VOLUME 6: CHAPTER 7 – GEOLOGY AND SOILS ENVIRONMENT – ALTERNATIVE ALIGNMENT

Appendices (Volume 5 of this EIA Report)

Figures (Volume 3 of this EIA Report)

7. GEOLOGY AND SOILS ENVIRONMENT

7.1 Executive Summary

7.1.1 An assessment has been undertaken of the Alternative Alignment within Section 3 of the project between Broadford and Kyle Rhea on geology, peat and soils (the geology and soils environment) during the construction and operational phases. The Alternative Alignment is referred to interchangeably with "the Proposed Development" for the purposes of this Chapter. The assessment has also considered the potential effects of dismantling the existing Overhead Line (OHL) might have on the geology and soils environment.

7.1.2 Information for the study area was compiled using baseline data from a desk study which was verified by an extensive programme of investigative field work.

7.1.3 The assessment was undertaken considering the sensitivity of the receptors identified during the baseline study and considering the mitigation measures incorporated in the development design.

7.1.4 The scope of the assessment was informed by scoping responses received from statutory and non-statutory consultees, as well as feedback received by the project team at public information and consultation meetings.

7.1.5 The assessment is supported by Appendices that consider potential effects on peat landslide and peat management, to ensure that there has been systematic consideration of peat throughout the development process.

7.1.6 Subject to adoption of best practice construction techniques and a project specific Construction Environmental Management Plan (CEMP), no significant adverse effects on the geology and soils environment have been identified for the Alternative Alignment.

7.2 Introduction

7.2.1 This Chapter considers the likely significant effects associated with the construction and operation of the Alternative Alignment on the geology and soils environment (soils, peat and geology). It also considers the effects associated with the dismantling of the existing 132 kV OHL and outlines standard best practice methods which have been incorporated into the design to prevent or reduce any identified effects and risks.

7.2.2 Further mitigation methods to address any potential effects are proposed, where appropriate, and residual effects are then assessed.

7.2.3 In addition, the assessment uses information and findings presented in **Volume 6, Chapter 4: Ecology** and **Volume 6, Chapter 6: Water Environment**. This Chapter also presents summary information from the following Appendices:

- Appendix V2-7.2: Peat Landslide Hazard and Risk Assessment (PLHRA); and
- Appendix V2-7.3: Peat Management Plan (PMP).

7.2.4 This Chapter has been prepared by SLR Consulting Ltd (SLR), who has also undertaken the assessment. It has been informed by a detailed programme of site investigation and surveys undertaken by the report authors.

Statement of Qualifications

7.2.5 Production of this Chapter has been overseen and reviewed by Colin Duncan, a Technical Director for SLR Consulting with over 40 years' experience as a geologist. His recent specialist area is Engineering Geological Assessment in the renewables and transmission sectors. He has been involved in engineering and geological assessment on a number of EIA projects for proposed wind farms, transmission lines and substations, providing both pre and post consent services in geological and geotechnical services. He has experience in

infrastructure design, geological assessment, borrow pit assessments, mining related studies and peat slide risk assessments.

7.2.6 A table presenting relevant qualifications and experience is included in **Appendix V15.1: EIA Team**, contained within Volume 5 of this EIA Report.

7.3 Scope of Assessment and Methodology

7.3.1 The potential effects from the Proposed Development on the geology and soils environment have been assessed by completing an initial desk study and a detailed programme of site investigation followed by an impact assessment.

7.3.2 This Chapter:

- describes the existing baseline established from desk studies, dedicated surveys and consultation;
- outlines the potential environmental effects on the geology and soils environment arising from the works associated with Proposed Development, based on the information gathered and the analysis and assessments undertaken;
- provides an assessment of the potential direct and indirect impacts of the Proposed Development on ground conditions and land use;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible significant environmental effects identified.

Study Area

7.3.3 The study area includes all elements of the Proposed Development, as described within **Volume 6, Chapter 2: Project Description** of this EIA Report. In addition, details of local geology and soil environments within a buffer of at least 250 m from the Proposed Development have been considered. The study area encompasses the Proposed Development as well as geological features which could potentially be affected by the construction and operation of the Proposed Development and dismantling of the existing OHL.

Consultation and Scoping

7.3.4 The scope of the assessment has been determined through a combination of professional judgement, reference to relevant guidance documents and consultation with stakeholders through a formal EIA scoping process and pre-application advice, and is based on the formal Scoping Opinion issued by Scottish Ministers.

7.3.5 Scoping responses, relevant to the geology and soils environment, are summarised in **Volume 2, Chapter 7 – Geology and Soils Environment** (see Table V2-7.1).

Potential Impacts

7.3.6 The following potential impacts have been assessed in full in relation to the Proposed Development:

- erosion and sedimentation which could give rise to potential impact on soil quality and resource during forest felling from construction and operation;
- potential impact on areas of peat during construction, operation and dismantling activities; and
- potential impact on areas of geology during construction, operation and dismantling activities; and
- potential cumulative impact during construction, operation and dismantling activities.

