merit a higher level of importance. Non-designated heritage assets of Local importance, including assets that may already be partially damaged
Negligible	Identified historic remains of no importance in planning considerations, or heritage assets and findspots that have already been removed or destroyed (i.e. 'site of') (e.g. through quarrying or archaeological excavation)
Unknown / Uncertain	Heritage assets for which a level of importance cannot be defined on current information

Source: NatureScot & HES 2018, Environmental Impact Assessment Handbook, v5 Appendix 1, Figure 2

8.5.20. The importance of heritage assets that may be affected by the proposed development is identified in the DBA's Impact Assessment section and summarised in the Gazetteer (Appendix 8.1).

Impact Assessment

8.5.21. Impacts of the proposed development on the historic environment can arise through direct/indirect physical impacts, or impacts through change within their setting:

- Direct physical impacts describe those activities of the proposed development that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works and will only occur within the Application Boundary.
- Indirect impacts describe secondary processes, triggered by the proposed development, that lead to the degradation or preservation of heritage assets. For example, changes to hydrology may affect archaeological preservation; or changes to the setting of a building may affect the viability of its current use and thus lead to dereliction. May occur within or outwith the Application Boundary.
- An impact on the setting of a heritage asset occurs when the presence of the proposed development changes the surroundings of a heritage asset in such a way that it affects (beneficially or adversely) the cultural significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to lead to significant effects during the prolonged operational stage of the development. May occur within or outwith the Application Boundary.

8.5.22. Identified impacts upon heritage assets for which a level of importance cannot be defined based on current information are defined as ‘Uncertain’. In accordance with NPF4 Policy 7.o (The Scottish Government, February 2023), where there is potential for non-designated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeological resource at an early stage so that planning authorities can assess impacts.

8.5.23. In all cases conclusions will be expressed in terms of the relevant Legislation and/or Policy tests.

Physical Impacts

8.5.24. Direct or indirect impacts on known or unknown heritage assets are discussed in terms of the risk that an impact could occur. The level of risk depends on the location of known heritage assets, or the level of archaeological potential, in comparison with the physical location, nature and scale of disturbance associated with proposed construction activities in different areas of the Application Boundary.

Setting Effects

8.5.25. The special characteristics which contribute to an asset’s cultural significance may include elements of its setting. Setting is defined in ‘Managing Change in the Historic Environment: Setting’ (HES 2016 updated 2020, Section 1) as “the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced”.

8.5.26. NPF4 does not define 'integrity' in the context of Policy 7.h, therefore for the purposes of the assessment, HES recommend that the following shared definition for the concept of integrity of setting is used: 'changes to factors of setting that contribute to cultural significance such that the understanding, appreciation and experience of an asset are not adequately retained will affect the integrity of setting.'

8.5.27. Visual impacts are most commonly encountered but other introduced environmental factors can affect setting such as noise, light or air quality. Setting impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to lead to substantial harm during the prolonged operational life of the development.

8.5.28. The setting of a heritage asset is defined and analysed according to Stage 2 of the three-stage approach promoted in 'MCHE: Setting', with reference to factors listed on pages 9-10. The relevance of these factors to the understanding, appreciation and experience of the asset determines how, and to what extent, an asset's cultural significance derives from its setting. All heritage assets have settings; however, in some cases, setting may contribute very little to the asset's significance, or only certain elements of the setting may be relevant.

8.5.29. Heritage assets screened as sensitive to visual change were visited and assessed with a view to potential setting impacts. The field visit enabled assessment of likely impacts of the proposed development: locations which would remain unaffected, locations which have some visibility but that is minimal and does not affect the baseline condition, and locations where visibility is possible/prominent.

8.5.30. The scope of this DBA is limited to identifying where no substantial setting impacts are anticipated requiring no further works, or where substantial setting impacts are anticipated, to identify which heritage assets are considered likely to be affected, and to make recommendations for proportionate further detailed assessments.

Mitigation: Minimising Harm

8.5.31. Assessment of impacts is an iterative part of the design process. For any identified effect the preferred mitigation option is always to avoid or reduce effects through design, or through precautionary measures such as fencing off heritage assets during construction works to avoid accidental direct effects.

8.5.32. In accordance with NPF4 Policy 7.o (The Scottish Government, February 2023), known heritage assets and their settings should be preserved in situ wherever possible.

8.6. Results

Overview Of The Historic Environment

8.6.1. The full list of known heritage assets is presented in the gazetteer (Appendix 8.1), and the location of each is shown on Figures 8.1 and 8.2.

Application Boundary

8.6.2. There are no heritage assets within the Application Boundary.

Study Area

8.6.3. There are no Inventory Garden and Designed Landscapes (IGDL), Inventory Battlefields (BF), Listed Buildings (LB) or Conservation Areas (CA) within the Application Boundary or Study Area. The closest IGDL to the Application Boundary lies c. 30 km to the east at Barrogill Castle (GDL00096). The closest recorded BF is located 80 km to the south, namely the Battle of Carbisdale (BTL19). The nearest LBs are in the village of Reay just beyond the 2 km study area. These comprise the Category A Reay Parish Church (LB4992) and the Category B listed Reayburn House (LB17592). There are also further listed buildings at New Reay 2.5 km to the north and at Sandside House on the coast 3 km north off the Application Boundary. The closest CA is Thurso (CA125), 15 km east of the Application Boundary.

8.6.4. There are three scheduled monuments within the Study Area. These comprise two standing stones (SM441 Clach Clais an Tuire and SM421 Achvarasdal House and a Broch (SM514 Achvarasdal House).

8.6.5. There are 113 non-designated heritage assets within the Study Area. These are primarily located to the low-lying land across the northern half of the study area with only seven known assets located across the higher areas of moorland and plantation to the south. There are 51 non-designated assets related to Prehistoric occupation of the area with hut circles and cairns the predominant two asset types. Of the remaining non-designated assets, 53 are dated to the post-medieval period, mostly comprising enclosures, field boundaries and farmsteads. Nine of the non-designated assets are undated.

8.6.6. The significance of these assets is discussed by period in the Assessment of Heritage Significance (Section 6) below.

Geology and Topography

8.6.7. The underlying solid geology is recorded by BGS as Portskerra Psammite Formation, a metamorphic bedrock formed between 1000 and 541 million years ago between the Tonian and Ediacaran periods6. Superficial deposits are recorded as large areas of peat plus a mix of hummocky glacial deposits including sand, gravel and boulders. Sedimentary superficial deposit formed between 2.588 million and 11.8 thousand years ago during the Quaternary period.

6 BGS, http://mapapps.bgs.ac.uk/ geologyofbritain/ home.html viewed 13/05/2025

8.6.8. The Application Boundary is situated within an undulating landscape leading down to a relatively low-lying flat landscape as it reaches the coastline to the north. The highest point of the Application Boundary lies at 125 m AOD close to Cnocann Dubh nan Eun (128 m AOD). The main waterways across the area include the Sandside Burn to the west and the Achvarasdal Burn to the east both of which flow into the Sandside Bay to the north.

Historic Landscape Assessment (HLA)

8.6.9. Historic Landscape Assessment of the study area (https://map.hlamap.org.uk) defines the Application Boundary as: Plantation comprising densely planted, single age, coniferous species, within clearly defined straight boundaries, with regular, linear firebreaks. No past use of the area is given, though prior to planting of the conifers the whole Application Boundary would have been open moorland as depicted on the early Ordnance Survey (OS) mapping. Two small areas of traditional peat cutting are recorded. Cutting peat used to be the main way of gathering fuel across Scotland in areas where there were few trees, particularly in the north and west of the country. As well as the cuttings, various other features are associated with this land use. For instance, in some area's peat stands were built alongside the cuttings for stacking and drying the cut wet blocks. Tracks were also created across the moorland to bring the dried peats out by pony.

8.6.10. The Application Boundary is currently part of the recently operational Limekiln Wind Farm, comprising 24 turbines across c.7000 ha of moorland and forestry.

Previous investigations

8.6.11. Within the Study Area there are 12 archaeological events recorded in the Highland HER. Eight are archaeological studies related to the construction of Limekilns Wind Farm and the Limekilns Wind Farm Extension. These include desk-based assessments, walkovers and watching briefs during the wind farm's construction. This work identified several previously unrecorded heritage assets across the Study Area. The watching brief also recorded several archaeological features within the wind farm development. The majority of these were related to post-medieval draining of the moorland although one feature provided evidence of early Bronze Age activity in the area. This comprised a spread of burnt material that provided a date range between 2466 cal BC and 2297 cal BC. Although little is known about the nature of the deposit, the evidence implies occupation and landscape exploitation in the vicinity.

8.6.12. The remaining archaeological events in the Study Area comprised a walkover survey (EHG6309) and watching brief (EHG6310) in advance of the Dounreay 33kV 7L5 and 8L5 rebuild project, a pre-afforestation survey at Achrasker (EHG375) and a photographic survey of a barn at Borlum House (EHG2960). The walkover and watching brief at Dounreay recorded no previously unknown heritage assets and no archaeological features. The pre-afforestation survey at Achrasker recorded a cairnfield and the remains of a farmstead and its associated dykes and cultivation remains. The photographic survey of the barn at Borlum House was carried out to comply with a condition on planning consent for conversion to a shop.

Field Visit

8.6.13. The field visit took place on 22nd May 2025 in clear and dry conditions. Heritage assets recorded on the Highland Council HER were visited to assess their level of preservation.

8.6.14. The whole Application Boundary has previously been developed as part of the Limekiln Wind Farm and Limekiln Wind Farm extension development. The location for the proposed BESS facility is on land previously utilised for the construction compound to facilitate the construction of the wind farm. The surrounding landscape was predominantly forestry plantation with limited access to areas of open moorland.

Archaeological and Historical Narrative

Prehistoric Periods (c.8,000 – 400 CE)

8.6.15. Settlements within the Mesolithic period (c.8,000 – 4,000 BCE) were rarely permanent and varied greatly, from larger multi-activity locations to short-lived specialist sites which may only have been used for as little as a day or a matter of hours. Lithic scatters are the most visible sites, due to the durable nature of the artefacts. But all lithic scatters represent archaeology that has been disturbed, and few have been comprehensively investigated. They are often an indication of locations that have been used for millennia, as well as into later periods, so that detailed interpretation is difficult. Shell middens have received much attention, in part due to their preservation and visibility, but in fact they are relatively rare in the Scottish Mesolithic. They vary in size, and while most are coastal, they can occasionally be found inland. Many are in locations that show long periods of use, even into the Neolithic or Bronze Age.

8.6.16. The archaeological record for this area of Caithness is relatively rich with assets dating from the Prehistoric to the early Modern period present. The Neolithic to Bronze Age (4000 – 900 BCE) is represented by chambered tombs (SM444, SM471, SM476, SM489, SM498 and SM500), funerary cairns (SM437, SM458, SM470 and SM5406), standing stones (SM428, SM478, SM441 and SM421) and stone circles (SM427). Also possibly dating to the Bronze Age are an asset type – stone rows – unique to Caithness and the east of Sutherland. The site type is composed of multiple rows of small, upright stones commonly radiating in a fan shape from a cairn (SM2386). There is also a scheduled example of a stone setting (SM426).

8.6.17. Assets of broadly Prehistoric date recorded within the Study Area include the scheduled monuments Clach Clais an Tuire standing stone (SM441), located 1.5 km to the east of the Application Boundary and Achvarasdal House, two stones N of (SM421), 2 km to the north-east of the Application Boundary. There are also 51 non-designated heritage assets of Prehistoric date within the Study Area. These comprise a mix of funerary and ritual features, such as cairns, standing stones and stone alignments, as well as settlement activity in the form of hut circles, burnt mounds, enclosures, field systems and cairnfields. Most of these assets have not been scientifically dated and may represent later Prehistoric settlement activity related to the Iron Age (900 BCE - .400 CE).

8.6.18. The Iron Age in Caithness is primarily represented by brochs (including SM492, SM513, SM514, SM562 and SM564). These structures are stone-built towers typically with a stairwell and intra-mural chambers built within the wall thickness. The exact function of brochs remains open to debate but the nature of these structures clearly suggests that defence was a priority. Caithness has the highest concentration of brochs in Scotland; these large dry-stone towers are commonly located on top of natural mounds. One broch is recorded within the Study Area: Achvarasdal House, broch 65m NE of (SM514), located 2 km north-east of the Application Boundary. Additionally, it is possible that at least some of the hut circles, enclosures and field systems in the study area date to this period.

8.6.19. Most of this Prehistoric activity is recorded across the more accessible fertile areas of land bounded between the higher moorland areas to the south and the coastline to the north. Whether this anomaly is a result of recording bias, based on the idea that the assets located across the more accessible areas of farmland were more likely to have been recorded, has not been fully explored. At face value, the spread of the known Prehistoric assets, covering both settlement and ritual activity, does seem to utilise the more accessible low-lying areas of the landscape. Based on the known spread of assets, it could be argued that it is this landscape area that is of more relevance in relation to the significance of assets in cases where the wider landscape contributes to the significance of the asset.

Historic Periods (400 CE – Present)

8.6.20. Dating to the early medieval period, Pictish inscribed stones such as SM616 and SM5299 located within wider area testify to Pictish cultural activity in the area in the last quarter of the first millennium AD (400 CE – 900 CE). There is limited evidence of settlement during this period, although it is possible that some of the Iron Age sites continued into the early historic period. There are no known sites of this date within the Study Area.

8.6.21. Dounreay Castle (SM6401) is a late medieval castle dating to the late 16th century. This castle was built in the style of the Lowland Scots castles rather than the more typical Highland style castle. As such this castle reflects the influence that the Lowland Scots exerted here at this time and is a symbol of the wealth of some of the larger estates of Caithness during the medieval period (900 CE – 1600 CE). The medieval period is also represented by Reay burial ground, old church and cross slab (SM615); the cross slab is believed to date to the 9th – 10th century.

8.6.22. Evidence for the Vikings in Caithness is largely concentrated along the coast. In the area just beyond the Study Area Viking burials were recovered in the early 20th century in the sand dunes at Reay. This set of burials is the largest concentration of Viking burials recorded on mainland Scotland.

8.6.23. From the Post-medieval period through to the early 19th century, the inland glens and straths of Caithness were populous with communities of farmsteads and townships farming the land. Outlying these settlements in more remote areas small shielings related to summer pastoral activity were commonly used. with farmstead, enclosures, dykes and sheepfolds represented within the Study Area.

8.6.24. The Sandside Estate clearances took place in the 1830s. This period saw the inland glens and straths cleared of their densely populated farming settlements with the population being moved out to the coast to make way for the adoption of large-scale sheep farming. These clearances left behind a legacy of abandoned remains of townships, farmsteads and shielings, many of which are marked on both Roy's Military map of the Highlands (1752-55) and the early OS (1877 and 1907). There are 53 non-designated heritage assets within the study area that represent the post-medieval settlement of the area.

8.6.25. Large scale sheep farming subsequently gave way to the creation of sporting estates and the development of extensive plantation forestry. To this day these remain the principal land-uses for the inner straths of Caithness, whilst the coastal fringe of this part of Caithness has been dominated by the Dounreay Nuclear Plant and the employment and infrastructure that this large industry has brought to the area.

OS name book

8.6.26. Additional information on several of the features noted is available in the OS name book compiled in this area between 1871 and 1873.

***Picts House at Big Keoltag**: "Very little of this one remains, to be seen, as the greater part of it has been removed and nearly all the stones carried away, many years ago. None of my authorities can tell, whether anything was found in it or not. Situated on the Summet (sic) of Big Keoltag."*

8.6.27. Big Keoltag is within the study area to the north of the Application Boundary and includes HER MHG1615.

***Milton**: "Is a small district having 6 or 7 small crofts in it situated between Borlum and Achvaresdale Cottage, none of the dwellings is in very good repair, the property of His grace the Duke of Portland."*

8.6.28. Milton now appears as a scatter of buildings forming a single farm with all the structures depicted still visible on the ground (MHG17820, MHG35639, MHG13499 and MHG37237).

***Creagan Well:** "Is a fine spring well situated close to a small rocky hillock about 20 chains east of Borlum it is well known by this name in the district round about where it is the property of His grace the Duke of Portland."*

8.6.29. This well is situated just to the south west of two structures (part of MHG17820) noted as roofless on the map but these are not mentioned.

***Borag Knowe:** "A small hillock well known by this name situated about ten chains North of Claperon. the property of His grace the Duke of Portland."*

8.6.30. This mound has a prominent Prehistoric enclosure (MHG39408) and hut circle which was clearly not noted at the time of making the map.

Aryleive: *"This name applies to a piece of Green, Rough, pasture, part of which appears to have been, at one time, in cultivation. There is a lime Kiln at this place, in which lime is made for the land. The Stone is taken out of a quarry quite close to it. The property of the Duke of Portland."*

8.6.31. This shows the kiln and quarry (MHG 22039) were in use in the late 1800's as well as highlighting that at least some of the area around may have been cultivated.

8.6.32. Other records are all of natural features.

Statistical Accounts

8.6.33. The statistical accounts for the parish of Reay in Caithness and Sutherland were consulted for reference to relevant features.

8.6.34. The old account was written by David Mackay (1793). Although Sandside bay is mentioned several times along with the quarrying of limestone, nothing relevant to the site is mentioned and the only antiquity or archaeological monument mentioned is Knock Urray (MHG2517).

8.6.35. The new account was written by Finlay Cook (1845). This also mentions Knock Urray along with some stone built remains apparently exposed during a flood between Reay and the shore. It seems some pottery was also found with these structures but that they were robbed out for the good quality stone. A mineral spring is mentioned close to Helshetter (MHG25104), whose waters are compared to the spa at Strathpeffer. This well is most likely the 'White Well' noted on modern mapping at NC 96614 62805. Several limestone quarries are mentioned although these appear to be well to the north of the Application Boundary. There is also a section in the new account on antiquities that mentions chapels, brochs and a fort in the area.

Disturbance

8.6.36. The proposed BESS development area and the access tracks are within land areas previously disturbed and utilised during the construction of Limekiln Wind Farm and the Limekiln Wind Farm Extension. In particular the location of the proposed BESS is within an area that had formerly been the location of a large temporary compound. The site visit confirmed that the proposed area of the BESS was covered in a rubble stone surface. The construction of this large compound area will have truncated any known or potential archaeological remains.

8.6.37. Prior to the construction of the wind farm the Application Boundary had been part of the commercial plantation. The likelihood is that this would also have disturbed and likely removed any potential archaeology in the areas of plantation.

8.6.38. Based on the past disturbance of the area there is assessed a nil potential for previously unknown remains of any period to be encountered within the Application Boundary.

8.7. Statement of Significance and Importance

Known and potential heritage assets within the Application Boundary

Known historic assets within the Application Boundary

8.7.1. There are no known designated or non-designated heritage assets within the Application Boundary.

8.7.2. As stated above (Section 5.7), the proposed BESS will be located across an area that had previously been in use as a temporary compound during the construction of Limekilns Wind Farm and Limekilns Wind Farm Extension. The associated Substation Extension will occupy land adjacent to the existing wind farm Substation and access will utilise existing wind farm tracks. The underground cabling will run along the Core Path and will have a minimal negative impact on the ground.

8.7.3. The previous disturbance of these areas has resulted in there being a nil potential for archaeological remains as a result of the construction of the proposed BESS, associated substation extension and ancillary works.

Setting of Heritage Assets

Screening

8.7.4. The gazetteer in Appendix 8.1 presents the results of a screening exercise to identify baseline heritage assets with the potential for adverse impacts as a result of the proposed development within their setting. The Zone of Theoretical Visibility within the Landscape and Visual Report presents the results of the ZTV in relation to SM441 Clach Clais an Tuire standing stone. A specific photomontage within the Landscape and Visual Report presents the results of visualisations in relation to SM441 Clach Clais an Tuire standing stone.

8.7.5. Consideration of significance, and the contribution of setting to significance (such as significant sightlines and vistas, notable open spaces, and prominent landmarks), is presented for heritage assets within the Study Area.

8.7.6. Only assets where it was assessed that the wider landscape contributed to significance have been considered for further detailed assessment in this report. The assessment of these assets has considered whether it is likely that their cultural significance could be harmed through development within its setting.

Assessment of Significance and Contribution made by Setting

Designated Heritage Assets

8.7.7. All three designated heritage assets within the Study Area had the potential to be subject to impact through change in their settings from the proposed development.

SM441 Clach Clais an Tuire standing stone

8.7.8. As a monument type, standing stones are poorly understood but the Scottish Archaeological Research Framework identifies them along with stone circles, stone rows and burial cairns as monuments that provide information about the nature of belief systems and associated ritual activity. It is suggested that many of these monuments have astronomical orientations, although for single standing stones this is somewhat difficult to attribute. Of importance is that these monuments were probably meant to be visible within the wider landscape. Clach Clais an Tuire standing stone (SM441) is a quadrangular stone standing to a height 1.9 m above ground, 0.6 m to 1.0 m broad, and 0.6 m thick and aligned on an E-W. axis.

8.7.9. The scheduled monument Clach Clais an Tuire standing stone is of high (National) importance.

8.7.10. The primary value of standing stones is the intrinsic archaeological interest. It holds archaeological significance as an asset that could provide evidence of the community that first erected the monument. Its likely association with other monument types is also a significant factor in its significance. Its contextual value therefore comes from its relationship with the surrounding landscape. The surrounding landscape therefore contributes to the significance of the standing stone. Clach Clais an Tuire standing stone is situated close to the east bank of the Achvarasdal Burn as it turns to the south before heading to a narrow pass between the hills of Creag Bheag (114 m AOD) and Creag Mor (142 m AOD). The standing stone's location also roughly marks the extent of the low-lying farmland which extends towards the coastline to the north.

8.7.11. Clach Clais an Tuire standing stones' alignment or setting within the landscape is not obvious although two factors have been considered. Firstly, the monument's potential association with other known Prehistoric assets within the wider landscape. The spread of known Prehistoric assets within the Study Area show that, except for one hut circle, none are located further south than the standing stone itself. These assets, which include evidence of both ritual and settlement activity, are spread across the low-lying accessible land along the coastal zone. These assets include two other known standing stones, both of which are closer to the coastline: Achvarasdal two standing stones (SM421), located within the grounds of Achvarasdal House, and the standing stone at Reay (MHG736), although this is possibly the remains of a stone circle. Therefore, it is considered that it is these views, across the low-lying fertile landscape, towards the coastline, that are intrinsic in understanding, appreciating and experiencing the monument.



Illus 1. View to Clach Clais an Tuire standing stone (SM441) from Creag Bheag, facing north-east

8.7.12. The second factor is the position of the standing stone at the turn of the Achvarasdal Burn, which on reaching the stone from the north east runs south between Creag Bheag and Creag Mor. The standing stone is certainly visible from the tops of both these hills (Illus 1) and the lower ground between them. Both these hills are also very prominent in the landscape (Illus 2). It could therefore be interpreted that views from the monument south-west in the direction of the hills holds some meaning to the monument and as such contributes to the significance of the standing stone. In this context it is considered that it is the two hills in this direction, being the most prominent features in the landscape, that provide the primary elements of the landscape that contribute to the significance of the stone and not the landscape between or beyond them.

8.7.13. A bare earth ZTV of the proposed development and a photomontage from the standing stone (see Landscape and Visual Report) both confirm that the proposed BESS and associated substation extension are screened in views from the standing stone towards the Application Boundary by the intervening topography. Therefore, no impact to the asset's significance is anticipated from the proposed development.



Illus 2. View to Clach Clais an Tuire standing stone (SM441) looking towards Creag Bheag, Creag Mor (screened by the forestry).

SM421 Achvarasdal two standing stones

8.7.14. Achvarasdal two standing stones (SM421) comprises two monoliths, which had evidently been standing stones at one time, which lie fallen within the garden at Achvarasdal Lodge. They are located c.2 km north-east of the Application Boundary on low lying ground close to Sandside Bay.

8.7.15. As a scheduled monument Achvarasdal standing stones are of high (National) importance.

8.7.16. The primary value of standing stones is their intrinsic archaeological interest. They hold archaeological significance as assets that could provide evidence of the community that first erected the monuments. Their likely association with other monument types is also a significant factor in its significance. Its contextual value therefore comes from its relationship with the surrounding landscape. Therefore, the surrounding landscape contributes to the significance of the stones as it provides context to the areas being settled by these communities. This landscape comprises the surrounding low-lying fertile land which would have been suitable for settlement and farming. The moorland to the south-west on which the Application Boundary is located is not part of this landscape and does not contribute to the significance of the stones. The stones are also screened from the Application Boundary by both mature woodlands surrounding the house and the local topography to the south.

Therefore, no impact to the asset's significance is anticipated from the proposed development.

SM514 Achvarasdal House broch

8.7.17. Brochs were Iron Age fortified structures that date from approximately 600BCE to 400CE and comprised a squat tower with a small, single and easily defensible entrance. Some of the better-preserved examples contain evidence for a suspended floor, and most were constructed with an inner and outer wall tied together with wide stones, thereby forming galleries or passageways within the structure. It is thought that their appearance was linked to an expansion in slaving activity around the periphery of the emerging Roman Empire. They occur throughout coastal highland Scotland, with outliers recorded further south and in Ireland. Achvarasdal House broch (SM514) is set on a large grassy mound, the interior wall standing 1.7m high. Measuring 10m across the internal diameter, it has a chamber in the north-east segment and an entrance 0.9m wide in the south-east, where the width of the broch wall can be seen as 4.1m.

8.7.18. As a scheduled monument Achvarasdal House broch is of high (National) importance.

8.7.19. The primary value of brochs is the intrinsic archaeological interest in their fabric as a potential data source on the architecture, defensive, domestic life and the social motives behind the construction of such massive structures during the Iron Age. The nature of these structures suggests that defence was a priority, although symbols of power and the avoidance of conflict is also a potentially significant factor. The contextual value of brochs therefore comes from their relationship with the surrounding landscape, as prominently visible monuments. Brochs are commonly situated on mounds with views over the surrounding area/along valleys. Brochs are also often located close to areas of cultivatable land suggesting that agriculture was also of importance to those that constructed them.