Issues Scoped Out

7.3.1 As assessment of potential cumulative effects associated with the Proposed Development and other proposed electrical transmission projects has also been 'scoped out' of the assessment. Other developments would also be designed, developed and managed in accordance with best practice, industry standards and relevant legalisation, planning policy and guidance regulated by statutory consultees. These standards ensure, with respect to the geology and soils environment, potential impacts are mitigated and controlled at source.

7.3.2 It will be necessary to establish borrow pits and construction compounds to facilitate the Proposed Development. They do not form part of this consent application and measures required to control or mitigate the potential effects of these on the water environment will be presented as part of their respective planning application(s).

Policy and guidance

7.3.3 Relevant policy and guidance documents have been reviewed and considered as part of this assessment.

Planning Policy

7.3.4 In addition to Scottish Planning Policy (SPP) published by The Scottish Government[1], THC Highland-wide Local Development Plan (HwLDP)[2] provides planning guidance on the type and location of development that can take place in the region. The LDP presents development polices of which the following are relevant to this study:

- Policy 53: Minerals;
- Policy 54: Mineral Wastes;
- Policy 55: Peat and Soils; and
- Policy 69: Electricity Transmission Infrastructure.

Guidance

- SEPA Regulatory Position Statement - Developments on Peat (SEPA, 2010);
- Good Practice during Windfarm Construction, 4th Edition (Scottish Renewables, Scottish Natural Heritage (now NatureScot), SEPA, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW, 2019);
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Scottish Government, January 2017);
- Developments on Peatland - Guidance on the assessment of peat volumes, re-use of excavated peat and the minimisation of waste (Scottish Renewables & SEPA, 2012);
- Floating Roads on Peat - Report into Good Practice in Design, Construction and Use of Floating Roads on Peat with particular reference to Wind Farm Developments in Scotland (Forestry Commission Scotland & Scottish Natural Heritage, 2010);
- Managing Geotechnical Risk: Improving Productivity in UK Building and Construction (Institution of Civil Engineers, 2001);
- Ground Engineering Spoil: Good Management Practice CIRIA Report 179 (CIRIA, 1997);
- Scottish Roads Network Landslides Study Summary Report (Scottish Executive, 2005); and
- Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads on Peat (Forestry Commission, 2006).

[1] The Scottish Government (2014) Scottish Planning Policy

[2] The Highland Council (April 2012) Highland-wide Local Development Plan

Desk Study

7.3.5 A desk-based review of soil and geological maps, Ordnance Survey (OS) mapping and Digital Terrain Model (DTM) mapping has been undertaken. Baseline data with respect to geology and soils environment has been collected from publicly available information and open-source data from a range of sources. The data review includes:

- NatureScot Environment map viewer[3];
- British Geological Survey (BGS) Geoindex mapping[4];
- NatureScot SiteLink[5];
- Department for Environment, Food and Rural Affairs (DEFRA) Multi-Agency Geographic Information for the Countryside (MAGIC) online viewer[6];
- Public Health England UK Radon Map[7];
- The Coal Authority Interactive Map[8];
- Zetica UXO Risk Maps[9];
- A review of current and historical Ordnance Survey maps; and
- Site Specific Ground Investigation Reports (Card Geotechnics Ltd).

Field Work

7.3.6 The geologists and hydrogeologists have worked closely on this assessment to ensure that appropriate information is gathered to allow a comprehensive impact assessment to be completed.

7.3.7 Detailed site visits and walkover surveys have been undertaken by SLR on the following dates:

- October 2021 – reconnaissance visit of the route. The length of the section was walked or driven; and
- November / December 2021 – peat probing to collect peat depth and condition data along the Alternative Alignment.

7.3.8 In addition, a programme of intrusive field investigation was undertaken by Card Geotechnics Limited (CGL) on the following dates:

- Section 3 – 1 November 2021 and 8 April 2022[10] which included investigation at the location of a number of towers within Section 3 (no site investigations were carried out along the Alternative Alignment through Glen Arroch);

7.3.9 The field work has been undertaken in order to:

- verify the information collected during the desk and baseline study;
- undertake a visual assessment of the site and main geological features;
- inspect rock exposures and establish by probing, an estimate of overburden thicknesses, peat depth and stability;
- confirm underlying substrate, based on the type of refusal of a peat probe and by coring; and

[3] NatureScot, Scottish Government., (2016). available at: https://www.environment.gov.scot/ [Accessed 22 March 2022]
[4] British Geological Survey (BGS) Online Viewer/Geoindex website, available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html ; http://www.bgs.ac.uk/geoindex / [Accessed 22 March 2022]
[5] NatureScot SiteLink, available at: https://sitelink.nature.scot/about [Accessed 22 March 2022]
[6] Department for Environment, Food and Rural Affairs (2013), available at: https://magic.defra.gov.uk/ [Accessed 22 March 2022]
[7] UK Radon Map (2022), available at: https://www.ukradon.org/information/ukmaps [Accessed 22 March 2022]
[8] Coal Authority (2022), available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html [Accessed 22 March 2022]
[9] Zetica UXO (2022), available at: https://zeticauxo.com/downloads-and-resources/risk-maps/ [Accessed 22 March 2022]
[10] Card Geotechnics Limited (2022) LT91 Fort Augustus to Skye OHL Reinforcement – Section 3 & 3A Broadford to Kylerhea, Geotechnical Interpretative Report, Revision 0

- allow appreciation of the site, determine gradients, access routes, ground conditions, etc., and to assess the relative location of all the components of the Proposed Development.

7.3.10 The desk study and field surveys have been used to identify potential development constraints and have been used as part of the iterative design process.

Significance Criteria

7.3.11 The significance of effects of the Proposed Development has been assessed by considering two factors: the sensitivity of the receiving environment and the potential magnitude of impact, should that effect occur.

7.3.12 This approach provides a mechanism for identifying the areas where mitigation measures are required and for identifying mitigation measures appropriate to the significance of likely effects presented by the Proposed Development.

7.3.13 Criteria for determining the significance of effect are provided in **Appendix V2-7.1**.

Limitations of the Assessment

7.3.14 The assessment uses site investigation and survey data and publicly available data sources, including but not limited to SEPA, NatureScot, BGS, and commercial data supply companies, as well as additional information supplied from stakeholders during the scoping and consultation stages.

7.3.15 It is considered that the data and information used to complete this assessment is robust and that there are no significant data gaps or limitations.

7.4 Baseline

7.4.1 This part of the Chapter describes the present conditions which constitute the existing baseline environment for geology and soils within the study area. For a description of the Proposed Development, refer to **Volume 6, Chapter 2: Project Description.**

Designated Sites

7.4.2 The designated sites within the study area for the Alternative Alignment related to local geology and soil environments have been considered and are described below. The designated sites are illustrated in **Figure V6-7.1** and **Figure V6-7.2.**

Section 3

- Mointeach nan Lochan Dubha Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) – comprising and cited for presence of blanket bog, depressions on peat substrates, acid peat stained lakes and ponds, oligotrophic to mesotrophic standing water, transition mires and quaking bogs;
- Kinloch and Kyleakin Hills SAC and SSSI – comprising an area of highlands at the eastern end of the island of Skye. The site is cited for important flora and fauna as well as significant geological sites at the head of Glen Arroch and the north east coast of Loch Na Dal round into the sound of Sleat; and
- Kylerhea Glen Geological Conservation Review site (GCR) – a 1.66ha site noted for its structural and metamorphic geology. Particularly its reference section of excellent cross-bedding and convoluted bedding for the Beinn na Seamraig Formation.

7.4.3 There are also a number of sites designated for geological, soils or peat interests that are present within 1 km of the study area, these are outlined below. It is considered that the distance between the Proposed Development and the designated site provides geographical separation. Therefore, the designated sites are

beyond the reach of impact from the Proposed Development and are not considered further within this assessment:

- Loch Ashaig SSSI and GCR site. This 3.3 ha site designated for fossil pine stumps is approximately 700m downslope from the Proposed Development; and
- Strath SSSI and SAC. An 1,847 ha site designated for geological features and a range of limestone habitats including fen, marsh and swamp habitats. The SSSI / SAC is approximately 500 m up slope from the Proposed Development.

Land use and topography

7.4.4 The Alternative Alignment within Section 3 deviates from the Proposed Alignment south-east of Ashaig, at approximately National Grid Reference (NGR) NG 70907 22847. The route of the Alternative Alignment continues adjacent to the C1239 road through Glen Arroch towards Kylerhea, before heading north towards the existing crossing towers at Kyle Rhea.

7.4.5 The land use within the vicinity of the Alternative Alignment is rural, mainly moorland and forested areas with occasional tracks and roads for woodland maintenance. The Alternative Alignment traverses the slopes of the Beinn Bheag and Beinne na Grèine through Glen Arroch and Kylerhea Glen. A number of small streams flow down the southern slopes of Beinne na Grèine, Sgùrr na Coinnich and Beinn Bhuidhe and other peaks.

7.4.6 Analysis of mapping indicates that ground elevations range from between approximately 170 m Above Ordnance Datum (AOD) south-east of Ashaig, to in excess of 230 m AOD along the northern slopes of Beinn Bheag. The topography then falls towards the coast and Kyle Rhea.

Slope

7.4.7 The Alternative Alignment traverses the valleys of Glen Arroch and Kylerhea Glen. Slope mapping indicates that gradient of the slope varies significantly and ranges from 2 degrees to more than 12 degrees within the study area. Several locations within the study area pass over or intersect areas of slope gradients in excess of 12 degrees in several areas.

7.4.8 In these areas with sloping ground, the composition and extent of the superficial geology affects the stability of the slopes and therefore the potential for landslide.