8.7.20. Achvarasdal House broch is located c.2 km north-east of the Application Boundary within the grounds of Achvarasdal House, positioned on low lying ground close to Sandside Bay. It is a well-preserved example of a broch located close to a number of potentially contemporary broch sites in the area. It displays key architectural details within its interior such as an entrance passage with door checks and blocked doorways to intramural features. There is high potential for the preservation of related structures and deposits in the largely undisturbed mound surrounding the broch.



Illus 3. View to Achvarasdal House broch (SM514) with one of the Achvarasdal standing stones (SM421) in the foreground, Facing south.

8.7.21. It is likely that the broch would have been placed to be intervisible with other contemporary brochs, with a view over its controlled/farmed hinterland. When the broch was newly built and at full height, it would have been a dominant feature in the landscape, although this is no longer the case. It is this immediately surrounding landscape that was likely the territory of those that built it and which contributes to the significance of the monument. The majority of this landscape has been altered such that the original landform is no longer discernible, restricting the ability to understand and appreciate where the broch's dominant influence may have been targeted, or where its farmed hinterland may have been situated.

8.7.22. The moorland to the south-west on which the Application Boundary is located is not part of the landscape that contributes to the significance of the broch. The broch is also screened by mature woodland surrounding the house (Illus 3) and by topography to the south with no views to Application Boundary. Therefore, no impact to the asset's significance is anticipated from the proposed development.

Non-designated Heritage Assets

8.7.23. Of the 113 non-designated heritage assets within the Study Area, 14 may be subject to impact through change in their settings. These comprise eight funerary cairns, five ritual monuments and one settlement asset.

Funerary Cairns

8.7.24. The primary value of the eight funerary cairns is the intrinsic archaeological interest in their fabric as a potential data source on the architecture, and ritual funerary practices carried out by the communities that erected the cairns. These funerary cairns are generally constructed to be visible from distance, sometimes placed on hilltops or areas of higher ground. Therefore, the surrounding landscape contributes to the significance of the monuments as it provides context to the areas being settled by these communities.

8.7.25. **MHG738 Borag Knowe cairn** is recorded as being a ‘circle of stones' on the summit of Borag Knowe surviving as a low pile of rubble stones, much disturbed and containing the footings of a crude later structure. It is of low (Local) importance (Illus 4). It is located 350 m north of the existing Limekiln Farm Substation close to Borag Knowe. Currently views towards the existing Limekiln Farm substation are screened by forestry plantation although the landscape to the south-east of the monument contributes to the significance of the monument as this would have been the hinterland settled by the communities that erected the monument. However, views in this direction already includes infrastructure associated with the wind farm Therefore, although it is possible in principal that the cultural significance could be adversely impacted through development within its setting, this has already taken place, and the adverse impact will not be increased through the development of a substation extension at the proposed location.



Illus 4. View of Cairn MHG739 looking SE towards the substation

8.7.26. **MHG1614 Creagan Liath Cairn** is located 1.5 km north-east of the Application Boundary within farmland at Creagan Liath on low lying ground close to the Achavellan Burn. It is recorded as a turf-covered cairn, 9 m in diameter and 0.4 m in general height. It is of low (Local) importance. It was likely constructed to be seen from the areas of settlement and may be contemporary with the known hut circles (MHG733) recorded nearby. The assessment identified that the asset is screened from views towards the Application Boundary by Creag Leathan and Creag Bheag. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.27. **MHG1615 – Big Keoltag Cairn** is a turf-covered, flat-topped cairn, reduced to 22 m in diameter and 0.8 m high. It is of low (Local) importance. The cairn is located on a low rise at Little Keoltag close to the Burn of Isauld. The landscape that contributes to significance is the surrounding low-lying fertile land towards the coastline. The assessment identified that the asset is screened from views towards the Application Boundary by Borlum Rock and Little Rock. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.28. **MHG25075 Blarmore Cairn** comprises two isolated cairns, mostly heather covered, but with some stone exposed. The asset is of low (Local) importance. The cairns are located 1.8 km north-east of the Application Boundary within an area of low-lying ground overlooking the Achavellan Burn. The assessment identified that the assets are screened from views towards

the Application Boundary by Creag Leathan. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.29. **MHG718 Torran Dubh possible burial or clearance cairn** comprises a mound which could be the remains of a burial cairn or clearance cairn. It is of low (Local) importance. The cairn is located on a small mound 1.8 km north of the Application Boundary overlooking the Burn of Isauld to the north-east. The landscape that contributes to its significance is the surrounding low-lying fertile land close to the coast. The assessment identified that the asset is screened from views towards the Application Boundary by the hills to the south. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.30. **MHG729 Creag Liath Cairn** measures 11 m in diameter and stands over 1 m in height. It is of low (Local) importance. The cairn is situated on a north facing slope 1.5 km north-east of the Application Boundary. There are no views towards the Application Boundary from the asset. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.31. **MHG730 Creag Liath Cairn** possible burial or clearance cairn is a heather-covered mound that may be a burial cairn or clearance cairn. It is of low (Local) importance. The cairn is situated on a north facing slope 1.5 km north-east of the Application Boundary. There are no views towards the Application Boundary from the assets. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.32. **MHG742 Little Rock Kerb Cairn** comprises a small cairn 6 m in diameter and 0.5 m high. On the south-west periphery a kerb about 0.2 m high is clearly visible. It is of low (Local) importance. The cairn is located 500 m north of the Application Boundary on the north facing slope of Little Rock. It is screened from views to Application Boundary by the intervening topography. Therefore, no impact to the asset's significance is anticipated from the proposed development.

Ritual Monuments

8.7.33. The primary value of the five ritual monuments is the intrinsic archaeological interest in their fabric as a potential data source on the architectural and ritual practices carried out by the communities that erected these monuments. These monuments are generally constructed to be visible from distance, sometimes placed on hilltops or areas of higher ground. Therefore, the surrounding landscape contributes to the significance of the monuments as it provides context to the areas being settled by the communities that erected the monuments and may inform on the ritual practices of the community.

8.7.34. **MHG24974 Achrasker Standing Stone** is located 1.8 km east of the Application Boundary on low lying ground and is currently within commercial forestry. The standing stone is of low (Local) importance. The landscape that contributes to its significance is the low-lying fertile land towards the north likely occupied by the communities that erected the stone. It is only 500 m north-east of SM441 Clach Clais an Tuire, standing stone and may be contemporary with that scheduled monument. It potentially includes views to the Application Boundary. However, at nearly 2 km from the Application Boundary the landscape that contributes to its significance does not include the moorland to the south and the proposed development would

not affect the understanding, appreciation and experience of the monument. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.35. **MHG13450 – Little Rock stone alignment/cairn** is located 600 m north-east of the proposed substation extension at the base of Little Rock. It is of low (Local) importance. In this instance the lower slopes of Creag Leathan screen the asset from the Application Boundary. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.36. **MHG19408 Beul an Lochain a possible stone circle** is a setting of at least six irregularly shaped stones, showing through peat and heather. It is of low (Local) importance. The stone circle is located 2 km east of the Application Boundary although it was not found during a pre afforestation survey. It is supposedly on low lying ground close to Achavellan Burn. It is screened from Application Boundary by Creag Leathan and Creag Bheag. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.37. **MHG19431 Borlum Stone Row** comprises approximately 52 small stones sat in about 8 fan shaped rows that converge towards a small mound of stones at the narrow end of the fan and some 12.5 m distant. It is of low (Local) importance. The stone row is located 600 m north-east of the proposed substation extension at the base of Little Rock. The lower slopes of Creag Leathan screen the asset from the Application Boundary. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.38. **MHG60608 Reay Possible henge** identified on vertical APs dating to 1999-2001 and 2009. It is approximately 47 m diameter and appears to be formed from a ditch between 2 m and 3 m in width with the suggestion of an external bank. It is of low (Local) importance. The henge is located 600 m north of the Application Boundary across low lying fertile land. It is screened from the Application Boundary by Borlum Rock. Therefore, no impact to the asset's significance is anticipated from the proposed development.

Settlement

8.7.39. **MHG710 Creag Leathan Broch/homestead** comprises the mutilated remains of a feature that has been variously described as a cairn, broch and homestead. Its most likely interpretation is probably a Broch. It is of low (Local) importance. The asset is located on the north facing slope of Creag Leathan overlooking the low-lying fertile land to the north. It has no views towards the Application Boundary. Therefore, no impact to the asset's significance is anticipated from the proposed development.

8.7.40. The remaining non-designated heritage assets within the study area are considered to either not derive significance from setting that includes the surrounding landscape, or the landscape that does contribute to setting does not including the moorland landscape within the Application Boundary. These include findspots and cropmark sites that have no surface evidence or settlement evidence such as hut circles and townships where only the immediate surrounding landscape contributes to setting.

8.7.41. The archaeological, architectural and/or historic significance of each heritage asset would be fully preserved and appreciated should the development take place.

8.8. Proposed Development

8.8.1. The final design details of the Proposed Development are still under development and the description provided below is indicative.

8.8.2. The Proposed Development will consist of lithium-ion battery energy storage units, Substation Extension and associated electrical equipment, a temporary construction compound, and all ancillary infrastructure (access, drainage, grid connection). An Indicative Development Layout plan is shown in Figures 'Site Plan' and 'Site Plan Detail'.

8.8.3. The BESS equipment would be sited in a site compound with appropriate surface water drainage and enclosed by security fencing. Operational access is proposed via existing access points and tracks used to serve the Limekiln and Limekiln Extension Wind Farm.

8.8.4. During operation, the site would be unmanned and operated remotely. Minimal on-site activities are required once operational other than infrequent maintenance activities.

8.8.5. The Proposed Development would likely comprise the key components as listed in Chapter 1 – Introduction.

8.8.6. BESS technology is a rapidly evolving area, and it is likely that changes will occur prior to consent, and then again prior to construction in light of the timescales involved. Notwithstanding that, the solution proposed will represent maximum case and will reflect best knowledge and practice at the time of submission.

8.9. Predicted Impacts of the Proposed Development

Physical Impacts

Known & Potential Archaeological Remains

8.9.1. The assessment presented in this report has considered the evidence for the known archaeological and heritage resource within and surrounding the Application Boundary in order to establish the potential constraints and implications for construction of the BESS facility and Substation Extension.

8.9.2. Direct impacts upon known or previously unknown buried archaeological remains have the potential to occur during development as a result of intrusive groundworks causing truncation, fragmentation or complete removal. As set out in Section 7 above, the proposed BESS facility is proposed to be constructed across an area of land that had previously been used as the temporary construction compound during the development of the Limekiln Wind Farm and the Limekiln Wind Farm Extension. Access to the proposed BESS and Substation Extension will also utilise existing access tracks. Therefore, this assessment identifies that no known or unknown heritage assets are likely to be physically affected by the Proposed Development.

Setting Effects

8.9.3. Impacts upon the setting of heritage assets in the area surrounding the Application Boundary may occur during the construction and operation of the development as a result of visual or other sensory changes (such as noise, light and movement) within their settings, such that our ability to appreciate the significance of the asset is adversely (or beneficially) affected.

8.9.4. Beyond the Application Boundary there is one non-designated heritage assets which may be subject to impact through change in its settings.

Designated Heritage Assets

8.9.5. None of the three designated heritage assets in the Study Area are considered to derive significance from setting that includes the proposed development site. The archaeological, architectural and/or historic significance of each non-designated heritage asset would be fully preserved and appreciated should the proposed development be constructed.

Non-designated Heritage Assets

8.9.6. It was considered that the setting of Borag Knowe cairn (MHG738) would be adversely affected by the proposed development. The site of the existing Limekiln Wind Farm substation is located within the wider landscape that contributes to the setting of the asset. The assessment of the asset identified that the cairn would include views towards the Substation Extension, although most of the surrounding area had already been altered by forestry plantation plus the construction of the wind farm. It is therefore assessed that the construction of the BESS and in particular the Substation Extension would not add significantly to the extant infrastructure in the location of the proposed substation extension. Therefore, as a heritage asset of low (Local) importance, this adverse effect is unlikely to be of such magnitude to warrant a refusal of consent for the proposed development and it is assessed that the current understanding, appreciation and experience of the asset would remain unchanged.

8.9.7. The wider landscape contributes to the setting of a further 13 non-designated heritage assets. In all cases the assets are either screened from views towards the Application Boundary by topographical features or the wider landscape that contributes to each assets significance does not include the landscape within the Application Boundary. In each case the understanding, appreciation and experience of the assets would remain.

8.9.8. None of the remaining non-designated heritage assets in the Study Area are considered to derive significance from setting. The archaeological, architectural and/or historic significance of each non-designated heritage asset would be fully preserved and appreciated should the proposed development be constructed.

Historic Landscape

8.9.9. Historic Landscape Assessment of the study defined land within the Application Boundary as: Plantation comprising densely planted, single age, coniferous species. No past use of the area was given and the whole Application Boundary would have been open moorland.

8.9.10. The development proposal is for a BESS, Substation Extension and associated infrastructure. located alongside an existing wind farm. The proposed development fits into this altered landscape grain located within both the envelope of the forestry plantation and the wind farm.

8.10. Discussion of Heritage Risk

Evaluation Investigations

8.10.1. Archaeological evaluation investigations typically take the form of field walking for artefact recovery from plough soils, geophysical survey to identify anomalies which may be buried archaeological features, advance intrusive testing through trial trenching, or watching brief during construction.

Archaeological Potential

8.10.2. Based on the assessment of no buried archaeological remains being present within the Application Boundary due to previous construction disturbance, the risk to known and unknown archaeological assets would not represent a likely constraint on development consent.

8.10.3. In light of the specific circumstances of this site and the assessment of potential development impacts described in Section 8, it is considered no further assessment of the archaeological potential would be required.

Mitigation Measures

8.10.4. No additional action is likely to be required of the developer by the planning process. The likely development impacts are considered to be of a level of significance that no further archaeological investigations would be required. This recommendation would need to be confirmed in agreement with the Local Planning Authority.

8.11. Conclusions

Policy Tests

8.11.1. This desk-based assessment has considered the likely impact that future development would have on potential below-ground archaeological remains within the Application Boundary, and the setting of heritage assets within the Study Area, in accordance with planning policy and guidance.

NPF4

8.11.2. In the terms NPF4 Policy 7.h the understanding, appreciation and experience of the scheduled monuments would be adequately retained such that the integrity of setting would not be significantly adversely affected. In all cases it would remain possible to understand, appreciate and experience factors of their setting that contribute to its cultural significance.

Local Development Plan

8.11.3. In the terms of LDP Policy 57 the proposed development has been assessed, taking into account the level of importance and type of heritage features, the form and scale of the development, and any impact on the feature and its setting.

8.11.4. Point 1 of the policy states 'for features of local/regional importance we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource'. The currently proposed BESS location does not impact upon any known heritage assets within the 2 km study area. The location of the Substation Extension is assessed as having an adverse impact on the setting of MHG738 Borag Knowe cairn. However, the construction of the Substation Extension would not add a significant change to the existing extant infrastructure in this location. As a heritage asset of low (Local) importance, this adverse effect is unlikely to be of such magnitude to warrant a refusal of consent for the Proposed Development.

8.11.5. There are no known heritage assets within the Application Boundary, and it is anticipated that the development proposals will accord with the Local Policy requirements.

8.11.6. Point 2 states 'For features of national importance we will allow developments that can be shown not to compromise the natural environment, amenity and heritage resource'. None of the assets of National importance will be compromised by the proposed BESS facility.

8.12. Conclusions

8.12.1. It is intended that this report contains sufficient objective data to enable an informed and reasonable decision to be made regarding the potential heritage constraints to the Proposed Development and whether further investigation and mitigation is required.

8.12.2. The DBA identified no designated heritage assets within the site boundary and three in the wider Study Area.

8.12.3. The assessment identified no non-designated heritage assets in the Application Boundary and 113 in the wider Study Area.

8.12.4. There is considered to a nil potential for the presence of previously unknown archaeological remains from any periods.

8.12.5. It is not anticipated that proposals to develop the site should represent a conflict with legislation or national or local planning policies relating to the historic environment. The likely development impacts are not considered sufficiently significant to warrant refusal of a planning application to develop the site.

Potential Direct Impacts

8.12.6. The assessment has found that the archaeological potential of the Application Boundary is Nil due to the previous use of the site.

8.12.7. The BESS will not impact directly on any designated or non-designated historic assets as there are none within the application boundary.

Potential Setting Effects

8.12.8. The Stage 1 assessment has found that the significance of the three scheduled monuments within the Study Area would not be affected as a result of direct impacts and through visual changes within their setting resulting from the proposed BESS and Substation Extension. There may be an adverse effect (through changes within its setting) on the significance of up to one non-designated assets (MHG738 Borag Knowe cairn). However, the construction of the Substation Extension would not add a significant change to the existing extant infrastructure in this location and this adverse effect is unlikely to be of such magnitude to warrant a refusal of consent for the Proposed Development.

References

Bibliographic references

Gordon, J. ed. The New Statistical Account of Scotland / by the ministers of the respective parishes, under the superintendence of a committee of the Society for the Benefit of the Sons and Daughters of the Clergy. Reay, Caithness, Vol. 15, Edinburgh: Blackwoods and Sons, 1845, p. 12. University of Edinburgh, University of Glasgow. (1999) The Statistical Accounts of Scotland online service: https://stataccscot.edina.ac.uk:443/link/nsa-vol15-p12-parish-caithness-reay

Sinclair, Sir John. The Statistical Account of Scotland, Reay, Caithness, Vol. 7, Edinburgh: William Creech, 1793, p. 570. University of Edinburgh, University of Glasgow. (1999) The Statistical Accounts of Scotland online service: https://stataccscot.edina.ac.uk:443/link/osa-vol7-p570-parish-caithness-reay

Historic maps

1st edition OS 25” map surveyed 1872 showing Limekiln and two buildings. Caithness X.14 (Reay)

9.0 Geology & Peat

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9. Geology & Peat

9.1. Introduction

9.1.1. This Chapter presents a summary of the existing baseline conditions present at the site in terms of geology, soils and peat. An appraisal of the potential impacts which might occur as a result of the Proposed Development has then been undertaken and any required measures to mitigate these impacts are identified. Industry standard good practice construction and management techniques which will be deployed are also presented along with a summary of the key findings.

9.1.2. The assessment has been undertaken by SLR Consulting Limited and has been overseen by a Technical Director who has more than 30 years' experience assessing similar developments with respect to potential impacts on geology and peat. A site visit has also been undertaken by SLR staff.

9.1.3. This Chapter is supported by a Technical Note **(see Appendix 9.1: Peat)** which assesses the depth, distribution and condition of peat, alongside the following figures:

- Figure 9.1: Soils
- Figure 9.2: Superficial Geology
- Figure 9.3: Peatland Classification, and
- Figure 9.4: Bedrock Geology

9.2. Scope of Appraisal

9.2.1. This assessment is based on the description of the Proposed Development detailed in **Chapter 3: Description of the Proposed Development** and shown in **Figures 'Site Plan' and 'Site Plan Detail'**.

9.2.2. The Proposed Development will utilise existing access tracks which are part of the existing Limekiln Wind Farm site. No upgrades or construction works are required to use the access tracks, and they are therefore with respect to soils, peat and geology not considered in this appraisal.

Study Area

9.2.3. The study area is shown on **Figures 9.1** to **9.4** and includes a buffer of 500 m to all elements of the Proposed Development including the proposed BESS, proposed Substation Extension and the underground cable.

Policy and Guidance

9.2.4. The assessment has been undertaken with respect to planning policy and general good practice guidance, including the following which are relevant to the geology and peat.

Planning Policy

9.2.5. National Planning Policy Framework 4 (NPF4) provides planning guidance and polices regarding sustainable development, tackling climate change and achieving net zero. Policies relevant to this Chapter include:

- Policy 2 (Climate Mitigation and Adaptation); and
- Policy 5 (Soils).

9.2.6. In addition, The Highland Council (THC) Highland-wide Development Plan (HwDP) provides planning guidance on the type and location of development that can take place in the region. The HwDP presents policies of which the following are relevant to this assessment:

- Policy 28 – Sustainable Design;
- Policy 55 – Peat and Soils;
- Policy 60 – Other Important Habitats and Article 10 features; and
- Policy 62 – Geodiversity.

Guidance

9.2.7. The following guidance is also applicable to the assessment:

- Scottish Government, Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (2017);
- Forestry Commission, Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads on Peat (2006);
- NatureScot, 2023, Advising on peatland, carbon-rich soils and priority peatland habitats in development management;
- A joint publication by Scottish Renewables, Scottish Natural Heritage (now NatureScot), Scottish Environment Protection Agency, Forestry Commission Scotland and Historic Environment Scotland, 2024, Good Practice during Windfarm Construction;
- Department of Environment, Food and Rural Affairs (DEFRA) Construction Code of Practice for the Sustainable Use of Soils on constructions Sites (2011);

- DEFRA Good Practice Guide for Handling Soils (Ministry of Agriculture, Fisheries and Food (MAFF) 2000);
- SEPA Regulatory Position Statement - Developments on Peat (2010); and
- CIRIA, Ground Engineering Spoil: Good Management Practice CIRIA Report 179 (1997).

Consultation

9.2.8. Pre-application advice was received from THC. **Table 9.1** summarises the key points relevant to geology and peat raised by this consultation.

Table 9.1: Consultation Response

Consultee	Response	Comment
THC Pre-application report February 2025	The proposal is located around 2-3 km to the east of the Caithness and Sutherland Special Area of Conservation (SAC) and East Halladale Special Site of Scientific Interest (SSSI), both of which are protected for blanket bog. NatureScot do not consider there is any hydrological connectivity between the application site and the SAC/SSSI. NatureScot advise there is no likely significant effect with regard to the SAC and no predicted impacts to the SSSI blanket bog.	Noted.
THC Pre-application report February 2025	SEPA is generally supportive of the locations for the laydown area (adjacent to the substation) and BESS (reinstated temporary construction area) in areas previously disturbed by development. Both areas also have existing access, which is also welcome.	Noted.

THC Pre-application report February 2025	The submission should include a layout drawing at a usable scale showing all permanent and temporary infrastructure, with extent of excavation required. The plan should include the peat depth survey showing peat probe locations, colour coded using distinct colours for each depth category. This must include adequate peat probing information to inform the site layout in accordance with the mitigation hierarchy in NPF4, which may be more than that outlined in the Peatland Survey – Guidance on Developments on Peatland (2017). In this case it would be helpful to show which areas are previously restored and which areas have not previously been disturbed; it should be demonstrated as far as possible that previously disturbed areas and areas of deeper peat are avoided as much as possible.	Peat probing was completed as part of the Limekiln Wind Farm Resubmission application. A site walkover was also completed as part of this assessment to confirm the distribution and condition of peat at the Proposed Development, details of which are discussed in **Appendix 9.1**.
THC Pre-application report February 2025	An Outline Peat Management Plan (PMP) should be prepared.	As discussed in **Appendix 9.1** it is confirmed here is no requirement for an outline PMP as the proposed BESS and cable route lies on mineral soils whilst the proposed Substation Extension lies on made ground which has is formed of a complex mix of peat soils, mineral soil and rock fragments. Best practice measures regarding handling of soils are included in **Section 9.6.**
THC Pre-application report February 2025	In this case we are content that a Peatland Condition Assessment is not required.	Noted.
THC Pre-application report February 2025	Contaminated Land have no comments to make on this application.	Noted.

9.3. Methodology

9.3.1. An initial desk study has been undertaken to determine and confirm the baseline characteristics of the study area by reviewing available information relating to geology and peat to ensure a contemporary assessment is prepared.

9.3.2. In addition to the Limekiln Wind Farm application[1], the following sources of information have been consulted in order to characterise the baseline conditions of the study area:

- OS 1:50,000, 1:25,000 and 1:10,000 scale mapping data;
- NatureScot SiteLink[2]
- James Hutton Institute, National Soil Map of Scotland (1:250,000)[3]
- British Geological Survey (BGS) Onshore Geoindex[4]
- Scottish Natural Heritage (now NatureScot) Carbon and Peatland 2016 map[5]

9.3.3. A detailed site walkover was undertaken by SLR in May 2025, to verify the information that was collected during the desk and baseline study and assess peat presence at the site.

9.3.4. An appraisal of potential impacts was then undertaken and where required mitigation measures or safeguards identified.

9.4. Baseline Conditions

9.4.1. This section outlines the baseline geology, soils and peat within the study area.

[1] Limekiln Wind Farm Resubmission (2016) ECU Reference EC00005269
[2] NatureScot, SiteLink, available online at https://sitelink.nature.scot/map [Accessed June 2025]
[3] James Hutton Institute, National Soil Map of Scotland (1:250,000 scale), available online at https://soils.environment.gov.scot/ [Accessed June 2025]
[4] British Geological Survey, Onshore Geoindex, available online at https://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed June 2025]
[5] Scottish Natural Heritage (now NatureScot) (2016) Carbon and Peatland 2016 map, available online at https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/ [Accessed June 2025]

Site Setting

9.4.2. The site is located on an existing wind farm and forestry site, with the site entrance located some 200 m east of Reay. The proposed BESS site is presently comprised of felled and unfelled forestry, and the proposed Substation Extension site is presently comprised of felled forestry land to the north of the existing Limekiln Wind Farm Substation.

Designations

9.4.3. Review of the NatureScot SiteLink[2] indicates that there are no geological or peat designated sites within the study area.

9.4.4. As discussed in **Table 9.1**, the Caithness and Sutherland Special Area of Conservation (SAC) and East Halladale Special Site of Scientific Interest (SSSI), both of which are designated for their blanket bog habitats, are located approximately 2 km west of the Proposed Development. NatureScot do not consider there is any hydrological connectivity between the application site and the SAC/SSSI. NatureScot advise no likely significant effect with regard to the SAC and no predicted impacts to the SSSI blanket bog as a consequence of the Proposed Development. They are not considered further in this appraisal.

Soils

9.4.5. An extract of 1:250,000 National Soil Map of Scotland[3] is shown on **Figure 9.1** and illustrates that site is underlain by three main soil types; mineral podzols along the northern extent of the existing access track, peaty podzols to the north west, including the proposed substation extension, and peat to the south east, including the proposed BESS site. The majority of the proposed underground cable route is shown to be underlain by peaty podzols.

Peat and Superficial Geology

9.4.6. An extract of BGS superficial deposit mapping[4], as shown on **Figure 9.2**, indicates that majority of the proposed underground cable route and the proposed BESS is underlain by glacial till deposits of the Thormaid Till Member, which is made up of a diamicton with clasts of Caledonian igneous and Moine metamorphic rocks. Peat superficial deposits are shown in the northern extent of the Proposed Development, including the proposed substation extension.

9.4.7. Areas of alluvium are recorded along banks of the unnamed tributary of the Achvarasdal Burn to the north of the proposed BESS site and the existing access track is shown to be underlain by glacial till of the Reay Burn Formation and Thormaid Till Member.

9.4.8. Peatland classification mapping[5] (shown on **Figure 9.3**), indicates that the majority of the Proposed Development including the existing substation and proposed BESS are underlain by Class 1 peatland. These are described as potentially nationally important carbon-rich soils, deep peat and priority peatland habitat in areas likely to be of high conservation value.

9.4.9. A small extent of the proposed underground cable route is also shown to be underlain by Class 2 peatland, which are also considered to be potentially nationally important carbon-rich

soils, deep peat and priority peatland habitat with conservation value and restoration potential.

9.4.10. A site walkover survey was conducted by SLR staff in May 2025 to assess the presence of peat underlying the Proposed Development, which is discussed in full in **Appendix 9.1.** In summary it has shown that:

- the proposed BESS and proposed cable route lie within shallow mineral soils rather than peat and no Class 1 peatland is found within these areas;
- the proposed substation extension is located within an area of made ground comprising a mixture of bedrock, mineral soils and peat soils rather than Class 1 peatland; and
- examination of the Peat Landslide Hazard Risk Assessment (PLHRA) which accompanied the wind farm planning application confirmed a negligible risk of peat landslide.

Bedrock Geology

9.4.11. An extract of the BGS bedrock and linear features geology mapping is shown in **Figure 9.4.** The northern extent of the Proposed Development, including the proposed substation extension, is underlain by igneous rocks of the Strath Halladale Granite which comprises biotite granites.

9.4.12. The southern extent of the Proposed Development, including the majority of the proposed underground cable and the proposed BESS is underlain by sedimentary rocks of the Tobaireach Conglomerate member.

9.4.13. An inferred fault is noted between the two bedrock units which has a northeast to southwest trend.

9.5. Embedded Mitigation and Good Practice Measures

Embedded Mitigation

9.5.1. It has been shown that areas of priority peatland and deep peat are not present within the Proposed Development footprint. The superficial geology and bedrock geology are common regionally and no geological or peat designated sites are noted within the study area.

9.5.2. Further the Proposed Development has been located within previously disturbed ground.

Good Practice Measures

9.5.3. The Proposed Development will constructed and operated in accordance with industry good practice guidance including that detailed in **Section 9.2**, and which includes the following commitments.

Construction Environmental Management Plan

9.5.4. A contractual management requirement of the successful Principal Contractor would be the development and implementation of a comprehensive and site-specific Construction Environmental Management Plan (CEMP). This document would detail how works would be managed in accordance with all commitments and mitigation detailed in the Environmental Appraisal, statutory consents and authorisations, and industry best practise and guidance. It is expected the existing and approved CEMP for the wind farm would be used as the basis for a revised CEMP for the Proposed Development.

9.5.5. The Proposed Development would be subject to detailed design prior to construction which would be informed by further site investigation that would include geotechnical analysis to ensure the stability of the Proposed Development and thereby safeguard soils and geology.

Safeguarding Soils and Geology

9.5.6. Soils excavated during the construction phase would be kept on site and used for landscaping and reinstatement of temporary construction areas. The following best practice measures would be detailed in the site CEMP in order to safeguard soils:

- any soils temporarily stockpiled would be managed in accordance with best practice so that their value is not degraded;
- works would be scheduled to avoid, when possible, periods of heavy rain and vehicular movement shall be planned to avoid saturated ground conditions;
- soils would be protected from temporary heavy vehicular movement from placement of ground protection mats or above ground tracks (underlain by a geotextile);
- stationary plant left for long periods would be parked on formal track / compounds so as to avoid potential of soil compaction;
- all temporary tracks would be removed upon completion of works;
- soils excavated to form the cable route would be used to backfill the cable trench in the order they were excavated;
- all works would be supervised by an Ecological Clerk of Works (ECoW); and
- localised measures including silt fencing would be used to manage runoff shed from areas where soils are disrupted so as not to locally impair water resources and protect sensitive receptors.

9.6. Assessment of Potential Impacts

9.6.1. Without appropriate design and controls, construction of the Proposed Development has the potential to impair geology and peat such as:

- over compaction of soils caused by the use of heavy machinery on site;
- structural deterioration of soil materials during excavation, soil handling, storage and replacement;
- erosion and loss of soils during soil handling, storage and replacement;
- disturbance and loss of deposits of peat;
- ground instability (including peat slide risk) and contamination; and
- an adverse effect on geological setting from pollution, fuel, oil, concrete or other hazardous substances;

Soils and Geology

9.6.2. It has been shown that the soils at the site have no particular rarity value and subject to best practice with regard to stripping, handling and reinstatement they can be safeguarded and be beneficially reused during restoration of temporary working areas. With careful management of soils and adoption of industry best practice, their value would not be impaired as a result of the Proposed Development.

9.6.3. The bedrock deposits are common regionally and have no specific rarity value. The superficial deposits at the site are also common regionally. The Proposed Development would not degrade the value of the bedrock or superficial deposits.

Peat Resources and Peat Slide Risk

9.6.4. It has been shown (see **Appendix 9.1**) that the Proposed Development is either underlain by made ground, which has previously been disturbed or mineral soils.

9.6.5. It is therefore considered that any impacts to peat can be avoided.

9.7. Summary

9.7.1. Existing soil and geological conditions have been confirmed by a desk based assessment and verified by a site visit.

9.7.2. A commitment has been made to use good practice construction techniques that would safeguard geology, soils and peat. Subject to the adoption of these, no effects on geology or peat have been identified during the construction or operation phases of the site life.

10 Hydrology and Hydrogeology

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10. Hydrology & Hydrogeology

10.1. Introduction

10.1.1. This Chapter presents a summary of the existing baseline conditions present at the site with respect to hydrology and hydrogeology (the water environment). It also details the embedded mitigation in the site design and best practice measures which would be implemented during construction and operation of the development. It then considers the likely potential impacts the Proposed Development may have on the water environment.

10.1.2. The assessment has been undertaken by SLR Consulting Limited under the supervision of a Technical Director who has more than 30 years' experience assessing similar developments with respect to potential impacts on the water environment. A site visit has also been undertaken by an experienced SLR hydrologist.

10.1.3. This Chapter is supported by **Appendix 10.1: Flood Risk Assessment and Drainage Impact Assessment** and the following figures:

- Figure 10.1a - b: Local Hydrology;
- Figure 10.2: Regional Hydrogeology; and
- Figure 10.3: Groundwater Vulnerability

10.2. Scope of Appraisal

10.2.1. This assessment is based on the description of the Proposed Development detailed in **Chapter 3: Description of the Proposed Development** and shown on **Figures 'Site Plan' and 'Site Plan Detail'**

10.2.2. It is noted that the Proposed Development will utilise existing access tracks which are part of the existing Limekiln Wind Farm and no upgrades or construction works are required to these access tracks.

Study Area

10.2.3. The study area is shown on **Figures 10.1** to **10.3** and includes a 500 m buffer to all elements of the Proposed Development including the proposed BESS, proposed Substation Extension and the proposed underground cable. Beyond this 500 m and with respect to water any effect is considered to be so diminished as to be undetectable.

Legislation, Policy and Guidance

10.2.4. The water environment in Scotland is afforded significant protection through key statutes and the regulatory activities of SEPA and the local authorities. The assessment has been undertaken with respect to environmental legislation, planning policy and general guidance, including the following which are relevant to the water environment.

Legislation

- European Union (EU) Water Framework Directive (2000/60/European Commission (EC));
- EU Drinking Water Directive (98/83/EC);
- Water Environment and Water Services (WEWS)(Scotland) Act 2003 (WEWS Act);
- The Environment Act 1995;
- Environment Protection Act 1990;
- The Flood Risk Management (Scotland) Act 2009;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (Controlled Activities Regulations (CAR)) (as amended);
- The Water Supply (Water Quality) (Scotland) Regulations, 2001;
- Private Water Supplies (Scotland) Regulations 2006;
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017; and
- The Electricity Act 1989.

Planning Policy

10.2.5. National Planning Policy Framework 4 (NPF4) provides planning guidance and polices regarding sustainable development, tackling climate change and achieving net zero. Policies relevant to this Chapter include:

- Policy 2 (Climate Mitigation and Adaptation);
- Policy 20 (Blue and Green Infrastructure); and
- Policy 22 (Flood Risk and Water Management).

10.2.6. In addition, The Highland Council (THC) Highland-wide Development Plan (HwDP) provides planning guidance on the type and location of development that can take place in the region. The HwDP presents policies of which the following are relevant to this assessment:

- Policy 28 – Sustainable Design;
- Policy 60 – Other Important Habitats and Article 10 features;
- Policy 63 – Water Environment;
- Policy 64 – Flood Risk;
- Policy 66 – Surface Water Drainage; and
- Policy 72 – Pollution.

Guidance

10.2.7. The following guidance is also applicable to the assessment, and includes Planning Advice Notes (PANs) published by the Scottish Government, such as:

- PAN 61 Planning and Sustainable Urban Drainage Systems (SuDS); and
- Online Planning Advice on Flood Risk (which supersedes Pan 69).

10.2.8. Scottish Environment Protection Agency (SEPA) and NetRegs Guidance for Pollution Prevention (GPP):

- GPP01 Understanding your environmental responsibilities – good environmental practices;
- GPP02 Above Ground Oil Storage Tanks;
- GPP03 Use and Design of Oil Separators in Surface Water Drainage Systems;
- GPP05 Works and Maintenance in or near Water;
- GPP06 Working at Construction and Demolition Sites;
- GPP08 Safe Storage and Disposal of Used Oils;
- GPP13 Vehicle Washing and Cleaning;
- GPP18 Containing Major Spillages and Firewater at Industrial Sites;
- GPP21 Pollution Incident Response Plans; and
- GPP22 Dealing with Spills.

10.2.9. Construction Industry Research and Information Association (CIRIA) publications:

- C532 Control of Water Pollution from Construction Sites (2001);
- C624 Development and Flood Risk – Guidance for the Construction Industry (2004);
- C741 Environmental Good Practice on Site (2015); and

- C753 The SuDS Manual (2015).

10.2.10. SEPA Publications:

- Groundwater Protection Policy for Scotland, Version 3 (2009);
- Technical Flood Risk Guidance for Stakeholders (2022);
- Flood Risk and Land Use Vulnerability Guidance (2024);
- Climate Change Allowances for Flood Risk Assessment in Land Use Planning (2025);
- Guidance on Assessing the Impact of Developments on Groundwater Dependent Terrestrial Ecosystems (2024); and
- Guidance on Assessing the Impact of Development on Groundwater Abstractions (2024).

10.2.11. Other Guidance:

- THC, Flood Risk and Drainage Impact: Supplementary Guidance (2013);
- British Standards Institution, Assessing and Managing Flood Risk in Development – Code of Practice, Report BS-8533:2017 (2017); and
- Energy Network Association, Engineering Technical Report (2018).

10.3. Consultation

10.3.1. Data requests were issued to SEPA and THC to obtain information relating to water quality, groundwater level and flow, private water supplies and licenced water abstractions and discharges.

10.3.2. Pre-application advice was also sought from THC. **Table 10.1** summarises the key points relevant to hydrology and hydrogeology raised through consultation for the Proposed Development.

Table 10.1: Consultation Response

Consultee	Response	Comment
THC Pre-application report February 2025	The proposal is located around 2-3km to the east of the Caithness and Sutherland Special Area of Conservation (SAC) and East Halladale Special Site of Scientific Interest (SSSI), both of which are protected for blanket bog. NatureScot do not consider there is any hydrological connectivity between the application site and the SAC/SSSI. NatureScot advise there is no likely significant effect with regard to the SAC and no predicted impacts to the SSSI blanket bog.	Noted.
THC Pre-application report February 2025	The applicant will be required to carry out an investigation to identify any private water supplies, including pipework, which may be adversely affected by the development and to submit details of the measures proposed to prevent contamination or physical disruption. THC has some information on known supplies but it is not definitive. An on-site survey will be required.	As discussed in **Section 10.5**, no properties or private water supplies have been identified within 500m of the Proposed Development.
THC Pre-application report February 2025	Development or landraising within any floodplain should be avoided and proposals should generally follow SEPA's Standing Advice for Flood Risk. Should any permanent infrastructure be located within close proximity to a watercourse, a Flood Risk Assessment should be submitted to demonstrate that the development is not at risk from flooding and will not increase flooding elsewhere.	A site-specific Flood Risk Assessment is included as **Appendix 10.1**.
THC Pre-application report February 2025	Small watercourse crossings should be oversized and larger watercourse crossings should be demonstrated to be adequately designed to accommodate the 1 in 200 year flow (including an allowance for climate change and freeboard) to avoid increasing the risk of flooding, or information provided to justify smaller structures.	No track watercourse crossings are required. The proposed underground cable with pass beneath one watercourse.

THC Pre-application report February 2025	A minimum strip of 50 m should be kept free from development from the top of bank(s) of any watercourse or waterbody. Storage of materials within this area during construction is not permitted.	Noted. It is confirmed a 50 m buffer to mapped watercourses has been applied, except for one proposed watercourse crossing.
THC Pre-application report February 2025	A Drainage Impact Assessment (DIA) for the development is required. The DIA should include details relating to any existing field drains and the management of surface water drainage, which should be designed in line with general Sustainable Drainage Systems (SuDS) principles. The DIA shall demonstrate that surface water discharge from the site is limited to the equivalent pre-development rate for a range of storms up to and including a 1 in 200 year plus climate change event. The Applicant should demonstrate, within the proposals submitted, any mitigation measures to manage the residual risk of overland flow/pluvial flooding.	A site-specific outline DIA is included as **Appendix 10.1** which includes an outline drainage design using SuDS which will be developed further as part of the detailed drainage design stage.
THC Pre-application report February 2025	Natural flood management techniques should also be applied to reduce the rate of runoff where possible. Tracks should not act as preferential pathways for runoff and efforts should be made to retain the existing drainage network. Appropriate drainage is required to restrict runoff to pre-development rates and to minimise erosion to existing watercourses. The DIA should ensure that post development runoff rate is no greater than pre-development runoff rate (i.e. greenfield runoff) for all return periods up to the 1 in 200 year event including an allowance for climate change Runoff from all events up to and including the 1 in 200 year plus climate change event should be managed within the site boundary, with no flooding to critical roads or buildings, and evidence as to how this will be achieved should be included within the DIA.	A site-specific outline DIA is included as **Appendix 10.1** which confirms that surface water drainage will be managed up to the 1 in 200 year event including an appropriate allowance for climate change.

THC Pre-application report February 2025	The proposals should demonstrate how impacts on local hydrology have been minimised and the site layout designed to minimise watercourse crossings and avoid other direct impacts on water features. Measures should be put in place to protect any downstream sensitive receptors. The submission must include a set of drawings showing: • All proposed temporary or permanent infrastructure overlain with all lochs and watercourses; • A minimum buffer of 50m around each loch or watercourse. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works; • A map showing the location, size, depths and dimensions of all borrow pits overlain with all lochs and watercourses within 250m and showing a site-specific buffer around each loch or watercourse proportionate to the depth of excavations. The information provided needs to demonstrate that a site specific proportionate buffer can be achieved.	Noted, please refer to **Figure 10.1**. A 50m watercourse buffer has been applied to mapped watercourses shown on the 1:10,000 scale Ordnance Survey (OS) mapping. No development is proposed within the 50m watercourse buffer, except for one proposed watercourse crossing. No borrow pits are proposed as part of the application.

THC Pre-application report February 2025	Groundwater Dependent Terrestrial Ecosystems (GWDTEs) are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further generic advice and the minimum information SEPA requires to be submitted. The application should include proposals for habitat improvement or creation to mitigate any loss of GWDTE. Excavations and other construction works can disrupt groundwater flow and impact on existing groundwater abstractions. Please refer to the aforementioned guidance on assessing impacts on GWDTE for further advice on the minimum information SEPA requires to be submitted.	Potential effects to GWDTEs are considered within **Section 10.5** of this Chapter.
THC Pre-application report February 2025	You should be aware that in the event of a fire occur, the containment and discharge of potential polluted water resulting from firefighting back into the natural water cycle would be a relevant planning consideration. You should therefore ensure that in the event of a battery fire, sufficient storage for all firefighting water runoff so that it is contained onsite for testing of pollutants before discharge or removal, and that pollution control measures are implemented to protect the water and wider environment including any downstream designated sites. This protection should also prevent water naturally infiltrating into the ground from across the site. Reference should be made to the Council's adopted Flood Risk and Drainage Impact Assessment Supplementary Guidance. Consultation with SEPA in this regard might also be required.	Noted. Firewater containment and discharge are considered as part of the DIA, included as **Technical Appendix 10.1**.

10.4. Methodology

10.4.1. An initial desk study has been undertaken to determine and confirm the baseline characteristics of the study area by reviewing available information relating to hydrology and hydrogeology. This has been undertaken in order to prepare a contemporary assessment.

10.4.2. In addition to the Limekiln Wind Farm application[1], the following sources of information have been consulted in order to characterise the baseline conditions of the study area:

- OS 1:50,000, 1:25,000 and 1:10,000 scale mapping data;
- NatureScot SiteLink[2]
- James Hutton Institute, National Soil Map of Scotland (1:250,000)[3]
- British Geological Survey (BGS) Onshore Geoindex[4]
- BGS Hydrogeological Maps of Scotland[5]
- UK Centre for Ecology and Hydrology, Flood Estimation Handbook (FEH) Webservice[6]

[1] Limekiln Wind Farm Resubmission (2016) ECU Reference EC00005269
[2] NatureScot, SiteLink, available online at https://sitelink.nature.scot/map [Accessed June 2025]
[3] James Hutton Institute, National Soil Map of Scotland (1:250,000 scale), available online at https://soils.environment.gov.scot/ [Accessed June 2025]
[4] British Geological Survey, Onshore Geoindex, available online at https://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed June 2025]
[5] British Geological Survey, Hydrogeological Maps of Scotland, available online at https://www.bgs.ac.uk/datasets/hydrogeological-maps-of-scotland/ [Accessed June 2025]
[6] UK Centre for Ecology and Hydrology, Flood Estimation Handbook (FEH) Webservice, available online at https://fehweb.ceh.ac.uk/ [Accessed June 2025]

- SEPA Flood Maps[7]; Rainfall data for Scotland[8]; Reservoir Inundation Flood Maps[9]; SEPA Environmental Data[10]; and
- THC Private Water Supply Map[11]

10.4.3. A hydrological walkover survey was undertaken by SLR in May 2025 to verify the information that was collected during the desk and baseline study and to allow an appreciation of the study area. This information was used to inform the emerging project design and to complete this assessment.

10.4.4. The assessment of potential impact to receptors identified by the baseline and field study has then been undertaken considering the safeguards incorporated into the site design and industry good practice that would be used during construction and operation of the Proposed Development.

10.5. Baseline Conditions

Site Setting

10.5.1. The site setting is shown on **Figure 10.1**.

10.5.2. The site is located on an existing wind farm and forestry site, with the site entrance located some 200 m east of Reay. The proposed BESS compound is located within an area of felled and unfelled commercial forestry, and the proposed Substation Extension site is presently comprised of felled forestry land to the north of the existing Limekiln Wind Farm Substation.

10.5.3. The site topography generally slopes from south to north, with a high point of approximately 105 m above Ordnance Datum (AOD) in the southwestern corner of the site, and a low of approximately 25 m AOD at the site access just east of Reay. The elevation of the proposed Substation Extension ranges from 71.7 m AOD in the southeastern corner to a low of 70.3 m

[7] Scottish Environment Protection Agency, Flood Maps, available online at https://beta.sepa.scot/flooding/flood-maps/ [Accessed June 2025]
[8] Scottish Environment Protection Agency, Rainfall data for Scotland, available online at https://www2.sepa.org.uk/rainfall/ [Accessed June 2025]
[9] Scottish Environment Protection Agency, Reservoir Inundation Flood Map, available online at https://map.sepa.org.uk/reservoirsfloodmap/Map.htm [Accessed June 2025]
[10] Scottish Environment Protection Agency, Environmental Data, available online at https://www.sepa.org.uk/environment/environmental-data/ [Accessed June 2025]
[11] The Highland Council, Private Water Supplies map, available online at https://map-highland.opendata.arcgis.com/maps/Highland::private-water-supplies [Accessed June 2025]

AOD in the western corner. The proposed BESS site elevation ranges from 90 m AOD in the southern corner to 81 m AOD in the northern corner.

10.5.4. SEPA precipitation data[8] for Strathy Bridge (station ID: 234319) rainfall gauge which is located approximately 14 km northwest of the Proposed Development indicates in 2024, the annual rainfall was recorded to be 872 mm.

Designations

10.5.5. Review of the NatureScot SiteLink website[2] confirms that there are no designated sites within the study area.

10.5.6. The Sandside Bay Site of Special Scientific Interest (SSSI) and North Caithness Cliffs Special Area of Protection (SPA) is located approximately 40 m north and 1.1 km northwest of the site access respectively. The SSSI is designated for important dune and links habitat whilst the SPA is designated for breeding bird assemblage. The designated sites are located downstream of the Proposed Development, however, they are located a significant distance (>2 km) from the Proposed Development and are not water dependent. The SSSI and SPA are not considered further in this assessment, however, potential effects on the designated features are discussed further in **Chapter 6: Ecology** and **Chapter 7: Ornithology**.

10.5.7. As noted by NatureScot in their pre-application advice the Proposed Development is located 2 – 3 km to the east of the Caithness and Sutherland Special Area of Conservation (SAC) and East Halladale SSSI, both of which are designated for their blanket bog habitats. NatureScot confirmed that there is no hydrological connectivity between the application site and the SAC/SSSI and therefore they are not considered in this assessment.

Geological Setting

10.5.8. Full description of the geological setting is described in **Chapter 9: Geology and Peat**.

10.5.9. An extract of 1:250,000 National Soil Map of Scotland[3] indicates that the Proposed Development is underlain by peat and peaty podzols.

10.5.10. The proposed Substation Extension location is shown on BGS[4] mapping to be underlain by igneous bedrock of the Strath Halladale Granite Formation, comprised of granite and biotite. The bedrock is shown to be overlain by superficial peat deposits.

10.5.11. The proposed BESS is shown to be underlain by bedrock of the Tobaireach Conglomerate Member, comprised of conglomerate sedimentary bedrock. The bedrock in this area is overlain by glacial till superficial deposits of the Thormaid Till Member. Areas of alluvium are also noted along the banks of the unnamed tributary of the Achvarasdal Burn to the north of the proposed BESS site.

10.5.12. As discussed in **Chapter 9: Geology and Peat** no peat deposits will be disturbed by the Proposed development.

Hydrogeology

Aquifer Characteristics

10.5.13. Extracts of the BGS 1:625,000 scale Hydrogeological Map of Scotland[4] and 1,100,000 scale Aquifer Productivity and Groundwater Vulnerability datasets[5] are presented in **Figure 10.2** and **Figure 10.3** respectively.

10.5.14. Review of **Figure 10.2** confirms that igneous bedrock, including that beneath the proposed substation extension, are classified as a low a productivity aquifer whereby small amounts of groundwater are expected in near surface weathered zones and secondary fractures. The sedimentary bedrock, including that beneath the proposed BESS is classified as a moderately productive aquifer, locally important, multi-layered aquifer.

10.5.15. The Aquifer Productivity and Groundwater Vulnerability datasets classify the underlying aquifer (superficial and bedrock) according to the predominant groundwater flow mechanism (fracture or intergranular) and the estimated groundwater productivity.

10.5.16. Review of **Figure 10.3** confirms that the peat and glacial till superficial deposits are not considered a significant aquifer. Alluvium deposits are considered a moderate productivity aquifer with intergranular and fracture flow. Groundwater in the alluvium is likely to be shallow and in hydraulic continuity with adjacent watercourses.

10.5.17. The igneous bedrock aquifer is confirmed to be a very low productivity aquifer. Any groundwater that is present would be confined to shallow depths and found in the upper weathered surface of the rock or in secondary fractures. The sedimentary bedrocks are a moderately productive aquifer whereby flow is predominately through intergranular flow and fractures.

10.5.18. Groundwater vulnerability is divided into five classes (1 to 5) with 1 being least vulnerable and 5 being most vulnerable. The Proposed Development is shown to be underlain by groundwater vulnerability Class 4a and 4b which is considered vulnerable to pollution.

Groundwater Quality

10.5.19. All of Scotland's groundwater bodies have been designated as a Drinking Water Protected Area (DWPA) in accordance with the Water Environment (Drinking Water Protected Area) (Scotland) Order 2013 and require protection for their current use or future potential as drinking water resources.

SEPA has identified that the Proposed Development is underlain by two groundwater bodies, the Northern Highlands groundwater body (SEPA ID: 150701) and the Dounreay groundwater body (SEPA ID: 150487). Both groundwater bodies have been classified in 2023 (the latest reporting cycle) as having a Good overall groundwater quality with no pressures identified. SEPA have confirmed that they do not hold any specific groundwater quality data within the study areaA National Vegetation

Classification (NVC) habitat mapping exercise was conducted as part of the Limekiln Wind Farm EIA Resubmission project[1]. The assessment concluded that the majority of areas of potential Groundwater Dependent Terrestrial Ecosystem (GWDTE) are supported by rainfall, surface and/or near surface water flow controlled by local topography and drainage rather than emergent groundwater.

10.5.20. No development except for the proposed underground cable, will intersect any area of potential GWDTE mapped by the NVC survey.