Soils

The Carbon and Peatland 2016 map[11] shows the distribution of peatland classes across Scotland. The details of the classifications are shown in **Table V6-7.2**. The mapping shows peat may be present within the vicinity of the Alternative Alignment, and where peat is indicated, the majority has been classified as Class 3 and Class 5. Classes 2 and 4 are also present within the study area, the details of which are shown on **Figure V6-7.3.**

Table V6-7.2: Classification of Peat

Class of Peat	Peat Description	Indicative Soil	Indicative Vegetation
1	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value.	Peat Soil	Peatland
2	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of	Peat soil with occasional peaty soil	Peatland or areas with high potential

[11] Scottish Natural Heritage (SNH), The James Hutton Institute and Scottish Government., (2016) Carbon and Peatland 2016 map. Available from: http://map.environment.gov.scot/soil_maps/ Scottish Government, 2016, [Last accessed 22 March 2022]

Class of Peat	Peat Description	Indicative Soil	Indicative Vegetation
	potentially high conservation value and restoration potential		to be restored to peatland
3	Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.	Predominately peaty soil with some peat soil	Peatland with some health
4	Area unlikely to be associated with peatland habitat or wet and acidic soils. Area unlikely to include carbon-rich soils.	Predominantly mineral soil with some peat soil	Heath with some peatland
5	Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.	Peat soil	No peatland vegetation
0	Mineral soil - Peatland habitats are not typically found on such soils.	Mineral soils	No peatland vegetation

7.4.9 Peat is defined as a material consisting of the partially decomposed remains of plant material and organic matter preserved over a period in a waterlogged environment resulting in anaerobic conditions and is of depths >0.5 m. Accumulations of peat less than 0.5 m thick are too thin to be classified as true peat deposits and are often classified as organic soils or peaty soils.

7.4.10 Within the study area there are a range soil types recorded on the National soil map of Scotland[12]. The study area comprises mainly peaty gleys, with isolated pockets of other soil types including:

- peat;
- peaty podzols;
- peaty gleys; and
- brown soils.

7.4.11 As part of the baseline assessment a comprehensive peat probing and characterisation exercise has been conducted within the study area for the Alternative Alignment within Section 3; the peat depths are shown on **Figure V6-7.4**.

7.4.12 A summary of the results relevant to the Alternative Alignment within Section 3 is noted below (see also **Appendix V2-7.2: Peat Landslide Hazard Risk Assessment** and **Appendix V2-7.3: Peat Management Plan**):

- the presence and depth of peat was assessed at 31 tower locations along the length of the Alternative Alignment;
- peat was found to be limited along the Proposed Development footprint with the majority being classified as a soil (i.e., less than 0.5 m depth) draped extensively across glacial deposits and bedrock, and dissected by watercourses;
- a total of 9 tower locations have been identified as located within areas of peat (>0.5 m deep) with 2 tower locations identified on peat recorded over 1.0 m deep;

[12] Scottish Government, 2022, National Soil Map of Scotland. Available from: https://map.environment.gov.scot/Soil_maps/?layer=1 [Last accessed 22 March 2022]

- the overall conclusion regarding peat stability is that there is negligible to low risk of peat instability over most of the Alternative Alignment although some limited areas of medium risk have been identified; and
- a hazard impact assessment has been completed, which has concluded that subject to the employment of appropriate mitigation measures, all these areas can be considered constructable with minimal peat slide risk.

7.4.13 Ground investigation works carried out within Section 3 noted that topsoil was encountered at one location as a silty sandy gravelly clay to a depth of 0.7mbgl.[13] "*Peat was encountered across the route generally on shallow valley sides, plateaus, and valley floors. Peat generally occurred as spongy or plastic slightly sandy fibrous or pseudofibrous peat to a maximum depth of 3.6m bgl. Typically, peat deposits are thinner than 1.00m in thickness across Section 3*"[14].

Superficial Geology

7.4.14 The BGS[4] published mapping indicates that the superficial geology present across the study area comprises areas of Alluvium, Till and Raised Marine deposits, although the majority of the Alternative Alignment is mapped without superficial deposits indicating that bedrock is at or near surface. The superficial Till and Moranic deposits appear to be present mainly in the Glen Arroch and Kylerhea Glen valleys. The published superficial geology is illustrated in **Figure V6-7.1**.

7.4.15 The ground investigation encountered raised marine deposits at three locations to a maximum depth of 5.5m bgl. "*Glacial Till occurs across the length of the route generally at the base and side of valleys occurring to a mean depth of 3.05m bgl either from surface or underlying Peat or Topsoil. Glacial Till was recorded at a maximum of 5.90m bgl."*[15]

Bedrock Geology and Linear Features

7.4.16 The Sleat Peninsula and the eastern part of the island comprises Neoproterozoic sedimentary rocks of the Torridon and Sleat groups with Paleaogene igneous intrusions. These units lie to the west of the Moine Thrust, which trends northeast southwest through the Sound of Sleat and the Sleat Peninsula, and have been subject to faulting and folding.

7.4.17 A summary of the published bedrock geology of the site and surrounding area is described in **Table V6-7.3**. The published bedrock geology is illustrated in **Figure V6-7.2**.