10.5.21. Within the study area of this Proposed Development, areas of M15 and wet grasslands (defined as mostly M25 with small areas of MG9, MG10, M23, M27, M28 and CG10) are noted within the forest rides, along existing access tracks, areas of previously disturbed ground or along the banks of mapped watercourses. This distribution is not typical of that which is sustained by emerging groundwater, such as springs and/or seepage lines. The habitats are also underlain by low permeability peat/soils and glacial till deposits and no evidence of groundwater seepage was recorded during the site walkover. It is therefore considered that these areas of potential GWDTE are sustained by rainfall, surface water runoff and water ponding above the low permeability deposits and/or water logging of soils adjacent to watercourses rather than emergent groundwater. Buffers to areas of potential GWDTE specified in SEPA guidance therefore do not apply.

Hydrology

Local Hydrology

10.5.22. The site lies in the catchment of the Reay Burn to the west and the Achvarasdal Burn to the east, which both flow in a northerly direction before discharging into the North Sea at Sandside Bay (see **Figure 10.1**). The proposed substation extension location is approximately 80 m east of a tributary of the Reay Burn at its closest extent, and the proposed BESS site is approximately 85 m south of a tributary of the Achvarasdal Burn at its closest extent.

10.5.23. None of the surface water catchments which drain the site have been designated as a DWPA.

10.5.24. An existing surface water drainage ditch was observed during the site walkover within the proposed Substation Extension site, as shown on **Photograph 10.1.** The ditch is sourced from a culvert underneath the existing substation and was recorded to be approximately 0.5 m to 1 m wide and 0.2 m deep. It will require to be re-routed around or culverted beneath the proposed platform extension area to facilitate the Proposed Development and would assessed at the detailed design stage, as discussed in **Section 10.6**.

Photograph 10.1: Existing drainage ditch



Surface Water Quality

10.5.25. The larger watercourses within the study area or hydraulically connected to the study area are monitored by SEPA and have been classified in 2023. A summary of the SEPA classification is shown in **Table 10.2**. Smaller watercourses within the study area, including the Reay Burn are not monitored or classified by SEPA.

Table 10.2: SEPA Surface Water Classification (2023)

Waterbody (SEPA ID)	Overall Status	Overall Ecology	Physio-Chemical	Hydro-Morphology	Water Quality
Achvarasdal Burn (20623)	Good	Good	Good	Good	Good
Strathy Point to Dunnet Head (200224)	Good	Good	Not monitored	High	Good

Flood Risk

10.5.26. A Flood Risk Assessment is included as **Appendix 10.1**, which assesses the risk of flooding to the Proposed Development and confirms that it is not at flood risk for the NPF4 design event of 1 in 200 year plus an allowance for climate change or the Energy Network Association (ENA) design event of 1 in 1000 year plus an allowance for climate change for the proposed substation extension. It is understood that safe access/egress is to be afforded by the existing windfarm tracks and that no alterations to these routes are required.

10.5.27. Small discrete areas of surface water flooding of less than 300 mm depth are indicated to be located adjacent to the Proposed Development areas but are not expected to present a risk to the development as these can be managed locally as part of the development. Any direct rainfall on the BESS and Substation Extension platform will be managed through the SuDS design, as discussed in **Section 10.6** and **Technical Appendix 10.1**. No works are required to the existing site access tracks and surface water runoff from these will continue to be managed by the existing trackside drainage.

Watercourse Crossings

10.5.28. The Proposed Development has sought to use existing access tracks associated with the wind farm. No works to upgrade the existing access tracks or existing watercourse crossings are required.

10.5.29. One watercourse crossing is required for the proposed underground cable which will cross an unnamed tributary of the Achvarasdal Burn. The location of the watercourse crossing is shown on **Figure 10.1,** and a photograph of the proposed crossing point is shown on **Photograph 10.2**. The watercourse was recorded as dry during the site walkover however the channel was noted to be 0.1 m wide and 0.1 m deep. Good practice crossing techniques which will be adopted as part of the Proposed Development are discussed in **Section 10.6** of this report.

10.5.30. Upstream of the proposed crossing, silt traps / attenuation basins have been installed in accordance with good practice to attenuate water from the existing access track, as shown on **Photograph 10.3**.

Photograph 10.2: View of WX01, looking north (downstream)



Photograph 10.3: View of existing attenuation features upstream of WX01, looking north (downstream)



Private Water Supplies

10.5.31. THC private water supply database indicates that there are no private water supplies within 500 m of the Proposed Development. No private water supplies were identified within the

Limekiln Wind Farm Resubmission application. In addition, no properties were identified within 500 m of the Proposed Development during the site visit undertaken in May 2025.

10.5.32. Properties are noted within 500 m of the existing access track however no works are proposed to upgrade these access tracks as part of the Proposed Development.

10.5.33. Potential impacts on private water supplies are therefore not considered further in this assessment.

Licenced Sites (Abstractions, Discharges, and Waste)

10.5.34. Consultation with SEPA has confirmed there are no CAR authorisations within the Study Area.

10.6. Good Practice and Embedded Mitigation by Design

Embedded Mitigation

10.6.1. The Proposed Development has sought to use existing wind farm infrastructure (such as the site access track) or ground previously disturbed by commercial forest or by temporary constructions areas used by the wind farm.

10.6.2. A 50 m buffer of has been applied to watercourses (as shown on OS 1:10,000 mapping). All elements of the Proposed Development, including the proposed Substation Extension and proposed BESS, is located out width the 50 m watercourse buffer, except for the proposed watercourse crossing.

10.6.3. No areas of potential GWDTE have been identified within the proposed Substation Extension and proposed BESS sites and no private or licenced abstractions or water dependent designated sites are recorded within 500 m of the Proposed Development.

Good Practice Measures

10.6.4. The Proposed Development will be undertaken in accordance with industry good practice guidance including those detailed in **Section 10.2.** As a principle, preventing the release of any pollution or sediment is preferable to dealing with the consequences of any release. There are several general measures which cover all impacts assessed within this Chapter, details of which are given below.

Construction Environmental Management Plan

10.6.5. A contractual management requirement of the successful Principal Contractor would be the development and implementation of a comprehensive and site-specific Construction Environmental Management Plan (CEMP). This document would detail how the works would be managed in accordance with the commitments and mitigation detailed in the Environmental Appraisal, statutory consents and authorisations, and industry good practise and guidance.

10.6.6. It is anticipated that many of the principals agreed with consultees in the wind farm CEMP used during its construction remain wholly applicable and can be used again in the CEMP for this development.

10.6.7. The CEMP will outline measures to ensure that the works minimise the risk to the water environment. It is expected that the following will be included within the CEMP and would ensure the works are undertaken in accordance with good practice guidance, as detailed in **Section 10.2**:

- during construction there would be heavy plant and machinery required and as a result it is appropriate to adopt best working practices and measures to protect the water environment, including those set out in Pollution Prevention Guidance (GPP01);
- in accordance with GPP02 any above ground on-site fuel and chemical storage would be bunded;
- emergency spill response kits would be maintained during the construction works (GPP21);
- a vehicle management system would be put in place wherever possible to reduce the potential conflicts between vehicles and thereby reduce the risk of collision (GPP21);
- suitable access routes would be chosen which minimise the potential requirement for either new temporary access tracks or for tracking across open land which could contribute to the generation of suspended solids;
- a speed limit would be used to reduce the likelihood and significance of any collisions;
- plant nappies would be placed under stationary vehicles which could potentially leak fuel / oils;
- any temporary construction / storage compounds required would be located remote from any sensitive surface water receptors and will be constructed to manage surface water run-off in accordance with best practice;
- any water contaminated with silt or chemicals would not be discharged directly or indirectly to a watercourse without prior treatment; and
- water for temporary site welfare facilities would either be brought to site or a local surface water or groundwater abstraction would be identified. Any water abstraction would be made in accordance with General Binding Rules or an authorisation would be obtained from SEPA in accordance with the CAR; and
- foul water would either be collected in a tank and collected for offsite disposal at an appropriately licensed facility or discharge will be to a septic tank or soakaway in accordance with the CAR.

Environmental Clerk of Works (ECoW)

10.6.8. To ensure all reasonable precautions are taken to avoid negative effects on the water environment, a suitably qualified ECoW will be appointed prior to the commencement of construction to advise the Applicant and the Principal Contractor on all hydrological matters.

10.6.9. The ECoW will be required to be present onsite during the construction phase and will carry out monitoring of works and briefings with regards to any hydrological sensitivities at the site to the relevant staff of the Principal Contractor and subcontractors.

10.6.10. With respect to the water environment, the ECoW will also have responsibility for advising on the maintenance of surface water flow paths and ensuring the quality of surface water is maintained.

Pollution Risk

10.6.11. Good practice measures in relation to pollution prevention would include the following:

- refuelling would take place at least 50 m from watercourses;
- foul water generated onsite would be managed in accordance with GPP4;
- areas would be designated for production of concrete or washout of vehicles which are a minimum distance of 50 m from a watercourse;
- washout water would also be stored in the washout area before being treated and disposed of, or re-used in concrete production;
- if any water is contaminated with silt or chemicals, runoff would not enter a watercourse directly or indirectly prior to treatment;
- water would be prevented as far as possible, from entering excavations such as trenches and foundations;
- procedures would be adhered to for storage of fuels and other potentially contaminative materials in line with the CAR, to minimise the potential for accidental spillage; and
- a plan for dealing with spillage incidents would be designed prior to construction, and this would be adhered to should any incident occur, reducing the effect as far as practicable. This would be included in the final CEMP for the Proposed Development.

Erosion and Sedimentation

10.6.12. Good practice measures for the management or erosion and sedimentation would include the following:

- all stockpiled materials would be located out with a 50 m buffer from watercourses;
- water would be prevented as far as possible, from entering excavations such as trenches and foundations through the use of appropriate cut-off drainage;
- where the above is not possible, water would pass through silt/sediment traps to remove silt prior to discharge into the surrounding drainage system;
- clean and dirty water onsite would be separated, and dirty water would be filtered before entering the water environment;
- silt fences would be deployed as required to reduce sediment transport;
- the amount of ground exposed, and time period during which it is exposed, would be kept to a minimum;
- silt/sediment traps, single size aggregate, geotextiles or straw bales would be used to filter any coarse material and prevent increased levels of sediment. Further to this, activities involving the movement or use of fine sediment would avoid periods of heavy rainfall where possible; and
- the ECoW and the Principal Contractor would carry out regular visual inspections of watercourses to check for suspended solids in watercourses downstream of work areas.

Flood Risk

10.6.13. As detailed in **Appendix 10.1**, it is proposed to adopt SuDS as part of the Proposed Development. The Drainage Impact Assessment outlines a concept drainage design to show how surface water runoff from the proposed substation extension and proposed BESS site can be managed in accordance with current best practice. The concept design presented in **Appendix 10.1** will be developed further as part of the detailed design stage of the project and would be agreed with THC and SEPA prior to construction. It is anticipated that this will be secured by a planning condition.

Diversion of the Existing Drainage Ditch

10.6.14. As outlined in **Section 10.5**, an existing drainage ditch will require to be diverted to facilitate construction and use of the proposed substation extension. It has been confirmed by site investigations that the drainage ditch is small. As part of the detailed design stage, the final alignment of the diversion will be determined as well as the cross section, capacity and design of the diversion channel.

Installation of Underground Cables

10.6.15. The proposed underground cable would be installed progressively. The length of time the cable trench would remain open would be minimised. The cable trench would be opened using a tracked excavator. Arisings from the trench would be temporarily stored adjacent to the trench ready for use to restore the trench.

10.6.16. Arisings would be stored so that the potential for erosion and sedimentation is minimised (see above). Silt fences, cut-off drains and temporary cover of the stockpiles will be deployed as directed by the ECoW.

10.6.17. Vegetation turves would be stored separately to the spoil arisings. Once the cable has been installed in the cable trench arisings would be used to restore the trench and backfilled in the same order that the material was excavated from the trench. Turves would then be replaced on the backfilled trench.

10.6.18. If directed by the ECoW, low permeability barriers would be installed in the trench to prevent the trench forming a preferential water flow path. Where ground conditions are saturated a geotextile wrap would be used within the trench to ensure there is no loss of the sand or stone cable surround to adjacent ground.

10.6.19. Where required localised temporary pumping of water from the cable trench would be undertaken to maintain safe working conditions and to facilitate cable duct installation. Pumping arrangements would be agreed and supervised by the site ECoW. Pumping would cease once the cable duct has been installed.

10.6.20. Following completion of installation of a cable duct a cable team will install (pull) the cables through the ducts. Safeguards used to control pollution, runoff, erosion and sedimentation presented above would be deployed as required.

10.6.21. It is proposed that open cut techniques are used to install the trench at watercourse crossing WX01. Any water in the watercourse will be pumped over the working area to maintain the flow of water while the works are being undertaken. The cable trench would be constructed and completed as described above.

Fire Water Management

10.6.22. As detailed in **Appendix 10.1** provision has been made to collect and attenuate all runoff shed from the proposed BESS and proposed Substation Extension. Provision has been made for firewater containment in the BESS site. This is proposed to be provided by lining the proposed detention basin with a low permeability liner and provision of a penstock/shutoff valve on the outfall which can be used in the unlikely event of a fire to contain firewater in the basin, thus preventing a discharge from site. An outline estimate of the required volume for firewater containment, in accordance with GPP18, is detailed in **Appendix 10.1**.

Concrete Pouring

10.6.23. In relation to works involving concrete batching, transport and pouring, the following mitigation would be adopted:

- Where concrete transfers are required, measures would be adopted at the point of concrete transfer to prevent accidental spillage of liquid concrete and no transfers would be undertaken in proximity to watercourses or areas of standing water; and

- There would be no wash-out of concrete carrying vehicles (except the concrete chute). Chutes would be washed out to a suitable container, allowed to settle and disposed at suitably licensed facilities.

10.7. Assessment of Potential Impacts

10.7.1. The following have the potential to impair hydrology (surface water) and hydrogeology (groundwater):

- the use of and tracking of machinery has the potential to generate suspended solids in surface water runoff and/or introduce oils or hydrocarbons to the water environment;
- existing groundwater or surface water drainage paths could be disturbed or altered;
- fire water runoff from the BESS units has the potential to enter the water environment; and
- inadequate hardstanding drainage could increase or exacerbate local surface water ponding and flooding.

Surface and Ground Water Quality

Construction Phase

10.7.2. As stated in **Section 10.6**, the construction of the Proposed Development would be undertaken in accordance with relevant technical guidance, GPPs and other codes of best practice, to limit the potential for contamination of both ground and surface waters. In addition, a site-specific CEMP would be prepared by the Principal Contractor and include a surface and groundwater quality management plan.

10.7.3. The above measures would significantly reduce the likelihood of pollutants, including suspended solids, being discharged to nearby watercourses or groundwater.

Operational Phase

10.7.4. The risk of contamination from the Proposed Development is considered to be very low, as there would be no requirement for the storage of any potentially hazardous substances and runoff from the site would typically comprise of clean rainwater runoff from areas of hardstanding.

10.7.5. The transformers on site would require the use of insulating oils. Transformers would be installed within bunded areas so that in the unlikely event of a leak or damage there would be no release to the site surface water drainage system (see below). As an additional safeguard, surface water runoff would also be also routed through an oil interceptor before being discharged to the surface water drainage system.

10.7.6. The transformers would be subject to regular inspections and would have an automated warning system to alert if oil levels within the transformers suddenly drop. The construction and maintenance of the transformers would be undertaken in accordance with best practice

guidance, particularly “GPP02: Above Ground Storage Tanks” and “GPP08: Safe Storage and Disposal of used Oils”.

10.7.7. A surface water drainage strategy has been developed and is included in **Appendix 10.1**. The drainage strategy outlines how surface water runoff can be managed, utilising SuDS, to manage the quality and rate of surface water discharged from the hardstanding areas.

10.7.8. The drainage system at the BESS has also been sized to manage firewater, should, in the unlikely event of a fire, fire water and fire retardants be used to extinguish a fire. Details of the proposed firewater management strategy associated within the proposed BESS will again be developed as part of the detailed drainage design for the site, and sizing for the detention basin will accommodate flows as calculated in **Appendix 10.1**. It is anticipated that this will be secured by a planning condition.

10.7.9. As above, these measures would significantly reduce the likelihood of pollutants, including oils and suspended solids, being discharged to nearby watercourses or groundwater.

Groundwater Levels and Flow

10.7.10. As discussed in the baseline assessment, the Proposed Development will be constructed on bedrock deposits that contain little to moderate groundwater with overlying superficial deposits which inhibit throughflow and groundwater emergence. No significant deep or expansive earthworks are proposed when compared to the groundwater catchments so there will be no catchment scale impact on groundwater levels and flows.

10.7.11. The detailed design of the Proposed Development will be informed by further site investigation. The site investigation would be used to ensure appropriate safeguards are included in the construction works. No impact on groundwater levels and flow is therefore anticipated.

Surface Water Flow and Flood Risk

10.7.12. SuDS will be incorporated as part of the Proposed Development and a concept drainage design has been prepared (see **Appendix 10.1**). This will ensure that increase in surface water runoff, associated with the increase in impermeable areas required to facilitate the Proposed Development, are managed onsite up to and including the 1 in 200 year event plus an allowance for climate change.

10.7.13. With these safeguards and those outlined in Section 10.6, surface water flow and flood risk to the Proposed Development and downstream of the site can be mitigated.

10.8. Summary

10.8.1. Existing hydrological and hydrogeological conditions have been confirmed and used to assess the potential effects the Proposed Development might have on the water environment.

10.8.2. Many of the potential impacts associated with a development of this nature have been mitigated by its design. Further, good practice construction techniques that would safeguard the water environment have been committed. Subject to the adoption of the good practice construction techniques and the committed further works at the detailed design stage of the project no effects on hydrology or hydrogeology have been identified.

11 Noise

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11. Noise

11.1. Introduction

11.1.1. The proposed Limekiln BESS development (the Proposed Development) is located within the Limekiln Wind Farm area and this Chapter discusses the potential noise impact at the nearest receptors identified (i.e. residential properties).

11.1.2. Construction noise for a BESS would be mostly from mobile plant on-site for earthworks and various small scale construction activities and deliveries. The principal noise emissions associated with the operational phase would arise from fixed plant such as battery units and inverters / transformers.

11.1.3. TNEI Services Ltd (TNEI) has prepared this chapter and has extensive experience of noise assessment for BESS developments.

11.2. Assessment of Likely Affects

11.2.1. The Proposed Development location is such that it is a remote location within the existing Limekiln Wind Farm, where the construction compound of that wind farm was located. As such the immediate surroundings are wind turbines spread over the local hills and receptors are distant.

11.2.2. The nearest noise sensitive receptors of interest are residential properties quite distant from the Proposed Development and these were already identified in the scoping report which suggested that noise could be scoped out. Figure 11.1 depicts the BESS area and nearby noise sensitive receptor and Table 1.1 below shows the distances between nearest identified receptors and the Proposed Development. It should also be noted that there will be no line of sight between the Proposed Development and the receptors due to a hilly topography, inclusive of the Creag Letham Hill.

Table 1.1 Noise Sensitive Receptors

Noise Sensitive Receptor	Easting	Northing	Approximate Distance to BESS (km)
NSR1 – Achins	295877	964090	2.9
NSR2 – Borlum House	297199	964065	2
NSR3 – Milton	297861	964470	2.3

NSR4 - Loanscorribest	298508	964010	1.9

11.2.3. In TNEI's professional opinion and experience of preparing BESS operational noise assessments, at distances over 1 km away from any BESS fixed plant no significant operational impact would be anticipated for a BESS of this scale (up to 70 MW) and no noise assessments are usually required. Here the distances are over 1.9 km so this well exceed the 1 km approximate threshold. Given the separation distances between the Proposed Development and the noise sensitive receptors, no detailed noise assessment is required and no significant operational impact are anticipated.

11.2.4. For construction noise, similarly to operational noise the distances between receptors and the main construction area and activities are large. Furthermore, construction noise can be managed if required through the adoption of best practice measures incorporated within a Construction Environmental Management Plan (CEMP). This could be prepared prior to the start of construction and would include construction hours beyond which construction works would not be able to take place. The distance to receptors, temporary nature of the construction phase, and with construction works being limited to certain hours of the day, including reduced hours on a Saturday and avoiding Sundays and Bank Holidays, means that construction noise is not expected to result in significant effects. Effects during eventual decommissioning of the Proposed Development would be similar to those during construction.

11.2.5. It is understood there will also be a minor upgrade to the wind farm substation to accommodate the connection of the Limekiln BESS. The distance of the substation is approximately 630 m north west of the proposed BESS site, and 1.3 km away from the nearest receptor. As such, given the large separation distances and the fact only minor upgrades are suggested, no significant operational and construction noise impact are anticipated due to the substation upgrade.

11.3. Conclusion

11.3.1. Given the large distance between the Proposed Development and nearby receptors, no significant noise effects associated with the construction, operation or decommissioning of the Proposed Development are anticipated.

12 Transport Statement & Construction Traffic Management Plan

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12. Introduction

12.1. Purpose of Report

12.1.1. Pell Frischmann has been instructed by Boralex (the Applicant) to produce a combined Transport Statement and Construction Traffic Management Plan (CTMP) to support a planning application for the construction and operation of a Battery Energy Storage System (BESS) with a maximum output of up to 70 megawatts (MW) and an extension to the existing Limekiln Wind Farm Substation on land within the operational Limekiln Wind Farm, within The Highland Council (THC) administrative area.

12.1.2. The planning application is for a proposed BESS and extension to the existing Limekiln Wind Farm Substation (the Proposed Development). This covers the construction, operation and maintenance of a BESS of up to 70 MW with associated infrastructure and ancillary works.

12.1.3. This report provides an overview of the Proposed Development in relation to construction traffic and sets out the proposed mitigation measures for use at the site. Once operational, the Proposed Development will generate minimal levels of maintenance traffic and no specific traffic measures are required for the operational phase.

12.1.4. No liability is accepted for the use of all or part of this report by third parties. This report is © Copyright of Pell Frischmann 2025 and the Applicant. No section of this report may be reproduced, without prior written approval.

12.2. Report Structure

12.2.1. Following this introduction, the report is structured as follows:

- Section Two describes the Proposed Development, including access arrangements;
- Section Three details the existing transport conditions in the vicinity of the site;
- Section Four details the types of construction traffic likely to be used on the site, including estimated delivery volumes;
- Section Five outlines the proposed construction traffic management measures to be used on the site; and
- Section Six provides a summary of the report.

12.3. Development Description

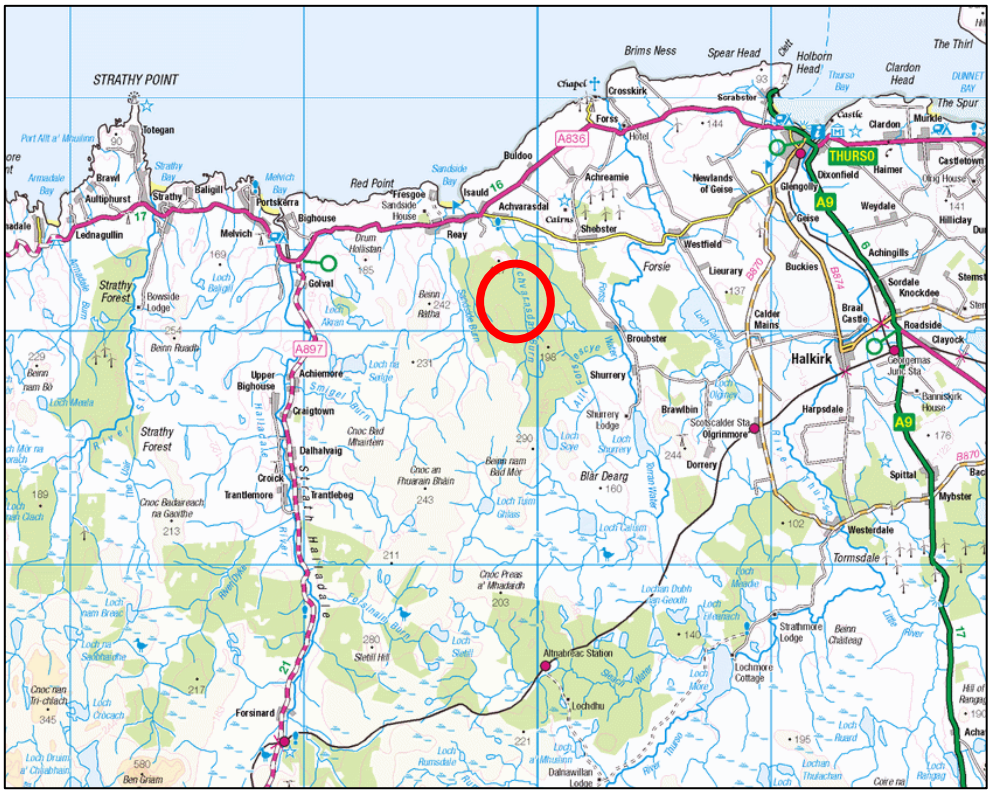
Development Location and Layout

12.3.1. The Proposed Development comprises of a BESS, featuring the following elements:

- Battery storage and their associated electrical connections and medium voltage switchgear;
- Control facilities;
- An extension to the existing Limekiln Wind Farm Substation;
- Access track to the secure compound (accessing from the existing Limekiln Wind Farm access track network, which will also provide operational access post construction); and
- Security fencing, landscaping and other soft features.
- Underground Cable between the BESS and Substation Extension.