Table V6-7.3: Bedrock Geology

Age	Stratigraphic Group	Unit	Desctiption
Paleogene (23 – 66 Ma)	North Britain and Central Skye igneous suites	Dykes	Variously: Basalt & microgabbro, felsite and granophyric granite, basaltic andesite and rhyolite, and peridotite.
Mesozoic (Jurassic Hettangian)	Lias Group	Ardnish Formation	Sandstone, siltstone, fissile micaceous mudstone with thin ironstone

[13] Card Geotechnics Limited (2022) LT91 Fort Augustus to Skye OHL Reinforcement – Section 3 & 3A Broadford to Kylerhea, Geotechnical Interpretative Report, Revision 0
[14] Ibid.
[15] Ibid.

Age	Stratigraphic Group	Unit	Desctiption
(c.200 Ma)		Breakish Formation	Quartzose sandstone, limestone, fissile mudstone with coral beds
Neoproterozoic (541 – 1000 Ma)	Torridon Group	Applecross Formation	Sandstone with conglomerate
	Sleat Group	Kinlock Formation	Grey sandstone with mudstone
		Beinn na Seamraig Formation	Greenish grey sandstone with mudstone

7.4.18 Numerous north northwest to south southeast trending faults intersect the Lias Group strata, with one mapped fault underlying the Alternative Alignment. Faulting and seismicity are not known to occur within this area in recent times.

7.4.19 The CGL ground investigation observed variation in the bedrock geology across Section 3. "The Breakish formation, a Jurassic limestone/mudstone can be seen at the western extent of Section 3, … Torridon Group Sandstone is the most prominent strata. To the east a few instances of igneous rocks belonging to the North Britain Palaeogene Dyke Suite are noted."[16] It was noted that the depth to rockhead indicates a natural variation in the deposits.

Hydrogeological Conditions

7.4.20 The hydrogeological setting of the Study area and ground conditions are described in detail within **Volume 2, Chapter 6: Water Environment**. A summary is included below.

7.4.21 The aquifer status within the majority of the bedrock of the study area is characterised as a Class 2C a *'low productivity aquifer'*, where '*flow is virtually all through fractures and other discontinuities*'[17].

7.4.22 The glacial and peat superficial deposits are not considered an important aquifer. These are likely to be discontinuous and limited in extent and as such can have limited groundwater potential.

Mineral Resources

7.4.23 The HwLDP states that a mineral audit will be conducted to assess mineral supply, and should the result of the audit highlight a need, THC will seek to identify areas of search and areas to be safeguarded for minerals. At the present time no mineral safeguarding plans have been formulated by THC and therefore the superficial or bedrock geology within the study area are not recorded as safeguarded minerals.

7.4.24 THC minerals audit of 2015-2016[18] records one active quarry (Kyleakin Quarry) to the east of Kyleakin, noted for working sand and gravel.

[16] Card Geotechnics Limited (2022) LT91 Fort Augustus to Skye OHL Reinforcement – Section 3 & 3A Broadford to Kylerhea, Geotechnical Interpretative Report, Revision 0

[17] Scotland's Environment, Scottish Government (2018). https://map.environment.gov.scot/sewebmap/ [accessed 22 March 2022]

[18] Highland Council Minerals Audit 2015-2016, available at: https://www.arcgis.com/apps/webappviewer/index.html?id=80b35ea0385a44728b6e4dacc07a4719 [accessed on 22 March 2022]

Radon Gas

7.4.25 The UK Radon Plan indicate that the majority of the study area of the Alternative Alignment is located in an area where less than 1 % of homes are at or above the National Radiological Protection Board (NRPB) action level therefore the risk of significant ingress of radon into structures on-site is considered low.

7.4.26 Given the anticipated ground conditions the risk associated with ground gas is considered generally low risk in accordance with BS8576[19]. Current advice confirms that protection measures would not be required for any permanently enclosed structure. This is therefore not considered further in this assessment.

Historical Past Use and Contaminated Land

7.4.27 The 1:10,000 scale historical maps for the study area have been reviewed. In general, these show that the study area has been predominantly forest or moorland with scattered settlements from the 1800s to present day.

7.4.28 The study area is not within a coal mining reporting area and there are no coal bearing bedrock units present.

7.4.29 There is no record of any mining or quarrying underlying the study area.

7.4.30 Contaminated soils are generally associated with historical or current industrial activities where localised or widespread contamination has occurred. In general, these former activities are concentrated in and around urban areas, or in rural areas which served specific industries or activities (e.g. mining).

7.4.31 Information on the status of the soils with regard to contamination along the route of the Alternative Alignment was sought from THC and SEPA. Consultation with THC, site visits and information provided for the EIA Report has identified a number of former land uses within the study area for the Proposed Development, where there is some potential for contaminated land to be encountered.

7.4.32 These may include:

- sites of limited agricultural activity; and
- sites associated with current or former electrical transmission infrastructure.