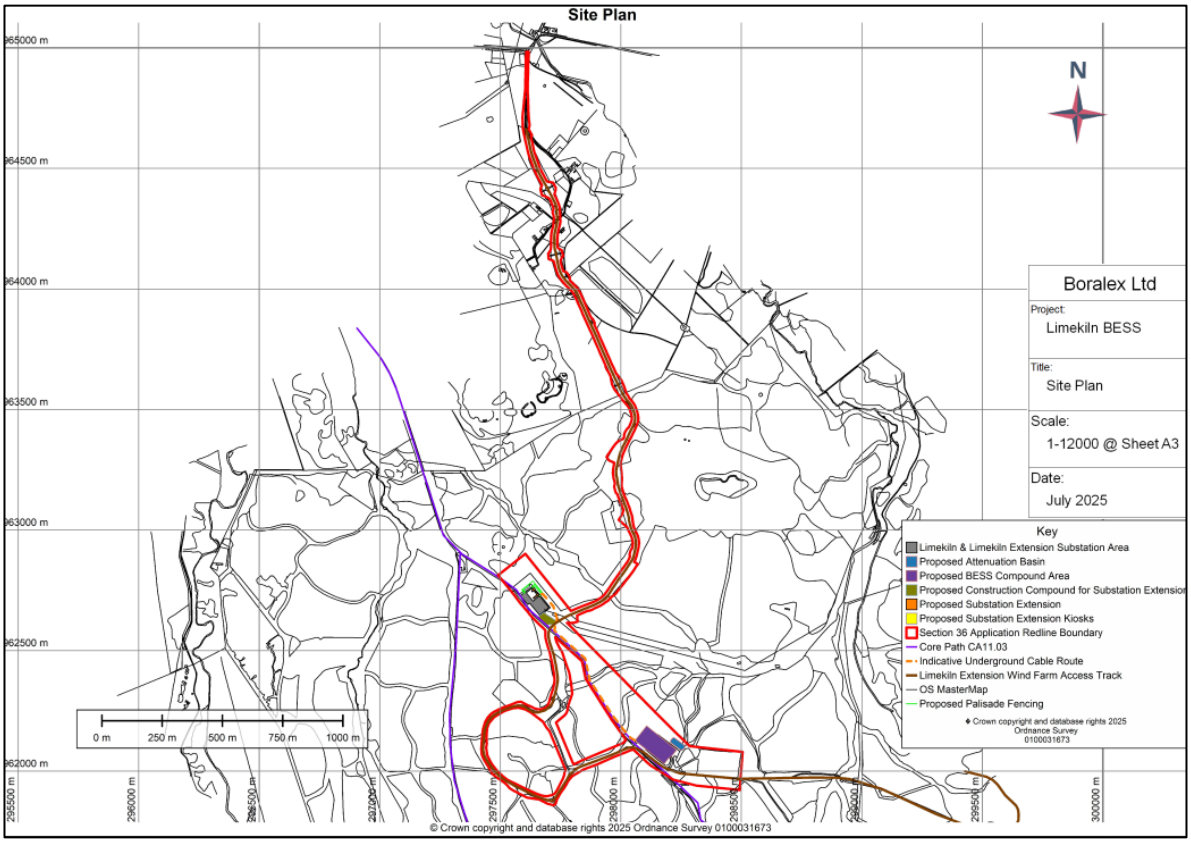
12.3.2. The Proposed Development location is illustrated in Figure 1.

Figure 1 Proposed Development Location


STRATHY POINT
Brims Ness
Spear Head
Holborn Head
Clardon Head
The Thirl
The Spur
Crosskirk
Scrabster
Thurso Bay
DUNNET BAY
Totegan
Brawl
Auliphurst
Strathy
Baligill
Armadale Bay
Strathy Bay
Melvich Bay
Portskerra
Melvich
Bighouse
Red Point
Fresgoe
Sandside Bay
Buldoo
Isauld
Achvarasdal
Cairnaburn
Shebster
Achreamie
Forss
Hotel
A836
Newlands of Geise
Dixonfield
Haimer
Castletown
Thurso
A9
Weydale
Hillclay
Geise
Westfield
Forsie
Lieurary
Buckies
Achingills
Sordale
Knockdee
Braal Castle
Roadside
Clayock
Halkirk
Lednagullin
Golval
Reay
Strathy Forest
Bowside Lodge
Beinn Ruadh
Beinn Rath
Drum Holistan
Loch Akran
Loch Bagail
A897
Upper Bighouse
Achiemore
Craigtown
Dalhalvaig
Croick
Trantlemore
Trantlebeg
Smigel Burn
Loch na Seilge
Cnoc Bad Mhairtein
Cnoc an Fhuarain Dhuibh
Beinn nam Bad Mor
Loch Tuim Ghlas
Shurrery
Shurrery Lodge
Broubster
Brawlbin
Scotscalder Sta
Olgrinmore
Dorrery
Harpsdale
Blar Dearg
Spittal
Mybster
Westerdale
Tormsdale
Loch Calsam
Cnoc Freas a' Mhadaidh
Altnabreac Station
Lochdhu
Strathmore Lodge
Lochmore Cottage
Beinn Chaiteag
Forsinard
Sibill Hill
Ben Griam
Dalnawillan Lodge
Loch Rumsdale
Loch Ruard
Loch Thurlachan
Loch Rangag
Hill of Rangag
Halladale River
Strathy River
Naver River
Thurso River
Wick River
Allt Bad a' Sgeire
Allt Smigel
Allt Dalnawillan
Allt Bealach Burn
Allt Briskich
Allt Beinn Rath
Allt Bad Mhairtein
Allt Shurrery
Allt Dorrery
Allt Bad Mor
Allt Tuim Ghlas
Allt Calsam
Allt Meadie
Allt Briskich
Allt Bealach Burn
Allt Dalnawillan
Allt Beinn Rath
Allt Bad a' Sgeire
Allt Smigel

12.3.3. Access to the Proposed Development is to be taken from the existing Limekiln Wind Farm access tracks. The layout of the Proposed Development is illustrated in Figures 'Site Plan' and 'Site Plan Detail'.

Figure 2 Proposed Development Layout



12.3.4. The proposed BESS development is to be constructed on the reinstated temporary construction compound used for Limekiln Wind Farm.

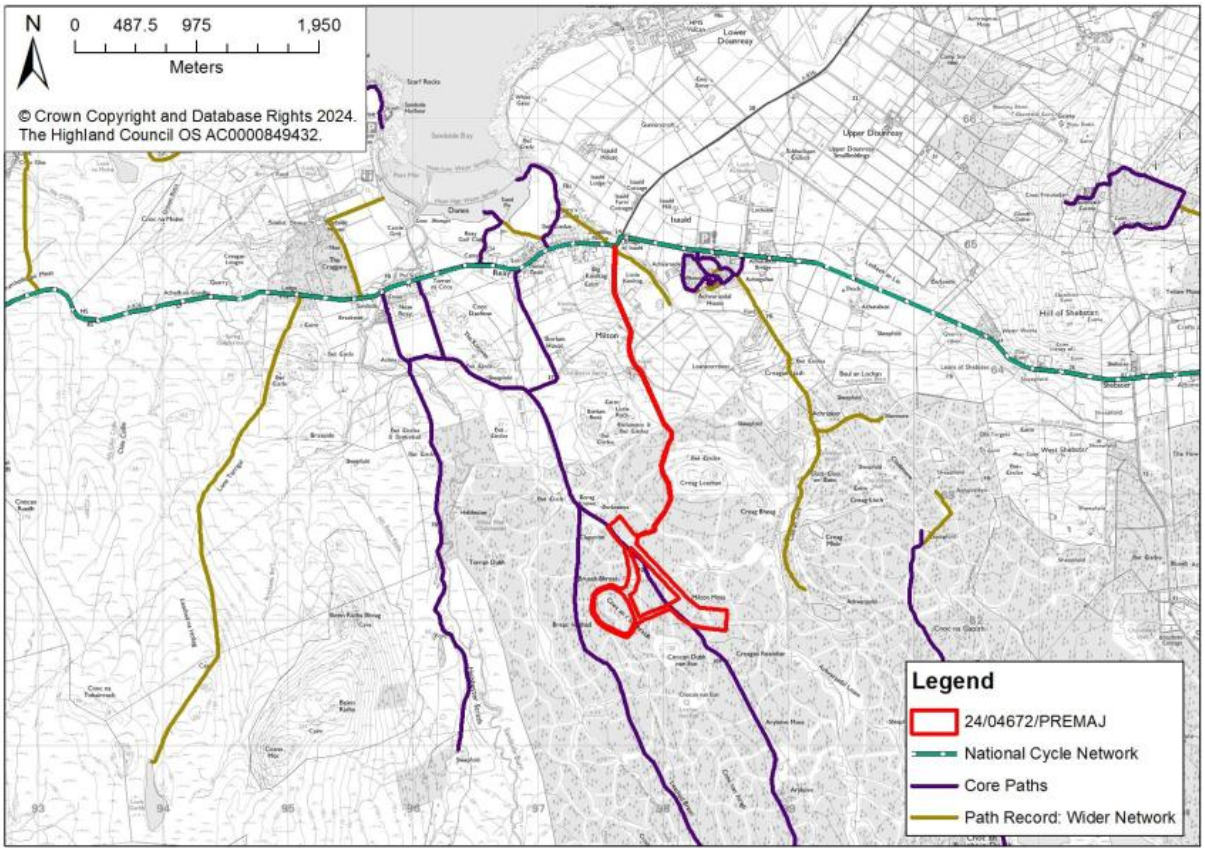
12.4. Existing Network Active Travel Network

12.4.1. A review of THC Core Path maps[1] indicates that Core Path CA11.03 intersects the access route to the Proposed Development. The Core Path is shown in Figure 2 below, taken from the pre-application details kindly provided by Highland Council under application 24/04672/PREMAJ to scope the Proposed Development for Environmental Impact Assessment (EIA).

12.4.2. A review of THC Core Path maps[2] indicates that Core Path CA11.03 intersects the access route to the Proposed Development. The Core Path is shown in Figure 2 below, taken from the pre-application details kindly provided by Highland Council under application 24/04672/PREMAJ to scope the Proposed Development for Environmental Impact Assessment (EIA).

12.4.3. Core Path No. CA11.03 Limekiln Forest comprises a track which is 8.4 kilometres (km) in length.

Figure 3 Core Path & Cycle Route Network



[1] https://highland.maps.arcgis.com/apps/webappviewer/index.html?id=2fd3fc9c72d545f7bcf1b43bf5c8445f [Accessed June 2025]
[2] https://highland.maps.arcgis.com/apps/webappviewer/index.html?id=2fd3fc9c72d545f7bcf1b43bf5c8445f [Accessed June 2025]

12.4.4. While there are no National Cycle Network routes in the immediate vicinity of the site, a review of the Map of the National Cycle Network (https://www.sustrans.org.uk/national-cycle-network) highlights parts of the A836 and the C1001 road, to the north of the site, as an "On-road route not on the National Cycle Network". This is shown in the context of the Development Site in Figure 2.

12.5. Existing Road Links

12.5.1. The nearest trunk road to the site is the A9, linking Stirling to Thurso. The A9 between Stirling and Thurso is operated by Transport Scotland on behalf of Scottish Ministers. The single carriageway sections are subject to a 60 miles per hour (mph) speed limit for cars and motorcycles outwith towns and villages on the route and 70mph on dual carriageway sections. Goods vehicles exceeding 7.5 tonnes are subject to a 40mph and 50mph speed limit on single and dual carriageway sections respectively. This is with the exception of single carriageway sections between Perth to Inverness where a 50mph speed limit applies to Goods Vehicles over 7.5 tonnes.

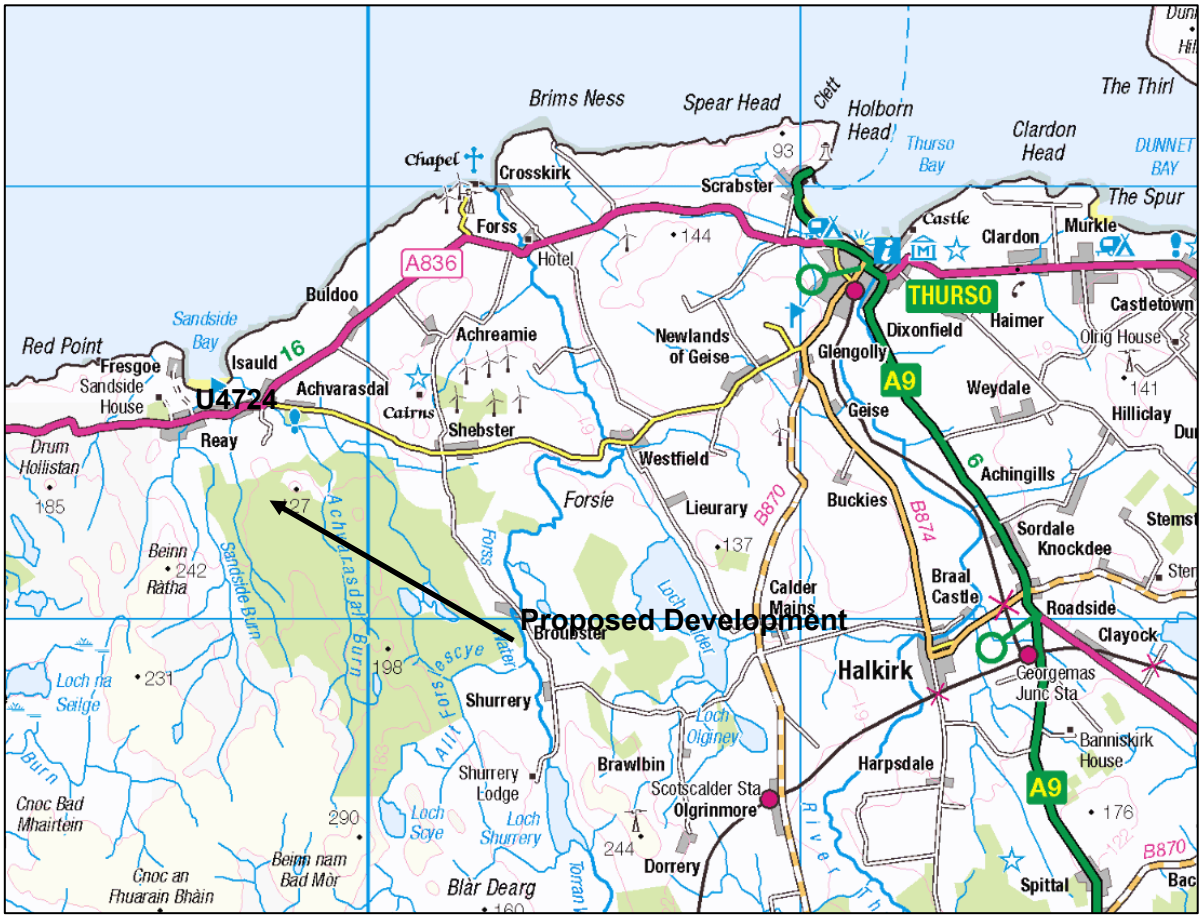
12.5.2. Access to the Proposed Development is from the A9 via the A836 and U4724 Milton Road.

12.5.3. The A836 is a rural single carriageway approximately 6 metres (m) in width and is a route of strategic national importance, connecting the Highlands and routing Thurso to Tain. The A836 is subject to the national speed limit in the vicinity of the junction with the U4724 Milton Road.

12.5.4. The U4724 was upgraded to enable access for Abnormal Indivisible Load (AIL) access for Limekiln Wind Farm turbine and transformer components. The road was used as the sole point of construction traffic access is capable of enabling Heavy Goods Vehicle (HGV) access to the Proposed Development.

12.5.5. Figure 4 illustrates the local road network links.

Figure 4 Study Area Network Road Link



12.6. Road Network Suitability

12.6.1. The Agreed Timber Route Map[3] has been developed by The Timber Transport Forum who are a partnership of the forestry and timber industries, local government, national government agencies, timber hauliers and road and freight associations. One of the key aims of the forum is to minimise the impact of timber transport on the public road network, on local communities, and the environment and a way of achieving this is to categorise the roads leading to forest areas in terms of their capacity to sustain the likely level of timber haulage vehicles i.e., HGVs.

[3] https://timbertransportforum.org.uk/ [Accessed June 2025]

The routes are categorised into four groups, namely, 'Agreed Routes', 'Consultation Routes', 'Severely Restricted Routes' and 'Excluded Routes'.

12.6.2. 'Agreed Routes' are categorised as routes used for timber haulage without restriction as regulated by the Road Traffic Act 1988. A-roads are classified as 'Agreed Routes' by default unless covered by one of the other road classifications. Those links classed as 'Consultation Routes' are categorised as a route which is key to timber extraction, but which are not up to 'Agreed Route' standard. Consultation with the local authority is required, and it may be necessary to agree limits of timing, allowable tonnage, etc. before the route can be used. B-roads are classified as 'Consultation Routes' by default unless covered by one of the other classifications. 'Severely Restricted Routes' are not normally to be used for timber transport in their present condition. These routes are close to being Excluded Routes. Consultation with the local authority is required prior to use. Finally, 'Excluded Routes' should not be used for timber transport in their present condition. These routes are either formally restricted, or are close to being formally restricted, to protect the network from damaging loads.

12.6.3. The A9 and A836 form part of the agreed route network used for the extraction of timber and are therefore regularly used by HGV traffic. As such, they are considered suitable for the movement of construction HGV traffic.

12.7. Road Safety Review

12.7.1. Personal Injury Accident (PIA) data for the five-year period commencing 01 January 2019 through to the 31 December 2023 was obtained from the online resource CrashMap[4] which uses data collected by the police regarding road traffic crashes occurring on British roads, where someone is injured.

12.7.2. Transport Assessment Guidance[5] requires an analysis of the accident data on the road network in the vicinity of any development to be undertaken for at least the most recent three-year period, or preferably a five-year period.

12.7.3. The statistics are categorised into three categories, namely "Slight" for damage only incidents, "Serious" for injury accidents and "Fatal" for accidents that result in a death.

12.7.4. A review of the A836 between Scrabster and the U4724 indicates that there have been three "Slight" accidents, two "Serious" accidents and one Fatal accident on the A836.

[4] https://www.crashmap.co.uk [Accessed October 2024]

[5] https://www.transport.gov.scot/media/4589/planning_reform_-_dpmtag_-_development_management__dpmtag_ref__17__-_transport_assessment_guidance_final_-_june_2012.pdf

12.7.5. HGVs were in volved in one “Fatal” accident involving a motorcyclist to the east of Forss. Young Drivers (those under the age of 25) were involved in one accident, whilst pedal cyclists were involved in one “Slight” accident.

12.7.6. Three of the accidents involved just one vehicle, indicating a loss of control. These accidents generally occurred at bends or at minor road junctions. No accidents were recorded in what is generally accepted to be winter months.

12.7.7. Based on the information available, it has been established that there are no specific road safety issues within the immediate vicinity of the Proposed Development that currently require to be addressed or will be exacerbated by construction activities.

12.8. Existing Traffic Flows

12.8.1. To review the existing traffic flows on the Department for Transport (DfT) count data for the A836 (to the east of Forss), A9 in Thurso and the A9 south of Thurso was collected.

12.8.2. The traffic data allowed the traffic flows to be split into vehicle classes and the data have been summarised into cars / Light Goods Vehicles (LGV) and HGV.

12.8.3. The DfT traffic flows were factored to 2025 traffic flows using National Road Traffic Forecast (NRTF) High Growth factors. The NRTF High Growth Factor from 2024 to 2025 is 1.012.

12.8.4. The traffic survey summary is provided in Table 1 below.

Table 1: 2025 Daily Traffic Flows

Description	Cars & LGV	HGV	Total Traffic
A836	2,332	31	2,363
A9 Thurso	2,997	137	3,133
A9 South of Thurso	3,205	328	3,533

Please note minor variances due to rounding may occur.

12.8.5. Should the Proposed Development be consented, construction works are expected to commence 2027. NRTF High Growth assumptions have been used to provide a factor to convert the 2024 flows to 2027 flows. The NRTF Low Growth Factor from 2025 to 2027 is 1.012.

12.8.6. The 2027 baseline flows are provided in Table 2.

Table 2: 2027 Daily Traffic Flows

Description	Cars & LGV	HGV	Total Traffic
A862 North	2,388	32	2,420
A862 Site Access	3,068	140	3,208
A862 East	3,282	336	3,618

Please note minor variances due to rounding may occur.

12.9. Committed Developments

12.9.1. A review of planning applications in the area has been undertaken. In line with established practice, the following screening factors of applications has been undertaken to determine those that can be included in the assessment:

- Will the application use the same study area as the Proposed Development?
- Is the application determined, and as such, can be considered as Committed Development?
- If the application results in temporary traffic, will these traffic flows occur at the same time as those for the Proposed Development?
- Does the application provide publicly available traffic data in the relevant traffic classes?

12.9.2. The review suggests that the Strathy South Wind Farm will be in construction at the same time as the BESS scheme. At its peak, 172 vehicle movements (100 Car / LGV and 72 HGV) are predicted. These have been applied across the study area,

12.9.3. Should there be a cross over between the Proposed Development and the construction period of other schemes, then the Applicant would welcome the opportunity to discuss common traffic management measures with the promotors of these projects, in association with THC.

12.10. Construction Traffic

Trip Generation

12.10.1. The proposed construction works are estimated to take between 6 and 12 months. To provide a robust assessment, a 9 month programme has been used.

12.10.2. The programme has been divided into its component sections and estimates of the likely traffic generation have been made from the material quantities, staff requirements and component deliveries required. The main areas of construction traffic can be subdivided as follows:

- Import of Plant and Machinery;
- Site Establishment Clearance Loads;
- Import of Bulk Materials;
- Import of Ready-Mix Concrete;
- Import of General Building Supplies;
- Delivery of HV Electrical Components;
- Delivery of batteries;
- Delivery of general site materials and supplies;
- Grid and electrical connection works; and
- Arrival and departure of construction and commissioning staff at the site.

12.10.3. The traffic generation during the construction phase has used first principles to establish the volume and tonnage of construction materials. This has then been converted to two-way vehicle movements to create the construction programme illustrated in Appendix A.

12.10.4. The peak of construction activity occurs in Month Five of the construction programme.

12.11. Distribution of Construction Trips

12.11.1. Exact material suppliers will be determined through the Balance of Plant (BoP) contract. The supplies anticipated for use in this study however are based upon the following:

- Deliveries associated with the batching of concrete on site will arrive via the A836 and A9 to the south of Thurso;
- Sand and aggregate for use in the on-site batching plant will be sourced from local quarries. For the purposes of the assessment, it is assumed that all material will be taken from the quarries located to southeast of Thurso. The BoP contractor will confirm final quarry and material sourcing with THC in the Construction Traffic Management Plan (CTMP);
- HV electrical equipment and batteries: Likely to be supplied from Scrabster Harbour via the A836;
- Staff working at the site are likely to be based locally. It is assumed that 10% will be based to the west of the site, 20% between the site and Thurso and 70% based in Thurso itself; and
- General site deliveries will be via the A9 and A836 to site. These are generally smaller rigid HGV vehicles.

12.11.2. These general distributions have been applied to the peak of construction activities to estimate the likely peak traffic associated with construction activities. The peak construction traffic flows are summarised in Table 3.

Table 3: Peak Daily Construction Traffic Flows

Description	Cars & LGV	HGV	Total Traffic
A862 North	26	32	58
A862 Site Access	18	32	50
A862 East	5	32	37

Please note minor variances due to rounding may occur.

12.11.3. A review of the traffic impact of the construction traffic on the road network has been undertaken and is illustrated in Table 4.

Table 4: 2027 Base + Construction Traffic Flows / Traffic Impact

Description	Cars & LGV	HGV	Total Traffic	Cars & LGV % Impact	HGV % Impact	Total Traffic % Impact
A862 North	26	32	58	1.0%	30.7%	2.2%
A862 Site Access	18	32	50	0.6%	15.1%	1.5%
A862 East	5	32	37	0.2%	7.8%	1.0%

Please note minor variances due to rounding may occur.

12.11.4. The peak construction traffic impact level is significantly below the 10% threshold for undertaking a detailed Transport Assessment. The daily flows are therefore not considered significant in traffic terms for roads within the study area.

12.11.5. The increase in traffic is significantly less than 30%, the threshold for undertaking an Environmental Impact Assessment (EIA). The increase in traffic represents an additional 58 vehicle movements (29 inbound and 29 outbound) per day, of which 32 are classified as HGV (16 inbound and 16 outbound). This represents on average 2 additional HGV movements in and out per hour during the peak month.

12.11.6. The impact of this number of HGV movements on the study area road network can be managed by a CTMP to ensure that any disruption and disturbance can be kept to a minimum.

12.12. Abnormal Load Traffic

12.12.1. The Applicant has advised that there is one large electrical transformer associated with the proposed development. This load is of the same weight and dimensions of the recently

completed wind farm transformer and would use the same access route and existing mitigation measures from Scrabster harbour.

12.12.2. The remaining abnormal loads are associated with the erection crane and battery units.

12.12.3. The battery units proposed for this development are approximately 6.0 m long, 2.5 m wide and 3.0 m high. These dimensions are below the threshold for Abnormal Indivisible Loads (AIL). At 32 tonnes they are likely to be marginally heavier when loaded on a trailer than the 44 tonne limit defined by the Road Vehicle Construction & Use Regulations 1986.

12.12.4. The proposed battery units will therefore come under the Road Vehicles (Authorisation of Special Types) (General) Order 2003, known as the STGO. Under these regulations, the proposed loads are Category 2 (under 80 tonnes fully loaded).

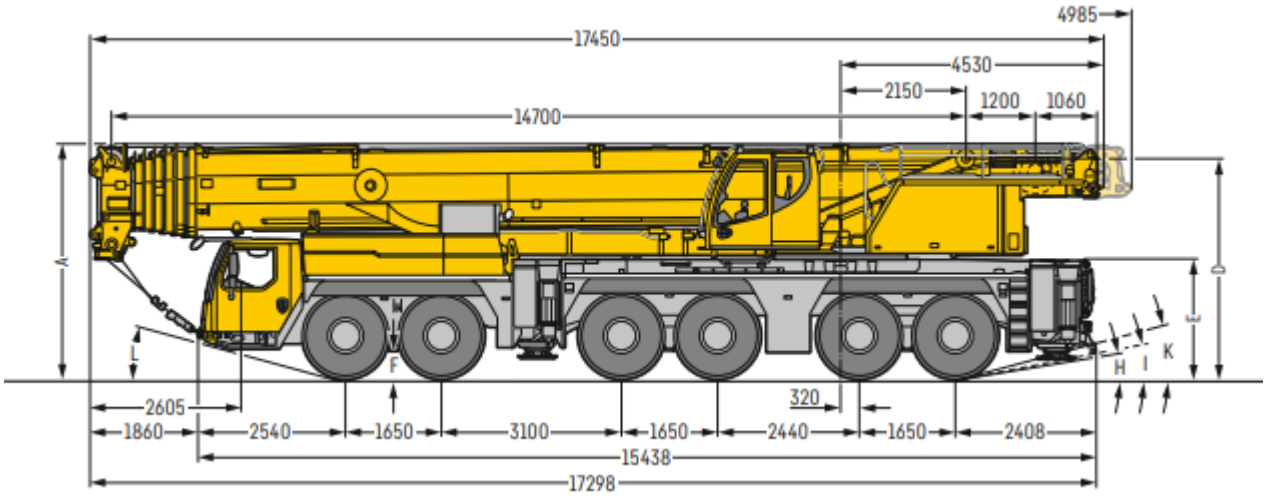
12.12.5. STGO Cat 2 loads require the Applicant to provide 2 working days' notice of the proposed movements to the road authorities and police,

12.12.6. Assuming the use of a four-axle trailer as a worst case scenario, the likely worst case axle load will be 9 tonnes with a gross vehicle weight of 55 tonnes. The maximum axle load for the tractor unit would be 10 tonnes. The overall length of the load would be similar to a standard 40-foot container HGV.