7.4.33 These are examples of typical current and previous land uses and given the predominantly rural nature of the study area, it is unlikely that a large number of such sites would be encountered during construction or dismantling activities.

7.4.34 The SEPA[20] website was consulted for the presence of landfills (authorised and historic), the search identified no authorised landfills within the study area.

7.4.35 Contaminated land on construction workers and human receptors from pre-existing ground conditions has been effectively ruled out of the assessment as no contamination sources have been identified along the route as part of this assessment. Where potentially contaminated sites are encountered during project works, the Principal Contractor would undertake further assessment.

Unexploded Ordnance (UXO)

7.4.36 The Zetica UXO mapping indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing. There is no evidence of any areas impacted by UXO within the Study Area.

[19] BSI Standards Publication 2013, BS 8576:2013 Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)
[20] Scottish Environment Protection Agency (SEPA), Waste site information. Available from: https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-site-information/ [Last accessed 02 February 2022]

The entire length of the study area is identified as a Low Risk site. Therefore, this is not considered further within the assessment.

Summary of Sensitive Geological or Soil Receptors

7.4.37 **Table V6-7.4** outlines the receptors identified as part of the baseline study, and their sensitivity based upon the criteria contained in **Appendix V2-7.1**, together with a description of their sensitivity to potential impacts associated with the Proposed Development. These receptors form the basis of the assessment, and as per the previously introduced methodology, are used in conjunction with an estimate of the magnitude of an effect to determine significance.

Table V6-7.4: Sensitivity of Receptors

Receptor	Sensitivity	Reason for Sensitivity
Soils	Low	Soils are not of noted quality or habitat.
Peat	High	Peat Class 2 and 3 are mapped as present within the study area.
Geology	Negligible	The geological units present within the study area are widespread across this part of Scotland.
Statutory Designated Sites	High	The Proposed Development passes within the vicinity of the following designated sites: - Mointeach nan Lochain Dubha SAC and SSSI; - Kinloch and Kyleakin Hills SAC and SSSI; and - Kylerhea Glen GCR.
Mining or quarrying	Negligible	Minimal sources within study area.
Contaminated land	Negligible	Minimal sources within study area.

7.5 Embedded Mitigation

7.5.1 Mitigation has been developed as the project design has evolved. The impact assessment and mitigation process has been iterative and therefore mitigation has been developed for the design to be as specific as possible and as an assumed part of the Proposed Development and associated infrastructure. This process has included, for example, using existing access tracks where possible, and the siting and location of infrastructure to avoid sensitive geological and soil areas, other than where these are unavoidable such as extensive areas of peat.

7.5.2 In addition to the mitigation embodied in the design and routeing of the project, best practice construction measures have also been developed to ensure that disturbance and pollution during construction is avoided. These are detailed below, and the assessment has been undertaken in the knowledge that such measures would be in place.

Good Practice Measures

7.5.3 The Proposed Development will be constructed in accordance with good practice guidance, including UK and Scottish guidance on good practice for construction projects.

7.5.4 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 the successful Principal Contractor would manage the works in accordance with all commitments and mitigation detailed in the EIA Report, Applicant's General Environmental Management Plans (GEMPs), statutory consents and authorisations, and industry best practise and guidance, including pollution prevention guidance.

7.5.5 The CEMP will also outline measures to ensure that the works minimise the risk to peat, soils and the geological environment. It is expected that the following measures outlined below will be included in the CEMP and would ensure the works are undertaken in accordance with good practice guidance.

Geology, Peat and Soils

7.5.6 A Design and Geotechnical Risk Register will be compiled to include risks relating to peat instability, as this will be beneficial in identifying potential risks that may be involved during construction.

7.5.7 Good construction practice and methodologies to prevent peat instability within areas that contain peat deposits are identified in **Appendix V2-7.2: Peat Landslide Hazard Risk Assessment**. These include:

- measures to ensure a well-maintained drainage system, to include the identification and demarcation of zones of sensitive drainage or hydrology in areas of construction;
- minimisation of 'undercutting' of peat slopes, but where this is necessary, a more detailed assessment of the area of concern would be required;
- careful micro-siting of infrastructure including tower bases, and crane hardstandings within the LoD to minimise effects on the prevailing surface and sub-surface hydrology and geology;
- raising peat stability awareness for construction site staff by incorporating the issue into the Site Induction (e.g. peat instability indicators and good practice);
- introducing a 'Peat Hazard Emergency Plan' to provide instructions for site staff in the event of a peat slide or discovery of peat instability indicators;
- developing methodologies to ensure that degradation and erosion of exposed peat deposits does not occur as the break-up of the peat top mat has significant implications for the morphology, and thus hydrology, of the peat (e.g. minimisation of off-track plant movements within areas of peat);
- developing robust drainage systems that would require minimal maintenance;
- developing drainage systems that would not create areas of concentrated flow or cause over-, or under-saturation of peat habitats;
- the removal and off-site disposal of soils would be avoided where possible and where soils are considered to have a value with regard to habitat (e.g. peat) and agricultural productivity, and where soils are to be used for restoration purposes following construction;
- best practice methods will be followed when soil handling and storage. This will be required in order to preserve soil, structure, texture and avoid compaction within sensitive locations. The principles that will be adopted to manage potential impacts upon soil during construction within the Proposed Development will be set out in the CEMP; and
- vehicle movements on untracked ground would be limited to reduce the impact of construction on surface cover loss and soil compaction and in particular in areas with softer drift deposits / soils (for example areas of peatland) and on steeper slopes (e.g. valley sides).