12.12.7. It is expected that BESS units will be delivered to site from the Port of Scrabster and would use the A836 direct to site.

12.12.8. The heaviest load accessing the site would be the erection crane. At a total weight of no more than 72 tonnes, the expected axle weight according to details provided by crane manufacturer Leibherr is no greater than 12 tonnes. Vehicle axle spacing is provided in Figure 4 below.

5 Proposed 300 tonne Capacity Crane



12.12.9. These load weights are all below the weights previously transported to site as part of the wind farm project. There are no requirements for offsite road accommodation works for the proposed crane or BESS unit loads.

12.12.10. The BESS units do not legally require the use of an escort vehicle. A civilian escort may accompany the crane to the front and rear of the vehicle.

12.12.11. No specific junction or crossing management measures are proposed, as none of the vehicles will oversail a footway or verge.

12.12.12. The width of the crane is 3 m and would not impede oncoming traffic, including emergency vehicles on the A9.

12.13. Operational Traffic

12.13.1. Traffic associated with the operational phase will be minor in nature and restricted to occasional visits for maintenance, servicing and security reviews. It is anticipated that traffic flows associated with this phase of the Proposed Development will be no more than ten vehicle movements (five inbound and five outbound) per month.

12.13.2. This level of traffic is not considered to be significant and as such, no further assessment is proposed.

12.14. Construction Traffic Management Proposals

12.14.1. The traffic management proposals in this report will be provided to the Principal Contractor and they will be required to abide by these regulations as part of their commercial contracts with the Applicant. Failure to follow the traffic management measures proposed would be a contractual matter and could result in contractors being dismissed from the site.

12.14.2. Pages with information about the construction of the development will be available on the project website. These will be updated throughout the construction period. If visitors to the site are unable to find the answer to their question in the webpages, an email address will be provided on the project website to contact the Applicant. In addition, details will also be circulated via a newsletter advising about ongoing activities. A telephone number for the Principal Contractor would be published during operational hours to resolve any traffic management problems that occur, and these calls would be logged and reported to the Applicant on a weekly basis to monitor the situation.

12.14.3. All contractors will be monitored through regular spot-checks to ensure they follow the approved access route(s). Access routes identified will be clearly defined in all sub-contracts and signposted.

12.14.4. The site access junction will be kept clear at all times during construction and will be monitored by on-site staff to ensure vehicles do not attempt to use the area for parking.

12.14.5. Use of a visible vehicle identification system for HGV deliveries should be employed to ensure compliance with the agreed route and driver behaviour standards. This will allow the public to identify any rogue vehicles to the site office for easy recognition and review.

12.14.6. The Applicant will also create a protocol for working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic wherever possible.

12.14.7. The following measures would be provided to assist in managing traffic across the study area road network.

12.15. General Measures

12.15.1. Wherever reasonably possible, local suppliers such as quarries and concrete works are proposed to help minimise traffic levels of the network.

12.15.2. The following measures would be implemented through this CTMP during the construction phase:

- Contractual requirement in the BoP contract that contractors will only use the agreed access routes;
- Direction signage signposting traffic on the agreed access routes;
- Identification numbers of HGV and vans to allow easy recognition;
- Providing the public with details of how to report use of unapproved routes or driving issues of concern;
- Using GPS trackers to allow the monitoring of bulk delivery vehicle movements;
- Setting out site staff disciplinary measures for those who ignore the agreed access routes and enforcing these throughout the construction period;
- All site vehicles will feature “white noise” reversing warning devices to reduce noise disruption when on site;
- All materials delivery lorries (dry materials) will be sheeted to reduce dust and stop spillage on public roads;
- Specific training and disciplinary measures will be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway;
- Wheel cleaning facilities will be established at the site entrance. A road sweeper would also be provided at site to ensure that the U4724 is kept clean at the site access junction

during the development platform works and any other works likely to generate material that could be tracked on to the public road network; and

- Site induction for all staff instructing them on what route to site they can use to enter and exit the site and obtaining their acknowledgement that there is only one approved access route. The induction would include:
    - A tool box talk safety briefing;
    - The need for appropriate care and speed control;
    - A briefing on driver speed reduction agreements (to slow site traffic at sensitive locations);
    - To advise drivers to be aware of vulnerable road users; and
    - Identification of the required access routes and access junction operation and the controls to ensure no departure from these routes.

12.16. Wear & Tear Agreement

12.16.1. An agreement is suggested to cover the cost of any abnormal wear and tear on the A836. This would be agreed with THC subject to the granting of planning approval.

12.16.2. The wear & tear agreement will address concerns about possible damage to the public road, verges and structures. It will be based upon condition surveys of the road to ensure that the condition of the road does not deteriorate as a result of the construction works.

12.16.3. Video footage of the pre-construction phase condition of the agreed area covered by the condition survey would be recorded to provide a baseline of the state of the road prior to any construction work commencing. This High Definition (HD) baseline review would inform any change in the road condition during the construction stage of the proposed Development as it notes the existing condition of the road surface and features and details current condition.

12.16.4. The condition survey would feature still images for the survey and would measures specific defects to monitor their progression. Locations of points would be accurately logged using a GPS tracker.

12.16.5. To agree the current state of the road, the report would be agreed with THC prior to construction works commencing.

12.16.6. Any immediate necessary repairs would be coordinated with The Highland Council. Any damage caused by traffic associated with the Proposed Development, during the construction period that would be hazardous to public traffic, would be repaired immediately.

12.16.7. During construction activities, a general road wear and tear review would be undertaken with THC every three months during construction. Interim reviews will be undertaken by the Principal Contractor on a regular basis and the progress reports issued to the Applicant.

12.16.8. Any damage to road infrastructure caused directly by construction traffic would be made good, and street furniture that is removed on a temporary basis would be fully reinstated.

12.16.9. There would be a regular road edge review and any debris and mud would be removed from the public carriageway to keep the road clean and safe during the initial months of construction activity, until the construction junction and immediate access track works are complete.

12.16.10. Upon completion of construction activities, a follow-on condition review will be undertaken around the site access junction and a defects list prepared. Works required to reinstate the road back to its original condition would be undertaken at the Applicant's expense following a review with THC.

12.17. Turning Facilities & Banksmen

12.17.1. For safety reasons both onsite and for other road users, the site has been designed so all vehicles can enter and exit the site in a forward gear. No vehicle shall reverse onto unmanaged public roads and shall only enter / exit the site using forward gear only.

12.17.2. A banksman will be provided at the site access to help guide traffic within the site and to ensure health and safety access for the site. The banksman will be in radio contact with the wider site compound to advise of movements to and from the site.

12.17.3. Upon completion of construction works, a gate will be provided on the access track at its junction into the proposed Development. The gate will be set back from the public road to ensure that any future HGV vehicles can stop at the gate without blocking back onto the track.

12.18. Road Signage

12.18.1. A junction signage strategy will be prepared and agreed with the Council prior to works commencing. The strategy will include the following:

- Site access signage to advise other road users of increased movements at the junction; and
- Chapter 8 (Traffic Signs Manual) "Slow Down" and "Heavy Plant Crossing" signage within 100 m of the site access.

12.18.2. Regular maintenance will be undertaken at the sign locations to keep the plates clean and to ensure they do not block the public footway and remain upright on their temporary mountings.

12.19. Non-Motorised Road Users

12.19.1. The Principal Contractor will ensure that speed limits are always adhered to by their drivers and associated subcontractors. Signage will be installed on the site exit that makes drivers

aware of local speed limits and reminding drivers of the potential presence of pedestrians and cyclists in the area. This will also be emphasised in the weekly toolbox talks.

12.20. Summary

12.20.1. This combined Transport Statement & Construction Traffic Management Plan has considered the likely impact of traffic generated by the Proposed Development on the local road network.

12.20.2. A review of the type and volume of vehicles associated with the construction programme has been provided and the peak of construction activities identified. This peak in traffic has been used to review the likely impact that construction activities would have.

12.20.3. Construction of the Proposed Development will generate approximately 58 vehicle movements per day at the peak of construction. It is expected that during the peak month of construction (Month Five), 32 two-way HGV movements per day will occur per day. A further 26 car / LGV trips would be created by construction staff travelling to and from the site.

12.20.4. Traffic management procedures have been proposed within this report which would ensure the safe operation of the approach route to the site during construction. Determination of the final details of these traffic management measures will occur once the contractor has been appointed.

12.20.5. As the Proposed Development will not be manned, operational traffic is expected to be minimal and would be conducted by smaller vehicles. The impact of this on the wider road network will be negligible.

Appendix A: Construction Programme and Delivery Profile

Construction **Programme**

Element	Vehicle									
Month		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Site Establishment / Reinstatement	HGV	100								100
General Deliveries	HGV	88	88	88	88	88	88	88	88	88
Site Clearance & Preparation	HGV	20	20							
Access Tracks	HGV		79	79						
Geotextile	HGV	6	6	6	6					
Development Platform	HGV		133	133	133	134				
Foundation Steel	HGV				3					
Foundation Concrete	HGV					366	366			
Cabling	HGV					8				
Cable Sand	HGV					86				
EV Gear & Switchgear	HGV							14		
Cranes	HGV					4			4	
Buildings	HGV							116		
Fencing, Landscaping & Security	HGV								20	
Battery & Inverter Delivery	HGV							180		
Commissioning	LGV								88	88
Staff	LGV	308	572	572	572	572	572	572	572	308
Total		522	898	878	802	1258	1026	970	772	584
Total HGV		214	326	306	230	686	454	398	112	188
Total LGV		308	572	572	572	572	572	572	660	396
Total HGV / Day		***10***	***15***	***14***	***10***	***32***	***21***	***18***	***5***	***9***
Total LGV / Day		***14***	***26***	***26***	***26***	***26***	***26***	***26***	***30***	***18***
Total per Day		***24***	***41***	***40***	***36***	***58***	***47***	***44***	***35***	***27***

Please note that rounding errors may occur

13. Socio-economics

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13. Socio-economics

13.1. Introduction

13.1.1. This chapter considers the potential socio-economic impacts associated with the Proposed Development. The assessment of socio-economic benefits is based on the Proposed Development featuring a maximum export capacity of up to 70MW, with up to 4-hour discharge period.

13.1.2. The Proposed Development will generate economic benefits, during its development and construction, and during the operation and maintenance phase.

13.1.3. During development and construction, the economic benefits that are expected are:

- £3.2 million Gross Value Added (GVA) and 40 years of employment in Highland; and
- £8.4 million GVA and 100 years of employment in Scotland.

13.1.4. The expenditure for the operation and maintenance of the Proposed Development could deliver up to:

- £0.3 million GVA and 3 jobs in Highland; and
- £0.5 million GVA and 4 jobs in Scotland.

13.1.5. During operations and maintenance, the Proposed Development will also support the delivery of local services through the annual payment of £0.1 million in non-domestic rates.

13.1.6. While community benefit funding is not a standard practice for energy storage developments, the Proposed Development will provide £8,400 per year index-linked in funds to support community-led initiatives over its operational lifetime.

13.1.7. The Proposed Development will contribute to the five pillars of community wealth build through local spending, a BESS fund, local employment, fair wages, using the land for productive use, and stakeholder engagement.

13.2. Legislation, Policy and Guidance

13.2.1. There is no specific legislation, policy or guidance available on the methods that should be used to assess the socio-economic impacts of a BESS development specifically. The method implemented is based on established best practice in the socio-economic assessment of renewable energy projects.

13.3. Methodology

Study Area

13.3.1. The analysis of the socio-economic effects from the Proposed Development considered the following study areas:

- Highland, as defined by the local authority area; and
- Scotland.

Desk Study

13.3.2. The following data sources have been used in characterising the baseline:

- ONS (2025), Annual Population Survey 2024;
- ONS (2025), Business Register and Employment Survey 2022;
- ONS (2025), Annual Survey of Hours and Earnings 2024;
- National Records of Scotland (2025), Mid-Year Population Estimates 2023;
- ONS (2024), Population Projections 2018-2043;
- Scottish Government (2018), National Performance Framework;
- Scottish Government (2023), National Planning Framework 4; and
- Scottish Government (2022), National Strategy for Economic Transformation.

Assessment of Socio-Economic Effects

13.3.3. Given that no specific legislation or guidance is available on the methods which should be used when assessing the socio-economic effects of a proposed battery energy storage system development, the identification and assessment of the significance of predicted socio-economic effects has been based on BiGGAR Economics' professional judgement on the degree of change resulting from proposals using methods similar to that used in Environmental Impact Assessments (EIA) for other proposed renewable energy technology developments.

13.3.4. The assessment of economic impacts was undertaken using a model that has been developed by BiGGAR Economics specifically to estimate the socio-economic effects of renewable energy generation and storage developments.

13.3.5. The units of measurement which are used to quantify the economic impacts of the Proposed Development are:

- GVA: this is a measure of the economic value added by an organisation or industry;
- job years: this is a measure of employment, which is equivalent to one person being employed for an entire year and is typically used when considering the short-term employment impacts, such as those associated with construction; and
- jobs: this is a measure of employment, which considers the headcount employment in an organisation or industry.

13.3.6. To begin estimating the economic activity supported by the Proposed Development, it was first necessary to calculate the expenditure during the development and construction, and operations and maintenance phases. The total expenditure figure was then divided into its main components using calculated assumptions regarding the share that could be expected by main and sub-contractors. This provides an estimate for each main component that could be secured in Highland, and Scotland.

13.3.7. There are three sources of economic activity:

- component contracts and the jobs they support (direct effect);
- wider spending in the supply chain (indirect effect); and
- spending of people employed in these contracts (induced effect).

13.3.8. There are four key stages of this model, which are illustrated in Figure 13-1 below:

- estimation of the capital and operational expenditure;
- estimation of the value of component contracts that make up total expenditure;
- assessment of the capacity of businesses in the study area to perform and complete component contracts; and
- estimation of economic impact from resultant figures.

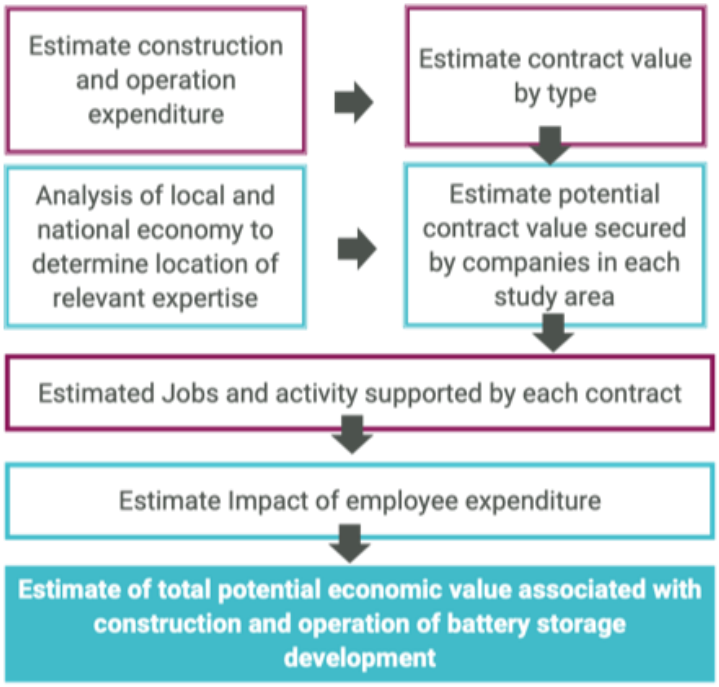

Figure 13-1 Approach to Economic Impact Assessment

13.4. Socio-economic Context and Baseline

Strategic Economic Context

Scotland's National Performance Framework

13.4.1. The National Performance Framework sits at the top of the policy hierarchy in Scotland, with all other policies and strategies designed to meet its purpose and outcomes. The purpose of the National Performance Framework is:

> *"To focus on creating a more successful country with opportunities for all Scotland to flourish through increased wellbeing, and sustainable and inclusive economic growth".*

13.4.2. The National Performance Framework (Scottish Government, 2018) sets out 11 outcomes, underpinned by 81 indicators, that combine to give a better picture of how the country is progressing towards these goals. As well as Gross Domestic Product (GDP) and employment measures, the National Performance Framework's outcomes reflect the desired fabric of communities and culture, education, the environment,

health and wellbeing and measures to help tackle poverty. It is these indicators on which the Scottish Government focuses its activities and spending to help meet the national outcomes.

13.4.3. The Proposed Development would contribute to the achievement of the national outcomes set out in the National Performance Framework. Investment in energy projects can increase productivity in the economy and create jobs in the local area. The Proposed Development will contribute towards the fulfilment of national outcomes by supporting the decarbonisation of the Scottish economy, creating jobs, and supporting the ambitions of local communities. Of the 11 national outcomes, the Proposed Development will contribute to:

- economy: have a globally competitive, entrepreneurial, inclusive, and sustainable economy;
- environment: value, enjoy, protect, and enhance the environment; and
- fair work and business: have thriving and innovative businesses, with quality jobs and fair work for everyone.

Scotland's National Strategy for Economic Transformation

13.4.4. In 2022, the Scottish Government published the National Strategy for Economic Transformation (Scottish Government, 2022), which set out its ambition for Scotland's economy over a decade. The Scottish Government's vision is to create a wellbeing economy where society thrives across economic, social and environment dimensions, which delivers prosperity for all Scotland's people and places. Of particular importance is the ambition to be greener, with a just transition to net zero, a nature-positive economy and a rebuilding of natural capital.

13.4.5. A key, longer-term challenge identified in the strategy is to address deep-seated regional inequality, which includes rural and island areas, that face problems such as a falling labour supply and poorer access to infrastructure and housing. The transition to net zero presents a further challenge of delivering positive employment, revenue and community benefits.

13.4.6. To deliver its vision and address the economy's challenges, five programmes of action have been identified (with a sixth priority of creating a culture of delivery), including:

- establishing Scotland as a world-class entrepreneurial nation;
- strengthening Scotland's position in new markets and industries, generating new, well-paid jobs from a just transition to net zero;
- making Scotland's businesses, industries, regions, communities and public services more productive and innovative;

- ensuring that people have the skills they need to meet the demands of the economy, and that employers invest in their skilled employees; and
- reorienting the economy towards wellbeing and fair work.

13.4.7. The strategy notes that Scotland has substantial energy potential and that it has developed a growing, green industrial base. This provides a strong foundation for securing new market opportunities arising from the transition to net zero. Renewable energy has a role to play in supporting productive businesses and regions across Scotland.

National Planning Framework (NPF) 4

13.4.8. The Scottish Government's National Planning Framework 4 (Scottish Government, 2023) is Scotland's national spatial strategy, setting out the principles to be applied to planning decisions, regional priorities and national developments.

13.4.9. One of the six spatial principles to be applied is a just transition, that ensures the transition to net zero is fair and inclusive, as is its principle of rural revitalisation, supporting sustainable development in rural areas. Applying these and other principles is intended to support the planning and delivery of sustainable places, where emissions reduce and biodiversity is restored and better connected.

13.4.10. As part of Policy 11a, all forms of renewable technologies, including energy storage, will be supported. This is subject to the test outlined in Policy 11c, that developments will only be supported where they 'maximise net economic impact including local and community socio-economic benefits such as employment, associated business and supply chain'.

Highlands and Islands Enterprise 2023-2028 Strategy

13.4.11. The strategy published by Highlands and Islands Enterprise (HIE) for the period 2023 to 2028 focuses on achieving net zero, fair and inclusive growth, and regional transformational opportunities. The strategy aims to achieve inclusive growth for all areas in the region.

13.4.12. The renewable energy sector and low carbon economy have been identified as significant economic, social and industrial opportunities for the region, both now and in the future. HIE is committed to building on the region's international reputation for excellence in energy and low carbon technologies by securing supply chain opportunities from energy developments, including onshore and offshore wind farms. HIE commits to:

- Supporting renewable energy deployment and associated supply chain development, with a particular focus on offshore wind (ScotWind and INTOG), wave and tidal energy (including further technology and commercialisation activity

through Wave Energy Scotland), onshore wind (repowering and circular opportunities) and pumped hydro;

- Raising awareness and encouraging adoption of the just transition to net zero, including developing and delivering net zero and circular economy awareness and training programmes including those targeted at the young workforce; and
- Supporting community wealth building/benefit from net zero through developing awareness of nature-based and circular opportunities for communities and developing and delivering the investment strategies for the Carbon Neutral Islands programme.

Community Wealth Building Strategy 2024-2027

13.4.13. The Highland Council is committed to embedding a Community Wealth Building approach within the Highlands. Community Wealth Building provides a recognised, alternative approach to economic development and a practical response that aims to keep wealth within a local area.

13.4.14. The Highland Council developed a three-year strategy to integrate these principles into Council services and communities. The strategy aims to retain wealth within the Highlands, focusing on the five key objectives of community wealth building. These are:

- Spending – using public spend to deliver community benefit, fair work and build local supply chains;
- Fair employment – creating fair and meaningful employment opportunities by recruiting from priority groups, paying the living wage and building progression routes for workers;
- Land and property – seeking to support equitable land development and ownership models, including the imaginative use of assets for community and wider social and economic use;
- Financial power – by increasing flows of investment within local economies to harness the wealth that exists locally; and
- Ownership – to advance inclusive economic ownership models such as local SMEs, employee-owned businesses, social enterprises and mutually owned companies and thus enable more wealth generated locally to stay within the community.

Summary of Strategic Context

13.4.15. The Proposed Development is expected to have various socio-economic benefits in line with national and regional strategic policy documents and deliver on some of the issues covered by Scotland's NPF4, including the economy, communities, and the environment.

13.4.16. The Proposed Development will also create employment opportunities, further diversifying the region's economic base and generating spend in the local economy and support for local businesses. The sector provides an opportunity for economic growth, with the Proposed Development supporting these objectives in Highland and the wider Scottish economy.

Existing Environment Baseline

13.4.17. As shown in Table Error**! No text of specified style in document.**-1, in 2023, the population living in Highland was 236,330, representing around 4.3% of Scotland's population (National Records of Scotland, 2025). Table 13.1 also shows that Highland has a lower proportion of working age population (60.2%) compared to Scotland as a whole (63.4%) and a higher proportion of population aged 65 and over.

*Table **Error! No text of specified style in document.**-1 Population Structure, 2023*

	Highland	Scotland
Total	236,330	5,490,100
0 – 15	15.6%	16.3%
16 – 64	60.2%	63.4%
65 and over	24.2%	20.3%

Source: National Records of Scotland (2025), Mid-year Population Estimates 2023.

13.4.18. Compared to the population in 2018, the population of Highland is projected to decrease by 1.0% by 2043, whereas the population of Scotland will increase by 2.5% to almost 5.6 million people (See Table **Error! No text of specified style in document.**-2).

13.4.19. The Projections indicate a decline of approximately four percentage points in Highland's working-age population, equivalent to a reduction of around 11,047 people. This trend is common in rural areas and is often linked to limited economic opportunities, which can lead working-age individuals to migrate elsewhere in search of employment and better prospects.

*Table **Error! No text of specified style in document.**-2 Population Structure Change, 2018 – 43*

	Highland		Scotland	
	2018	**2043**	**2018**	**2043**
Total	235,540	233,250	5,438,100	5,574,800
0 – 15	16.7%	14.3%	16.9%	14.8%
16 – 64	61.2%	56.0%	64.2%	60.3%
65 and over	22.1%	29.8%	18.9%	24.9%

Source: Population Projections for Scottish Areas (2018-based).

13.4.20. As shown in Table , in 2024 the rate of economic activity in Highland was 81.5%, larger than the Scottish rate of 77.0% (ONS, 2025). However, as previously noted, Highland had a lower proportion of working-age residents compared to Scotland overall (60.2% vs. 63.4%). This combination indicates a tighter labour market, with a smaller working-age population but higher rates of participation among those of working age.

13.4.21. Table also shows that unemployment in Highland was lower (2.2%) than that of Scotland (3.2%). The median annual gross pay for full-time workers in Highland was £31,526, compared to £31,891 in Scotland (ONS, 2025).

Table 13.3 Economic Indicators, 2024

	Highland	Scotland
Economic Activity Rate (16-64)	81.5%	77.0%
Unemployment Rate	2.2%	3.2%
Median Annual Gross Income	£31,526	£31,891

Source: annual population survey (2025) - Data for Jan 2024-Dec 2024 and the annual survey of hours and earnings (2025). Resident analysis data for – 2024.

13.4.22. Table 13.3 below indicated that the largest sector of employment in Highland is human, health and social activities, accounting for 16.8% of employment compared to 16.0% in Scotland as a whole (ONS, 2024). The local area also has a higher proportion of people working in accommodation and food services (12.9%) than Scotland as a whole (8.7%).

13.4.23. Highland has a higher share of the population employed in construction (6.4%), compared to Scotland as a whole (5.1%). On the contrary, Highland has a lower share

employed in professional, scientific and technical activities (4.7%) compared to Scotland (7.2%).