Geotechnical Stability

- earth cutting along steeper slopes would be avoided where possible to reduce the impact on slope stability. Where required, suitable engineering would be undertaken to ensure the stability of the slope is maintained, including in areas prone to peat slides.

Contaminated Land

- prior to construction works, an assessment would be made by the Principal Contractor as to the potential for contamination based on site specific information regarding potentially contaminated sites;
- where such investigations identify potentially contaminated land, strategies for mitigation or remediation of the land would be developed and agreed with the regulatory authorities (SEPA and the local authorities) and implemented prior to construction in these locations; and
- where previously unidentified contaminated land is encountered during construction, appropriate investigation and remedial measures would be developed and implemented by the Principal Contractor in accordance with relevant legislation and regulatory requirements to prevent pollution of environmental receptors and / or risk to human health.

Temporary Access Tracks

- in general, proposed construction site access would be taken via the existing public road network and would make use of existing forest and estate tracks as far as practicable, upgraded as required.
- the majority of access will be achieved through upgrade of existing and installation of new tracks. Floating stone road or trackway panel construction may be installed in sensitive areas such as over deeper areas of peat. All new tracks would be constructed in accordance with best practice construction methods, and with reference to NatureScot's good practice guide on constructing tracks in Scottish uplands[21].

Pollution Prevention

- water would be prevented as far as possible, from entering excavations such as foundations.
- procedures would be adhered to for storage of fuels and other potentially contaminative materials in line with the Controlled Activity Regulations, 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.

7.5.8 A wet weather protocol would be developed. This would detail the procedures to be adopted by all staff during periods of heavy rainfall. Toolbox talks would be given to engineering / construction / supervising personnel. Roles would be assigned and the inspection and maintenance regimes of soils and erosion control measures would be adopted during these periods.

7.5.9 In extreme cases, the above protocol would dictate that work onsite may have to be temporarily suspended until weather / ground conditions allow.

7.6 Assessment of Likely Significant Effects

7.6.1 The assessment of effects is based on the Proposed Development description outlined in **Volume 6, Chapter 2: Project Description.**

7.6.2 Potential impacts on geology and the soils environment have been considered for the different phases of the Proposed Development (construction, operation and dismantling). The impacts have been identified with reference to relevant guidance, through consultation and project team discussions, through targeted research on geology, peat and soil effects and by considering the information provided by the project engineers on infrastructure and construction methods.

[21] Constructed Tracks in the Scottish Uplands. Scottish Natural Heritage, September 2015.

Construction effects of the Proposed Development

7.6.3 Site clearance and preparation works for installation of the Proposed Development has the potential to result in the following effects without appropriate controls or mitigation:

- over compaction of soils caused by the use of heavy machinery onsite;
- 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;
- impact to sensitive geological receptors (e.g., SSSI's); and
- an adverse effect on geological setting from pollution, fuel, oil, concrete or other hazardous substances;

Designated Sites in proximity to the Proposed Development

7.6.4 There are three designated sites associated with the geology and soil environment within the study area, therefore the baseline assessment of sensitivity has been rated as high. The presence of the Proposed Development within a designated geological site has the potential to damage or have an adverse impact to the features of the designated site.

7.6.5 The Alternative Alignment crosses the most northern part of the Mointeach nan Lochain Dubha SAC / SSSI, although no infrastructure is proposed within the designated site. A new temporary access track is proposed approximately 12 m north of the designated site.

7.6.6 The controls which would be adopted at site in accordance with best practice would ensure that the potential magnitude of impact on the designated site is negligible and thus the significance of effect is **Negligible**. No additional mitigation, over and above best practice, is required.

7.6.7 Approximately 4 km length of the Alternative Alignment crosses Kinloch and Kyleakin SAC and SSSI. The Alternative Alignment would involve the construction of steel lattice towers, a new permanent access track and the dismantling of the existing OHL within the SAC and SSSI boundary.

7.6.8 The two areas of key geological importance found within the Kinloch and Kyleakin SSSI are situated at the head of Glen Arroch and following the north-east coast of Loch na Dal round into the Sound of Sleat. The former is located within the study area of the Alternative Alignment; the geological feature at the head of Glen Arroch at Bealach Udal comprises a series of rocky bluffs show the upper part of the Beinn na Seamraig formation. Bealach Udal is located to the north of the Alternative Alignment.

7.6.9 Careful site design and siting of the tower locations to avoid rocky outcrops and features of potential interest will ensure that negligible change from baseline conditions will occur as a result of the Alternative Alignment in relation to the SSSI.