Table 13.3 Industrial Structure, 2022

	Highland	Scotland
Human health and social work activities	16.8%	16.0%
Wholesale and retail trade; repair of motor vehicles and motorcycles	14.2%	13.2%
Accommodation and food service activities	12.9%	8.7%
Education	7.7%	8.4%
Construction	6.4%	5.1%
Agriculture, forestry and fishing	5.6%	2.0%
Manufacturing	5.2%	6.9%
Public administration and defence; compulsory social security	5.2%	6.4%
Transportation and storage	4.7%	4.5%
Professional, scientific and technical activities	4.7%	7.2%
Administrative and support service activities	4.7%	6.9%
Arts, entertainment and recreation	3.4%	2.7%
Water supply; sewerage, waste management and remediation activities	2.0%	0.8%
Information and communication	1.9%	3.1%
Real estate activities	1.3%	1.4%
Other service activities	1.3%	1.7%
Electricity, gas, steam and air conditioning supply	0.9%	0.7%
Financial and insurance activities	0.7%	3.3%
Mining and quarrying	0.3%	1.0%
Total	**116,325**	**2,562,500**

Source: ONS, (2024). Business Register and Employment Survey 2022.

Socio-Economic Baseline Summary

13.4.24. Highland has a lower proportion of working age population and a lower employment rate than Scotland, which highlights the need for employment opportunities in the area. Additionally, the working age population is projected to decrease more quickly

than for Scotland as a whole, suggesting that the need for employment opportunities will increase in the future.

13.4.25. The Proposed Development will support the creation of employment in the local area. As this job creation will occur in a rural setting, where generating employment typically requires greater time, effort, and coordination than in more densely populated regions such as the Central Belt, these opportunities are particularly valuable at the local level.

13.5. Effects[1]

Development and Construction

13.5.1. The Proposed Development will consist of up to 90 battery energy storage units with a maximum export capacity of up to 70MW. The Proposed Development has been designed with up to 4-hour discharge period. Based on BiGGAR Economics' experience in the sector, along with estimates from the Applicant and suppliers, the average expenditure on the construction of battery storage sites can be estimated using an average spend of £245,000 per MWh.

13.5.2. On this basis, the total development and construction cost for the Proposed Development is estimated to be £34.2 million (at 2024 prices).

13.5.3. Expenditure is split into five main categories of contract. As shown in Table 13.4, it is assumed that 45% of capital expenditure would be on balance of plant, 39% of spending would be on battery unit contracts, 2% on grid connection contracts, 2% on development and planning, and 12% on other capex contracts.

Table 13.4 Development and Construction Spend by Expenditure Type

	%	Total (£m)
Balance of Plant	45%	15.2
Battery System	39%	13.4
Other Capex	12%	4.0
Development and Planning	2%	0.8
Grid Connection	2%	0.8
Total	**100%**	**34.2**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

13.5.4. The economic impact of the development and construction phase was estimated for Highland and Scotland as a whole. In order to do this, it was necessary to estimate the proportion of each type of contract that might be secured in each of the study areas. The assumptions were based on BiGGAR Economics' previous experience in energy developments and information received by the Applicant.

13.5.5. To estimate the expenditure for each contract in each of the study areas, the proportions of contract type that might be secured in each area were multiplied by the estimated expenditure on each development and construction contract.

13.5.6. It is estimated that Highland could secure contracts worth up to 5.8 million, equivalent to 17% of total capital expenditure. The largest opportunities would be the contracts related to balance of plant[2], as companies in the area could secure up to 35% of contracts, worth £5.4 million.

[2] Balance of system refers to the non-battery components and expenses involved in constructing and operating the storage system. It includes elements such as power converters, control systems, cooling systems, electrical connections, installation costs, permitting, and project management. Contracts associated with it typically include those related to general construction and electrical engineering.

13.5.7. Scotland (including Highland) was estimated to secure £11.0 million, equivalent to 32% of total capital expenditure. The largest opportunity would be balance of plant contracts, worth around £6.7 million.

Table 13.5 Development and Construction Spend by Study Area

	Highland		Scotland	
	%	£m	%	£m
Development and Planning	6%	0.0	72%	0.6
Battery System	0%	-	0%	-
Balance of Plant	35%	5.4	44%	6.7
Other Capex	6%	0.3	76%	3.0
Grid Connection	14%	0.1	85%	0.7
Total	**17%**	**5.8**	**32%**	**11.0**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

13.5.8. To estimate the direct GVA from each of the main contract categories, each contract was split into sub-contracts. Using industry-specific data on turnover and GVA from the Scottish Annual Business Statistics (Scottish Government, 2025), turnover/GVA ratios were applied to each specific sub-contract in order to estimate GVA.

13.5.9. In this way, it is estimated that development and construction contracts could directly generate £2.3 million GVA in Highland and £4.9 million GVA in Scotland, as shown in Table Error**! No text of specified style in document.**-6.

*Table **Error! No text of specified style in document.**-6 Direct GVA by Contract Type and Study Area (£m)*

	Highland	Scotland
Development and Planning	0.0	0.3
Battery System	-	-
Balance of Plant	2.1	2.6
Other Capex	0.1	1.7
Grid Connection	0.0	0.3
Total	**2.3**	**4.9**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

13.5.10. Similarly, the contract values potentially awarded in each area would support employment. Turnover per employee for each of the industries involved is also given by the Scottish Annual Business Statistics (Scottish Government, 2025), which allows the employment from any increase in turnover to be estimated.

13.5.11. In this way, it is estimated that the Proposed Development could support 30 direct years of employment in Highland, and 60 direct years of employment in Scotland.

Table 13.7 Development and Construction Employment by Contract Type and Study Area (Years of Employment)

	Highland	Scotland
Development and Planning	0	3
Battery System	-	-
Balance of Plant	26	33
Other Capex	2	19
Grid Connection	1	5
Total	**30**	**60**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

13.5.12. There would also be multiplier effects associated with spending in the supply chain and from spending by employees in the local economy. These effects are estimated by applying Type I (indirect) and Type II (indirect and induced) GVA and employment multipliers (Scottish Government, 2025) to the direct GVA and employment impacts.

13.5.13. Indirect effect refers to the impact associated with spending in the supply chain of Tier 1 suppliers. This is captured by applying Type 1 multiplier to the direct economic impact. The induced effect is the impact associated with staff spending their wages in the wider economy and is captured by subtracting Type 1 multipliers from Type II multipliers, and applying this to the direct impact.

13.5.14. In order to adjust these multipliers, which consider the national economy, for the economy of Highland it is assumed that indirect multiplier effects would be 33% of the national impact, and induced multiplier effects, which consider the effect of local spending, would be 70% of the national impact.

13.5.15. Adding together direct, indirect and induced impacts, it is estimated that the Proposed Development could generate a total £3.2 million GVA and support 40 years of employment in Highland and £8.4 million GVA and 100 years of employment in Scotland.

13.5.16. The construction phase is expected to take approximately one year and the impacts will occur during this time period.

Table 13.8 Development and Construction GVA Impacts by Study Area (£m)

	Highland	Scotland
Direct	2.3	4.9
Multiplier	0.9	3.5
Total	**3.2**	**8.4**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

Table 13.9 Development and Construction Employment Impacts by Study Area (Years of Employment)

	Highland	Scotland
Direct	30	60
Multiplier	10	40
Total	**40**	**100**

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

Operations and Maintenance

13.5.17. The operations and maintenance impact of the Proposed Development is estimated as the impact that would persist throughout the operational lifespan of the Proposed Development (40 years).

13.5.18. Annual expenditure on operations and maintenance is estimated based on evidence from the Applicant, suppliers and BiGGAR Economics' experience in the sector. The evidence suggests that, on average, annual operational spending is around £11,000 per MWh. It is estimated that the annual operations and maintenance expenditure associated with the Proposed Development could be up to approximately £1.4 million (excluding non-domestic rates).

13.5.19. In order to estimate the economic impact of the operation and maintenance expenditure in Highland and Scotland, it was first necessary to estimate the proportion of contracts that could be secured in each of these areas. These assumptions were based the analysis of the industries present in each of the study areas, as well as BiGGAR Economics' previous experience on other energy developments and information provided by the developer.

13.5.20. On this basis it is estimated that Highland could benefit from £0.5 million in operations and maintenance contracts, with Scottish businesses potentially benefitting from £0.7 million.

Table 13.10 Operations and Maintenance Spending by Study Area

	Highland	Scotland
Turnover (£m)	0.5	0.7
Share (%)	35%	51%

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

13.5.21. As with the construction phase, the contract values awarded in each of the study areas represent an increase in turnover in those areas. The economic impact of the increase in turnover on GVA and employment was estimated in the same way as the construction expenditure.

13.5.22. Therefore, it is estimated that turnover generated by the operation and maintenance of the Proposed Development could support £0.2 million GVA and 2 jobs in Highland, and £0.2 million GVA and 2 jobs in Scotland.

Table 13.11 Annual Operations and Maintenance Direct Impact by Study Area

	Highland	Scotland
GVA (£m)	0.2	0.2
Employment	2	2

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

13.5.23. There would also be indirect and induced impacts during the operation and maintenance of the Proposed Development, which were estimated using the same method as for the development and construction phase.

13.5.24. By applying relevant economic multipliers, it is estimated that each year the spending required for the operation and maintenance of the Proposed Development could support £0.3 million GVA and 3 jobs in Highland, and £0.5 million GVA and 4 jobs in Scotland.

Table 13.12 Total Annual Economic Impact during Operations and Maintenance by Study Area

	Highland	Scotland
GVA (£m)	0.3	0.5
Employment	3	4

Source: BiGGAR Economics Analysis. *Totals may not add up due to rounding.

Non-Domestic Rates

13.5.25. The Proposed Development would be liable for non-domestic rates during operational life, the payment of which would contribute directly to public sector finances. By applying guidance developed by the Scottish Assessors Association (SAA, 2023), it has been estimated that the Proposed Development would contribute £0.1 million annually through the payment of non-domestic rates during its operations and maintenance phase.

Boralex BESS Funds

13.5.26. Community benefit funds (CBF) are a well-established mechanism through which renewable energy developers provide voluntary financial contributions to support local communities, based on the generation capacity of the development. While CBF is not standard practice for battery storage developments, given they are not generating electricity, the Proposed Development is committed to supporting the local area. As such, it will provide annual, index-linked funds throughout its operational life.

13.5.27. To determine the level of contribution, Boralex applies a land take-based approach. Given that the BESS compound for the Proposed Development occupies approximately 1.2 hectares, the annual contribution will amount to £8,400 (index-linked).

Approach to Community Wealth Building

13.5.28. The Proposed Development will implement initiatives aligned with Highland's Community Wealth Building Strategy.

Pillar 1: Spending

13.5.29. By the end of the construction phase, the Proposed Development is expected to have injected £5.8 million directly into the Highland economy, also creating the equivalent of 40 full-time job years during this period.

13.5.30. During its operational period (expected to begin from 2032), it is anticipated that the project will contribute a further £8,400 (index-linked) per year to the Highland economy, along with the creation of approximately three full-time jobs to meet ongoing operational requirements for the Proposed Development (see 13.5). These investments represent direct, additional benefits to both local and broader Highland communities that would not exist without the project's development

Pillar 2: Fair Employment

13.5.31. As noted, the Proposed Development will create a number of well-paid jobs across development, construction, and operational phases. A significant portion of these roles will be sourced from and based within the local and regional Highland Council

area. While the project is still relatively young and in development, an example of this principle is that Boralex, having recently completed the construction of the Limekiln Wind Farm will seek to engage one of the local contractors previously used on the project to carry out enabling works for the Proposed Development. Engaging a local contractor not only brings valuable local knowledge but presents Boralex with the opportunity to continue the positive working relationship with the community, built over many years, ensuring that the direct benefits of the project are felt locally.

13.5.32. In alignment with The Highland Council, Boralex is committed to paying a minimum of the 'living wage' and will guarantee this through the procurement of services.

13.5.33. The Highlands is becoming an increasingly important region for Boralex's renewable energy goals. The Proposed Development, alongside other projects such as the operational Limekiln Wind Farm on the north coast and the Sallachy Wind Farm currently in development, will strengthen Boralex's long-term commitment to generating full-time, flexible, and well-paid employment in the Highlands.

13.5.34. Boralex believes there is a current opportunity to engage with the Council and other stakeholders to discuss the long-term employment and skill requirements to support renewable energy projects. This would help to ensure training initiatives supported or provided by the Council are aligned with the skills and knowledge needed to retain local talent for jobs in the renewable energy sectors. We welcome a collaborative approach with the Council and other stakeholders on this matter.

Pillar 3: Land and Property

13.5.35. The Proposed Development will increase the economic value of the land by putting underused rural land to productive use. It will also generate value for the local community by supporting employment opportunities in the local area.

Pillar 4: Financial Power

13.5.36. The direct employment of local residents and those from the wider Highland area, alongside the funding contribution committed by the Proposed Development, will ensure that the wealth generated by the project plays a vital role in supporting the well-being of local communities and businesses. The example of seeking to engage a local contractor for the enabling works demonstrates this principle in action, ensuring that local resources and expertise are directly contributing to the project's success.

13.5.37. The long-term nature of community benefits guarantees that the socioeconomic impact of the proposal will extend well beyond the employment and economic boost during the Proposed Development's construction phase.

13.5.38. Boralex would welcome the opportunity to engage with the Highland Employment Partnership to explore how the Proposed Development, through its employment and

potential training opportunities, could contribute to alleviating poverty in the local area and throughout the wider Highlands.

Pillar 5: Inclusive Ownership

13.5.39. Boralex hopes that the local financial contributions from the Proposed Development, coupled with its shorter and longer-term employment opportunities, will lead to the development of stronger inclusive local economic organisations that are able to keep more locally generated wealth within the community. For example, Boralex has partnered with local communities in other markets to successfully develop sites. Boralex is in the process of developing a strategy on how similar organisational structures could be applied to the UK including the Highlands.

13.6. Concluding Statement

13.6.1. The Proposed Development will have a positive net impact on the economy of both Highland and the wider Scottish economy. The main opportunities will be for the construction sector. The largest economic impacts will occur during the construction phase, during which time it will support up to £8.4 million GVA to the Scottish economy, including £3.2 million in Highland. The Proposed Development could support 100 jobs in Scotland, including 40 jobs in Highland in the year it is constructed.

13.6.2. During the Operations and Maintenance phase the Proposed Development will generate £0.3 million GVA in the Highland and 3 jobs, and £0.5 million GVA and 4 jobs in Scotland.

13.6.3. As these jobs will be located in a rural area, where job creation typically requires more time, effort, and coordination than in more densely populated regions such as the Central Belt, these employment opportunities are particularly valuable at the local level.

13.6.4. The Proposed Development is expected to support the provision of local public services and the investment priorities of local communities. During its operations and maintenance, it is expected to generate approximately £0.1 million in non-domestic rates yearly.

13.6.5. While community benefit funding is not a standard practice for energy storage developments, the Proposed Development will provide £8,400 per year in funds to support community-led initiatives over its operational lifetime.

13.6.6. In addition, the Proposed Development will also support the energy transition in Scotland by providing crucial storage capacity to the electricity market. This directly supports the strategic economic objectives of the Scottish Government.

13.6.7. The Proposed Development will contribute to the five pillars of community wealth build through local spending, a BESS fund, local employment, fair wages, using the land for productive use, and stakeholder engagement.

13.7. References

Aurora Energy Research. (2022). *Aurora Battery Cost Assumptions .*

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SAA. (2023). *Scottish Assessors Association.*

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14 Outline Battery Safety Mangement Plan

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Executive Summary

This Outline Battery Safety Management Plan (OBSMP) has been prepared in relation to the Limekiln Battery Energy Storage System (BESS) and associated infrastructure sits within the footprint of the operational Limekiln Wind Farm, south of Reay in Caithness, Highlands. The installation in totality is henceforth referred to in the report as the Limekiln Site. The Limekiln BESS units will most likely use Lithium Ferrous Phosphate (LFP) chemistry cells, but this is subject to advances in technology.

This OBSMP, and associated project Hazard Log [Ref. 1] provides details of the safety management processes and procedures to be implemented at the Limekiln site to satisfy the prevailing safety requirements for the Limekiln Site and BESS system specifically. The safety management approach to be adopted follows the ethos of 'As Low As Reasonably Practicable' (ALARP), the Health and Safety Executive (HSE) 'Reducing Risk, Protecting People' Guidance [Ref. 2], National Fire Chiefs Council (NFCC) Guidance for BESS installations [Ref. 8], the associated FM Global Datasheet 5-33 [Re. 7], and the Department for Energy Security and Net Zero (DESNZ) Health and Safety Guidance for Electrical Energy Storage Systems [Ref. 10].

Whilst the make and model of the BESS units to be employed at the Limekiln Site has yet to be determined, the selection of the BESS units will require that the design, development, and manufacture of the BESS by the Original Equipment Manufacturer (OEM), demonstrates that the development and maintenance is of high standards, in respect of safety and operational sustainability, can be evidenced. This will be achieved through adherence to internationally acknowledged codes of practice for Lithium-Ion BESS including International Electrotechnical Commission (IEC) 62619:2022 [Ref. 3], United Nations (UN)38.3 [Ref. 4], Underwriters Laboratories (UL)1973 [Ref. 5] and UL9540A [Ref. 6].

Consultation with the Fire and Rescue Services (FRS) at similar BESS installations has concluded that "*the developer should produce a risk reduction strategy*" incorporating safety measures and risk mitigation in collaboration with the associated Regional FRS and covering the construction, operational and decommissioning phases of the project. This has been conducted for this installation and is detailed in Section 6.0 of this OBSMP. The developer must ensure the risk of fire is minimised, this may be by way of any or all the following measures:

- Procuring components and using construction techniques which comply with all relevant legislation.
- Including automatic fire detection systems in the development design.
- Including automatic fire suppressions systems on the development design.
- Including redundancy in the design to provide multiple layers of protection.

- Designing the development to contain and restrict the spread of fire using fire-resistant materials and adequate separation between elements of the BESS.
- Developing an Emergency Response Plan (ERP) with FRS to minimise the impact of an incident during construction, operation, and decommissioning of the facility.
- Ensuring the BESS is located away from residential areas. Prevailing wind directions should be factored into the location of the BESS to minimise the impact of a fire involving Lithium-Ion batteries due to the toxic fumes produced.

14. Introduction

14.1.1. This Outline Battery Safety Management Plan (OBSMP) has been developed by Abbott Risk Consulting Ltd (ARC) in the role of the Safety Subject Matter Expert (SME). The OBSMP has been prepared on behalf of Boralex Ltd in relation to the Battery Energy Storage System (BESS) facility at Limekiln.

14.1.2. This OBSMP has been developed to outline the potential risks presented by the BESS and its operation / maintenance. This OBSMP provides a robust safety strategy, supported by evidence to support full commissioning. The final design and equipment detail is yet to be fully backed off and is based on the intended site layout plan and associated details currently available and provided by Boralex Ltd at this juncture.

14.2. Background

14.2.1. ARC has conducted the Hazard Identification of the Limekiln site. This analysis has provided the necessary foundation for the identification of hazards and the development of a preliminary Hazard Log [Ref. 1], which contains:

- Consolidated list of hazards and hazard descriptions.
- Associated causes of the hazards with linkage to the relevant hazard(s).
- Design controls implemented to ameliorate / mitigate the causes.
- Identification of the potential outcomes or consequences from the hazards.
- Identification and linkage to mitigating factors that could ameliorate the severity or frequency of occurrence of the outcomes (consequences).
- Identification of any mitigation that will further ameliorate the probability of hazard or consequence frequencies and be contained in the Emergency Response Plan (ERP).

14.3. Aim

14.3.1. The overall safety aim is that the levels of risk of accident, death or injury to personnel or other parties, and risks to the environment due to the construction, operation and decommissioning are to be broadly acceptable or tolerable and As Low As Reasonably Practicable (ALARP) in accordance with the Health and Safety Executive (HSE) Reducing Risk, Protecting People (R2P2) [Ref. 2]. For the OBSMP specifically, the document presents an initial appraisal of the safety risks including:

- An overview of the main characteristics and the associated design guidelines and legislative and compliance requirements.
- The identification of safety risks (with consideration to proximity and pathways to sensitive receptors).
- The identification of inherent safety features and measures additional safety recommendations (e.g. emergency response planning) to be secured through the OBSMP at detailed design stage and secured by planning conditions.
- Determination of the identified safety risks and their significance.

14.4. Scope

Site

14.4.1. The scope of the OBSMP for the Limekiln Site and capability covers the physical and functional aspects of the equipment. The safety management covers design, validation, and operation. It also includes any remote monitoring and control, maintenance, storage / transportation, and calibration.

14.4.2. Predominantly the Site is not in an area of flood risk from rivers or the sea or from surface water flooding. There are no public rights of way affecting the Site.

14.5. Site Access

14.5.1. The proposed development sits within the footprint of the operational Limekiln Wind Farm, south of Reay in Caithness, Highlands. The site entrance is located off the A832 Road 1km west of Limekiln Station. The site is accessed by a private estate road for 700 metres, followed by a descending branch leftwards to the installation. The primary access track is constructed using a crushed / compacted stone and capable of withstanding 20 tonne payloads.

Frequently Asked Questions

14.5.2. Appendix A of this OBSMP contains frequently asked questions and is provided for assurance and a greater awareness of BESS and Lithium-Ion technologies in general.

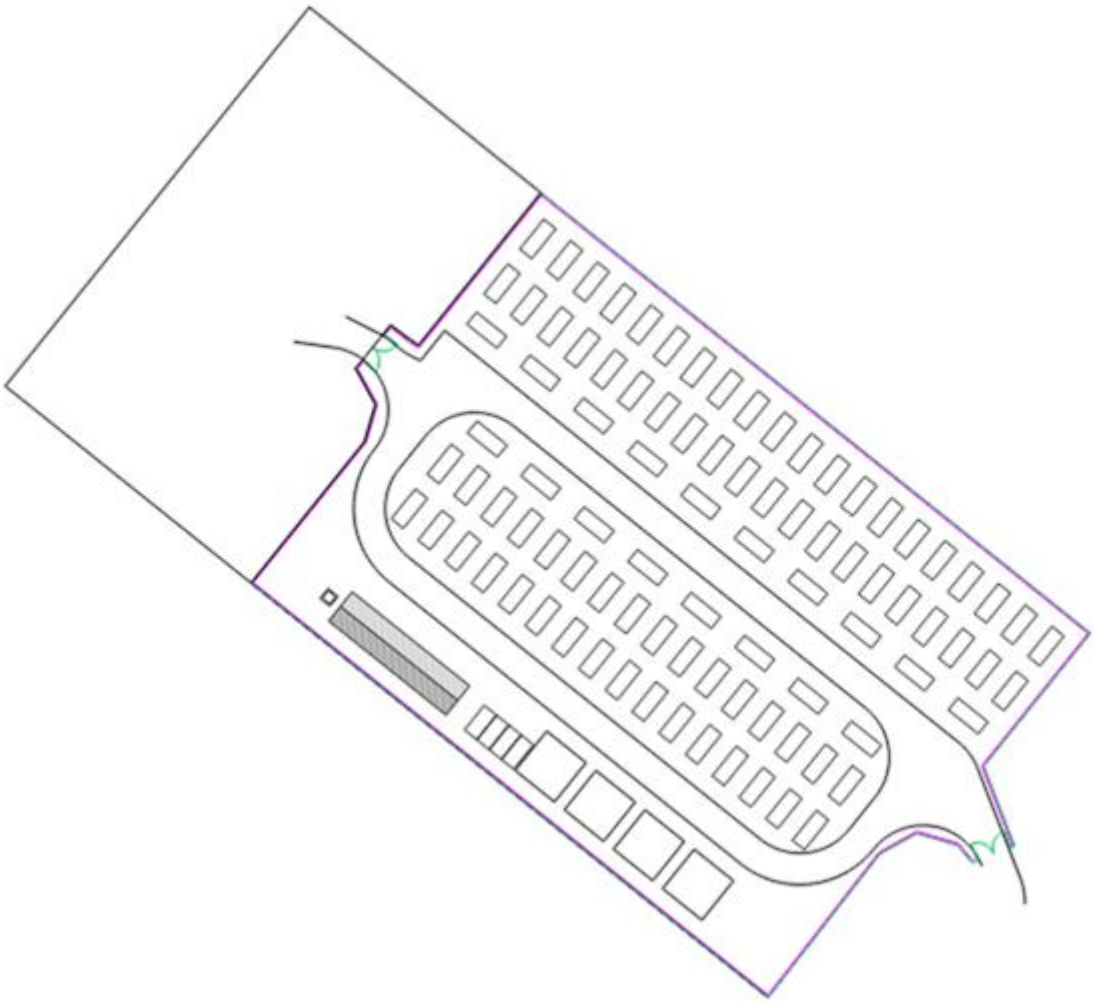


Figure 4-1 Limekiln BESS facility layout

14.6. Safety Requirements

High Level Safety Objective

14.6.1. The primary safety objective is to comply with applicable legal requirements and relevant good practice for large / grid scale BESS. Compliance with these requirements will be used as part of the safety evidence, to demonstrate that '*the risk posed to individuals, the environment and property has been reduced to a level that is as low as reasonably* practicable'. The Hazard Log (HL) produced for the Limekiln site is to be used to ensure that all direct and indirect safety requirements are met, and the system remains safety compliant through the life of the installation.

14.7. Legislation and Compliance Requirements

14.7.1. Legislative compliance, specifically safety, will be demonstrated by compliance with the United Kingdom (UK) Health and Safety at Work Act (HSAWA) 1974 and the appropriate underlying legislation that is enacted through the HSAWA. The following legislation and industry guidance has been determined as applicable to this installation.

14.7.2. Legislation (Scotland specifically):

- Health and Safety at Work etc. Act 1974 – UKSI1974/0037.
- Control of Noise at Work Regulations 2005 – UKSI 2005/1643.
- Control of Substances Hazardous to Health Regulations 2002 – UKSI 2002/2677.
- Control of Vibration at Work Regulations 2005 – UKSI2005/1093.
- Electrical Equipment (Safety) Regulations SI 1994/3260.
- Electro-magnetic Compatibility Regulations SI 2006/3418.
- Fire Safety (Scotland) Amendment Regulations SI 2010/393.
- Lifting Operations and Lifting Equipment Regulations 1998 – UKSI1998/2307.
- Management of Health and Safety at Work Regulations 1999 – UKSI1999/3242.
- Manual Handling Operations Regulations 1992 – UKSI1992/2793.
- Personal Protective Equipment Regulations 2002 – UKSI2002/1144.
- Provision and Use of Work Equipment Regulations 1998 – UKSI1998/2306.
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations SI2013/1471.
- Supply of Machinery (Safety) Regulations 2008 – UKSI2008/1597.

- Workplace (Health, Safety and Welfare) Regulations 1992 – UKSI1992/3004.
- Registration, Evaluation, Authorisation & Restriction of Chemicals Regulations (REACH) – 1907/2006.
- Restriction of Hazardous Substances Directive (RoHS) – 2011/65/EU.
- Dangerous Substances and Explosive Substances Regulations 2002 - SI 2002/2776.
- Construction (Design and Management) Regulations - SI 2015/51.

14.7.3. Industry Guidance and Best Practice Documents:

- UN38.3 – Standard Requirements for Lithium-Ion Battery Production [Ref. 4].
- Underwriters Laboratory (UL)1973 – Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power, and Light Electric Rail Applications [Ref. 5].
- UL9540A – BESS Test Methods [Ref. 6].
- FM Global Property Loss Datasheet 5-33 – Lithium-Ion BESS [Ref. 7].
- NFCC Grid Scale BESS planning – Guidance for FRS [Ref. 8].
- National Fire Protection Association (NFPA) 885 – Standard for the Installation of Stationary Energy Storage Systems [Ref. 9].
- Department for Energy Security and Net Zero (DESNZ) – Health and Safety Guidance for Electrical Energy Storage Systems [Ref. 10].

14.8. FRS Consultation

14.8.1. The Site's location falls within the jurisdiction of Scottish FRS (SFRS). Consultation with the SFRS will continue as necessary throughout the project development, construction and operation.

14.9. NFCC Guidance

14.9.1. The NFCC Report Grid Scale Battery Energy Storage System Planning – Guidance for FRS [Ref. 8] details the FRS recommendations for BESS installations. These have been distilled at Table 5-1 cognisant of the site layout at Figure 4-1.

14.9.2. At the time of the planning submission there was no specific UK regulation regarding fire safety of BESS facilities. However, the DESNZ has produced the Health and Safety Guidance for Electrical Energy Storage Systems report, providing risk mitigation techniques for BESS installations [Ref. 10]. For the BESS units, the NFPA 855:2023 [Ref. 9] code is the most internationally recognised and this will be considered in the procurement of the BESS units and ancillary equipment.

Table 5-1 - NFCC Recommendations Cross-Referenced to the Limekiln Site

Criterion	NFCC Recommendation	Status	NFCC Comment
1	Access - Minimum of two separate access points to the site	**Compliant**	The site has a common access from the A832 but forks as it heads north to the site, this allows for primary access to the site from the west and emergency access from the east. Recourse to metrological data indicates that the wind direction in this location is from the west, as such obscuration of the primary point of access is unlikely.
2	Roads/hard standing capable of accommodating fire service vehicles in all weather conditions. As such there should be no extremes of grade	**Compliant**	The proposed site access from the public road leading to the site entrance is approximately 5.0m wide. There is no extreme of gradient at the site, access to the site does rise by approx. 20m over a 450m distance to the site's primary entrance. All internal services roads have been designed with a 10m radii and are compatible for a DB32 Fire Appliance.
3	A perimeter road or roads with passing places suitable for fire service vehicles	**Compliant**	The BESS compound service roads are 4.0m wide hard surface access running around the site allowing access to all BESS units, Figure 4-1 refers, given the circular nature and compactness of the site the ability to drive-in and drive-out without the need for passing points or the need to reverse is provided. Section 13.4 of Approved Document B5 states that FRS vehicles should not have to reverse more that 20m from the end of an access road – given the provision of a circular perimeter service road the requirement for FRS vehicles to reverse is minimised to situations in which use of the perimeter service road is not possible, and in these circumstances, reversing more than 20m is not a requirement. Section 13.4 references Table 13.1 of the Approved Document B5 which contains typical FRS vehicle access route specifications – the site meets these specifications.
4	Road networks on sites must enable unobstructed access to all areas of the facility	**Compliant**	The BESS compound access service roads run around the BESS units, thus allowing access to all BESS units. The site meets the requirements of Approved Document B5 Vol 2 allowing all points on the site to be within 45m of a fire appliance.
5	Turning circles, passing places etc. size to be advised by FRS depending on fleet	**Complaint**	The BESS compound access service roads allow access to all BESS units; Figure 4-1 refers in two differing directions and allows FRS vehicles to drive in and out without the need to reverse. Liaison and consultation with the FRS will establish if these arrangements are satisfactory. The site is designed such that all routes have the capacity to allow for a Fire Tender (based on DB31 Fire Appliance).
6	Distance from BESS units to occupied buildings & site boundaries. Initial	**Compliant**	There are no occupied buildings within 25m of the BESS compound, the nearest residential dwelling is more than 750m distance to the west.

Criterion	NFCC Recommendation	Status	NFCC Comment
	min distance of 25m		
7	Access between BESS unit – minimum of 6.0m suggested. If reducing distances, a clear, evidence-based, case for the reduction should be shown	**Compliant**	The suggested 6.0m 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 again in Jan 2024, it now details the following: 1. For containerised Lithium-Ion Battery Energy Storage System (LIB-ESS) comprised of Lithium iron phosphate (LFP) cells, provide aisle separation of at least 5 ft (1.5 m) on sides that contain access panels, doors, or deflagration vents. 2. For containerised LIB-ESS comprised of Lithium nickel manganese cobalt (NMC) cells where wall construction is unknown or has an American Society for Testing and Materials (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 containerised 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. Additionally, the DESNZ published in March 2024 their Health and Safety Guidance for BESS in which it is stated that the separation distance, for sides with access panel, doors or deflagration panels should be a minimum of 1.5m. It has been noted that the current NFCC guidance is being revised and a consultation document has been promulgated. The draft consultation version removes the 6.0m separation distance and refers out to NFPA 855 for guidance on separation. Following this revision to the Datasheet, the BESS containers on-site will be 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. Current NFCC guidance recommends 6.0m, unless deemed acceptable to be closer based on manufacturers UL testing / fire rating qualification. The BESS units on the site are a minimum of 3.0m apart, which given current FM Global and DESNZ guidance, is twice the recommended 1.5m spacing. BESS technology is so rapidly changing and at the planning stage, the manufacturer and type of BESS unit is not usually known, and prevalence has been set by the decisions made for the Langford and Cleve Hill BESS sites.
8	Site Conditions – areas within 10m of BESS units should be cleared of combustible vegetation	**Compliant**	Although on a greenfield site the BESS and other installations will be positioned on concrete foundations that form part of the fire water runoff retention bunding design. All areas within 10m of the BESS are to be cleared of vegetation
9	Water Supplies	**Compliant**	The site has three Standby Water Tanks, each with a capacity of 230,000L, two of which will contain dedicated firefighting water, a total capacity for firefighting purposes of 460,000L. The third tanks will remain empty, allowing for the water runoff from the bund to be directed to the

Criterion	NFCC Recommendation	Status	NFCC Comment
			empty tank for containment. Should an event arise whereby the 460,000L is depleted then the runoff water can be used and recycled back onto the fire.
10	Signage	**Compliant**	Signage will be positioned at the entrance to the Site, including a site layout plan and details of key personnel.
11	Emergency Plans	**Compliant**	An ERP will be developed for the Site.
12	Environmental Impacts	**Compliant**	A range of environmental consultees, including NatureScot, the Scottish Environment Protection Agency (SEPA), Historic Environment Scotland, Scottish Forestry, and Transport Scotland, will be engaged during the application process and for the preparation of the associated Environmental Report. Outflow from the sites SUDS will, by means of pipework, limit the outflow rate. This outflow will be valve controlled and will have an actuator on it to ensure that if a fire alarm occurs the valve will be closed to ensure accumulated firewater will not discharge. Electronically actuated valves will have a manual over-ride.
13	System design, construction, testing and decommissioning	**Compliant**	Testing and decommissioning will only be available in later stages of the programme. Compliant at this juncture in the planning process.
14	Deflagration Prevention and venting	**Compliant**	This element will not be apparent up to the point where the decision is made as to what BESS is being used. Deflagration venting is possibly most effective when fitted to the roof of the BESS units, deflecting blast upwards and away from FRS personnel. Compliant at this juncture in the planning process.

14.10. Implemented Safety Strategy

Introduction

14.10.1. A safety strategy is required to support the design, development, and installation providing the necessary assurance that the safety of the Limekiln site is at an acceptable level for its role in its intended operating environment. The safety strategy employed provides a logically stated and convincingly demonstrated reason that all safety requirements are met. The overarching safety claim has the following elements:

14.10.2. A Technical Risk Element:

- An element that provides the argument that articulates the technical aspects of the design which serve to control the identified hazards, through the application of design control measures.
- It will identify system hazards and the causes that can contribute to these hazards.
- It will specify the risk analysis conducted, and risk reduction requirements implemented.
- It will provide the evidence to support any risk reduction claimed.

14.10.3. A Confidence (Assurance) Element:

- This part seeks to demonstrate that the processes used to design, implement, and verify the product is appropriate to its contribution to overall system risk – this being specific to the development of software and provide the requisite audit trail to validate any claimed safety integrity.
- The development of the HL and identification of imbedded physical attributes that support risk reduction.
- The cross-referencing of these physical attributes (and any supporting qualification data / certification) to the relevant cause(s), providing the evidence of validity of the control measure claimed.

14.11. Safety Integrity Level Requirements

14.11.1. The Safety Integrity Level requirements for the BESS units specifically are driven by the functionality implemented in the design solution. The BESS supplier will be beholden to demonstrate with evidence a layered protection approach from cell to container to remote monitoring. The envisaged safety control measures and design features within the BESS are detailed in the HL, albeit at this stage generically, tabulated against the appropriate cause that they control. The HL will be revised and supplemented with actual evidence once the BESS units to be employed have been selected.

14.12. Modular Safety Assurance

14.12.1. The construct of the safety assurance in the design of a BESS unit is vested in a ground up approach from cell to battery to rack to fully built BESS, comprising:

- IEC 62619:2022 Safety requirements for secondary lithium cells and batteries, for use in industrial applications [Ref. 3] This specifies requirements and tests for the safe operation of secondary lithium cells and batteries used in industrial applications, including stationary applications. Safety Management Strategy and Activities.
- UN38.3 Testing - UN38.3 [Ref. 4] is the United Nations standard that lithium batteries must meet if they are to be certified as safe to transport. Whilst lithium batteries have safeguards built-in to withstand the environmental and physical hazards they may encounter during transportation, UN38.3 acts as a 'rubber stamp' and shows that batteries are safe to move from one location to another.
- UL1973 (the Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power, and Light Electric Rail (LER) Applications) [Ref. 5]. This is the safety standard for energy storage systems. It specifies detailed requirements that manufacturers of BESS must meet to qualify for safety certification. UL1973 certification ensures that the BESS system is safe and reliable for use in real-world conditions. Compliance with UL1973 is necessary to ensure the safety, reliability, and proper functioning of the battery components of a BESS system.
- UL9540A (BESS Test Method) is the Standard for Safety Test Method for Evaluating Thermal Runaway (TR) Fire Propagation in Battery Energy Storage Systems [Ref. 6]. There are four stages in the UL9540A test method:
- Cell Level Test: Assessing whether a cell can exhibit TR. It also checks its characteristics and flammability.
- Module (Battery) Level Test: The objective is to determine if TR propagates with the module. In addition, it establishes the heat release and gas composition.
- Rack Level Test: Assessment of the whole unit to establish initially how quickly fire spreads and secondly for the heat and gas release rates and relationship with other emerging hazards.
- Installation Level Test: For completeness installation testing is conducted. This is an optional test, but the objective is to determine how effective the product fire protection is.

Certification

14.12.2. The BESS units to be procured will be designed to meet relevant industry standards and legal requirements which contain specific safety requirements, Section 5.2 refers.

14.13. Safety Management

Hazardous Material

14.13.1. Any hazardous materials held and stored at the BESS facility will be fully justified and will be detailed in the Limekiln ERP, detailing the location, description, precautions to be adopted and quantity.

14.14. Emergency Response Plan

14.14.1. As part of the initial development, an ERP will be developed, in conjunction with the SFRS, that outlines how the operator will respond to incident and accident scenarios at the site. This includes the interfaces with external first responder organisations. The ERP is iterative in approach and has been developed in parallel with technical safety requirements. This ensures that the site design and ERP are properly integrated, and that appropriate information can be provided to first responders to include in their planning activities.

14.15. BESS Hazard Log

14.15.1. The BESS HL [Ref. 1] is currently managed in the form of an excel spreadsheet and is currently generic, detailing the risks most commonly present in a BESS utilising LFP technology. The benefit of using a HL tool is that it provides an auditable record of all decisions made for the assessment of risk for the BESS Project which will be managed through life on a central repository.

14.16. Safety Management Structure

14.16.1. The BESS safety management structure has yet to be fully defined and will be subject to the safety management strategies and procedures that are in place with the successful supplier and installer of the BESS. At this juncture the minimum requirement is a formal top-down management structure that has the authority and responsibility to ensure safety management and environmental risk is at the forefront of products, procedures, and services.

14.17. Overarching Policy

14.17.1. All BESS development activities shall consider safety and environment as an integrated part of the BESS life cycle and shall be assessed from a safety viewpoint. This safety- focused

approach shall span all programme phases. This encourages and develops a safety and environmental culture that spans all levels of the organisation and encompasses all aspects of its working practices. It views safety as a holistic quantity that is owned by the organisation rather than something to be passed by function. This safety culture is supported by training to develop and maintain expertise and awareness for good practice, knowledge of emerging standards and in the understanding of legislation.

14.18. Management Plan

14.18.1. This OBSMP incorporates the management activities relevant to safety. This includes the planning for Quality, Engineering Development and Configuration Management. These are important disciplines that underpin arguments for safety and environment. Further details will be captured within the OBSMP to be secured by planning conditions.

14.19. Staff Competence

14.19.1. The BESS safety and environmental management programme shall ensure that all personnel who have any responsibility for a safety or environmental activity are competent to discharge those responsibilities or are adequately supervised/approved by someone with appropriate competencies.

14.20. Conclusions and Recommendations

Results

14.20.1. The HL [Ref. 1] is the tool used to monitor and manage hazards, causes and controls associated with this site. The HL is used to tabulate the level of residual risk posed by the installation. The Site Safety Audit will determine that the control measures identified are present.

14.21. Conclusions

14.21.1. It is concluded that, as far as reasonably practicable and for the Limekiln site, that currently foreseeable hazards associated with the equipment have been identified, and these are contained in the HL [Ref. 1]. These hazards are actively managed and added to as necessary and will be reported on at each Safety Working Group (SWG).

14.21.2. This OBSMP has been developed using existing knowledge of renewable and BESS capability and leans heavily on the subject matter expertise that ARC has in this technological domain. Installation of the BESS in accordance with OEM instructions followed by a period of qualification and testing will provide the supporting evidence. This will also allow for the consolidation of control evidence and enhanced development of mitigation to further reduce the level of risk posed.

14.22. Recommendations

14.22.1. It is recommended that the safety management, as defined in this OBSMP, is adhered to throughout the site life to ensure that safety management is developed as the programme progresses and remains valid through the life of the site.

14.22.2. Given the current understanding of the site layout, systems to be employed, and control measures to be implemented it has been determined that the residual risk is Class C and this is detailed in the site specific hazard log. The Class C hazards all relate to maintainer hazards and represent the worst-case scenario. Periodic review of the HL [Ref. 1] will identify further opportunities to improve these hazards.

14.22.3. Adherence to the recommendations and safety principles through detailed design, installation and operation will be demonstrated through the Operational Safety Audit Report to be approved prior to commercial operation of the site.

14.22.4. Given the above discourse and output of the Site Safety Audit, it will be possible to declare ALARP, cognisant of continued implementation of the proposed framework for safety management presented in this OBSMP.

References

1. Limekiln BESS Hazard Log - ARC-1266-002-R2, Draft A, June 2025.

2. Reducing Risk, Protecting People (HSE Publications) - https://www.hse.gov.uk/risk/theory/r2p2.pdf.

3. IEC 61619 - Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications – Edition 2 dated 2022.

4. UN38.3 Standard Requirements for Lithium Battery Production - 4th Revision.

5. UL1973 – Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power, and Light Electric Rail Applications.

6. UL9540A – BESS Test Methods.

7. Factory Mutual Property Loss Prevention Datasheet 5-33 dated Jan 2024 (Interim Revision).

8. NFCC Grid Scale BESS Planning – Guidance for FRS dated Nov 2022.

9. NFPA 855 Standard for the Installation of Stationary Energy Storage Systems dated Aug 2023.

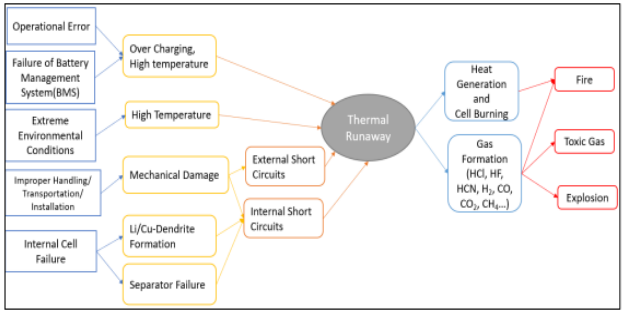
10. Department for Energy Security and Net Zero (DESNZ) – Health and Safety Guidance for Electrical Energy Storage Systems. Health and Safety Guidance for Grid Scale Electrical Energy Storage Systems (publishing.service.gov.uk)

14.23. Appendix A – BESS Frequently Asked Questions

Ser	Question	Answer
1	How does a BESS work?	A BESS employs technology to temporarily store electrical energy, very much in the same manner as a mobile phone or laptop battery, but on a much bigger scale. The energy can be stored and released when demand on the National Grid is high and assists in balancing out variations in demand. The primary use for BESS is to store electrical energy generated by energy suppliers during period of low demand and releasing in periods of high demand, thus balancing out changes in supply and demand on the National Grid.
2	How safe is a BESS?	The Department for Energy Security and Net Zero promulgates on a regular basis the Renewable Energy Planning Database (REPD). From the quarterly extract (dated Apr 2025) the data has been filtered for BESS installations in the UK and the following salient points are deduced[1]: 1. As of Apr 2025, there are approx. 132 operational BESS sites listed in the REPD[2], 8 having been decommissioned, 96 are under construction and a further 834 have planning consent and are awaiting construction. 2. The current operational BESS provides the UK with an estimated 2.6GWelec storage and those awaiting construction will provide an additional 5.4GWelec of storage. 3. Since 2006 UK BESS installations have accumulated an estimated 700 years of operation, this equates to 240,000 days of operation.

[1] The REPD tracks the progress of energy projects, including BESSs, through the planning system. Until 2021, the REPD only recorded projects with a capacity over 1 MW). Since 2021, it also includes projects with a capacity over 150 kilowatts (kW). Therefore, BESSs that were going through the planning system before 2021 may not have been captured in the REPD – Source: Commons Library Research Briefing, 19 April 2024 – BESS.
[2] This is a conservative figure as the REPD did not account for project under 1MW until 2021.

Ser	Question	Answer
		4. There have currently been only two reported BESS fires in the UK that have required FRS attendance, these occurred at Carnegie Road, Liverpool in Sept 2020 and East Tilbury in Feb 2025, the cause of the latter is yet to be declared. Given the estimated 6 million hours of operation, extrapolates out to approx. 3.3E-07 (0.00000014) failures per hour (fph) for BESS in the UK. 5. To date nobody in the UK has been killed in a BESS incident and there has been no damage to 3rd parties or the environment due to a BESS fire.
3	Lithium-Ion is sensitive to temperature variations – how is this controlled?	The batteries are housed in an ISO container which is fitted with an Environmental Control Unit (ECU). The ECU maintains the temperature and humidity within the container, allowing the Lithium-Ion batteries to operate within the optimum temperature range. The temperature of individual cells in each battery is monitored by the battery management system (BMS) and is reported back to the container level BMS which adjusts the internal temperature in response. Should the ECU develop a fault the container will isolate charge and discharge to the batteries until the fault has been rectified. All faults in the BESS are remotely fed to a centralised Control Room.
4	What is Thermal Runaway?	Thermal Runaway (TR) is the term used to describe an internal short-circuit in one of the battery cells that can lead to cell over-pressure and the venting of combustible gases. Should this gas ignite then the cell will increase in over-pressure and the resulting fire will be self-sustaining until all the material in the cell is expended. Short-circuits in cells are generally a result of: 1. Cell penetration by a foreign object (not usually an issue for a BESS as the batteries are housed in sturdy containers). 2. Impurities in the electrolyte (deposited during the manufacturing process), which over time can lead to the formation of dendrites (electrolytic crystals) which puncture the membrane isolating the anode and cathode – this can, but not always, result in a short-circuit and TR. 3. Over-temperature in the cell because of: . Over-charging (which is controlled by 2 separate BMS – battery and rack). . High ambient temperature – controlled by the ECU.

Ser	Question	Answer
		The illustration below provides an outline of the possible causes of TR. 
5	How can TR be controlled?	TR is not always inevitable, and the nature of the cell design is such that early warning signs of a stressed cell can be detected by the BMS. Initial signs of cell degradation are an increase in the time it takes the cells to reach full charge (maximum voltage) and a decrease in the time it takes to discharge. These indicators are picked up by the BMS and if persistent the BMS will isolate (prevent charge and discharge) to the battery and inform the centralised Control Room. In turn an engineer will be dispatched to remove the battery and replace it with a serviceable item. Since the early inception of BESS safeguards in the design have developed and are now details in UL1973 and BESS are assessed against UL9540A. If these indicators are not present, and the cell enters early stages of short-circuit the over-pressure in the cell will result in the venting of off-gas which is detected by the off-gas detectors built into the container Heating, Ventilation and Air Conditioning unit (the ECU). This will result in the container disabling the charge and discharge (the act of charging and discharging the batteries generates heat, which is what we want to avoid) and setting the ECU to maximum volume setting. This has a twofold effect, it clears the container of combustible gas and cools the internals, taking the energy out of the cells (the cells used in BESS, like other batteries do not perform well in low temperature conditions). It should be noted that most BESS only operate at between 80-90% of capacity provide an engineering margin that mitigates the probability of over-charging the cells.
6	How is a BESS fire controlled and suppressed?	If the TR is not controlled and spreads, known as Thermal Runaway Propagation, the fire detection and suppression system (FDSS) will activate. There are currently two types of FDSS that are used in BESS; gaseous systems and aerosol systems. Each system has advantages and disadvantages:

Ser	Question	Answer
		1. Aerosol systems are better in terms of extinguishing the fire and benefit against gaseous systems, which generally supress the fire by reducing the level of oxygen in the container. 2. Gaseous systems are instantaneous in operation; the gas being kept under pressure in bottles. Aerosol, by the nature of the deployment as a fine mist, take a little longer to reach all areas of the container. 3. Aerosol systems generally require a more complex and intricate delivery system to reach all areas of the container. 4. Gaseous systems require a sealed environment in which to operate. As such if the container is opened and oxygen reintroduced it can lead to the fire reigniting, as such they require the ECU to close prior to activation (to prevent the ECU from pushing out the extinguishing medium). 5. Various FDSS aerosols (also known as aqueous) and gaseous systems are available, and they use a variety of aerosol solutions. Under consideration for this site is the use of an aerosol aqueous solution containing potassium carbonate (K_2CO_3) – this inhibits the fire by isolating at a molecular level with the chemical chain reactions forming the flame front. This aerosol is non-harmful to the environment and presents no health and safety concerns to first responders.
7	Can water be used to extinguish a Lithium-Ion fire?	The use of water to extinguish a BESS fire has some drawbacks and disadvantages over bespoke FDSS aerosol mediums, these being: 1. Due to the design of the BESS batteries and racks (in which they are contained), the inability of water to cool the cell interiors may result in re-ignition of a fire once the water application is halted. 2. The high conductivity of water may cause short circuiting of cells presenting collateral damage risk and increase the spread of the fire internal in the BESS. 3. A high volume of water is required to cool the cells below the critical temperature to prevent TR propagation, this results in a high volume of fire water run-off and a potential environmental impact. 4. The application of water on a BESS fire increases the generation of gases such as carbon monoxide (CO), hydrogen (H_2) and hydrogen fluoride (HF). Applying water causes incomplete combustion of organic substances inside the battery resulting in production of CO rather than CO_2; when water is applied, H_2 is released that, without combustion, can react with phosphorus pentafluoride, if present in free form, to produce gaseous HF.

Ser	Question	Answer
8	What are the environmental consequences of a BESS fire?	In the event of a BESS fire several chemicals in gaseous form can be released and the composition and concentration of the plume (also referred to as the vapour cloud). In the event of a BESS fire amongst the general gases released are CO, HF, oxygen and hydrogen. The only UK BESS fire (Carnegie Road, Liverpool – Sept 2020) was monitored and the resultant composition of the plume was determined as being negligible in toxic gas concentration. Should the resulting fire be treated with water in the presence of HF the result can be the formation of a HF acid which can be detrimental to the environment, especially the aquatic habitat. To prevent this, it is possible to contain the fire run-off water but often best to let the fire run its course and burn out. It is worth noting that the fire run-off water at Carnegie is considered to have been neutralised by the lime-based gravel covering used at the base of the BESS and on testing was found to be a low alkaline level, as opposed to acidic. Further to this the recent fire at Moss Landing California (Feb 2025), was monitored at 1 second intervals for toxic substances in the smoke plume. It was established that the composition of the plume emanating from the fire was within US Air Pollution limits.
9	How is the BESS site secured?	The BESS Site is secured through fences / walls and monitored remotely via security cameras. Warning signs along the fence indicates the presence of electrical storage facilities within the site.
10	How is the serviceability of the BESS assured?	The Health and Usage data for each BESS is remoted to a centralised Control Room and the serviceability of each battery determined on an hour-to-hour basis. Given that the batteries have a finite number of cycles over a given period it is envisaged that the batteries will be renewed multiple times in the 40-year life of the site.