7.6.10 The controls which would be adopted at site in accordance with best practice would ensure that the potential magnitude of impact on the designated site is negligible in terms of the geology and soils environment, and thus the significance of effect is **Negligible**. No additional mitigation, over and above best practice, is required.

7.6.11 The Kylerhea Glen GCR is situated on the northern edge of the study area and on the opposite side of the valley to the Alternative Alignment. The Alternative Alignment would not enter or encroach upon this designated geological feature and the controls which would be adopted at site in accordance with best practice

would ensure that the potential effect on designated the SSSI is negligible and thus the significance of effect is **Negligible**. No additional mitigation, over and above best practice, is required.

Soils

7.6.12 During the construction phase there is potential from the siting of site infrastructure for the degradation, removal or loss of soils. The construction methodology chosen ensures that the direct impacts on soil resulting from excavation will be limited spatially to the Proposed Development and temporally to a one-off process of excavation, storage and replacement.

7.6.13 The sensitivity of the soil across the Proposed Development is rated as low. The magnitude of impact is considered negligible due to the careful micro-siting that has occurred during the design evolution stages of the project and, therefore, the significance of effect to potential soils receptors is assessed as **Negligible**. No additional mitigation, over and above best practice, is required.

Peat

7.6.14 The presence of peat within the study area formed a key consideration in the design of the Alternative Alignment. A peat management plan and detailed review of potential peat slide risk and appropriate mitigation is presented in **Appendices V2-7.2 and V2-7.3**

7.6.15 A peat probing exercise at hundreds of locations across the Alternative Alignment, and specifically at 31 tower locations in areas of identified peaty soil/peat, was used to determine the thickness thereof. The assessment identified a total of 2 tower locations located within areas of peat >1.0 m deep. The site design has avoided these deeper areas of peat where technically possible.

7.6.16 There is very limited erosion to peat as a consequence of fluvial activity, grazing or natural movement, although locally in particular around Broadford there is evidence of peat cutting. Peat has been proven to be virtually absent from the hill tops locally and on steeper hills sides.

7.6.17 The Proposed Development has been assessed for potential hazards associated with peat instability. The tower locations were screened to assess risk, only 3 sites were deemed medium risk. All investigated sites were deemed to be suitable for mitigation by construction design.

7.6.18 Ground investigation has proven that the majority of the excavated peat to be fibrous and thus readily handled and suitable for storage and re-use on site. Proposals for the re-use and management of peat on site have been outlined in **Appendix V2-7.3.**

7.6.19 The overall conclusion regarding peat stability is that there is negligible to low risk of peat instability over the majority of the Proposed Development although limited areas of medium and high risk have been identified. Subject to the employment of appropriate mitigation measures, all these areas can be considered constructable with minimal peat slide risk, as the area impacted by construction will be very limited, extent of excavation small and in most instances the peat will be used to restore the site.

7.6.20 Rated as a high sensitivity receptor. With the safeguards referred to in **Appendices V2-7.2** and **V2-7.3**, the potential magnitude of impact on peat across the Proposed Development is negligible and, therefore, the significance of effect is assessed as **Negligible**. No additional mitigation, over and above best practice, is required.

Mineral Resource

7.6.21 At the present time no mineral safeguarding plans have been formulated by THC within the study area, therefore the superficial and bedrock geology within the study area are not recorded as safeguarded minerals. The reduction in extent of these deposits as a result of the construction activities is considered to be negligible because of their widespread occurrence in the region and the country, and therefore minimal percentage loss.

7.6.22 In general, aggregate products are only cost effective if transported over relatively short distances, and thus in order to make extraction viable, there must be a source of demand near-by. The low value of construction aggregates and the high cost of transport is such that the distance to market is critical in defining market values and viability of production sites.

7.6.23 Existing quarries and historical gravel pits appear to be directly adjacent to the existing transport infrastructure and the local potential sales market. Much of the Proposed Development is sited in a rural locality and is some distance from the towns and cities that would have a demand for local aggregate. Furthermore, there is an absence of infrastructure for transporting or processing of any potential mineral deposits.

7.6.24 The potential minerals resources are therefore considered to be of negligible sensitivity. The potential magnitude of impact on the mineral resource is negligible and, therefore, the significance of effect is assessed as **Negligible**. No additional mitigation, over and above best practice, is required.

Geotechnical and Ground Stability

7.6.25 The potential presence of peat and ground stability within the study area formed a key consideration in the design of the Proposed Development. Informed by the extensive programme of peat probing and ground investigation undertaken across the site, the design has avoided areas of deeper peat, where possible.

7.6.26 A detailed review of potential peat slide risk and appropriate mitigation is presented in **Appendices V2-7.2 and V2-7.3.**

7.6.27 Site conditions have been assessed for the proposed tower locations as part of the detailed project design. In regard to slope stability, slopes characterised by steep gradients and / or loosely consolidated superficial deposits are considered to represent a low baseline sensitivity. Key effects may include localised slippage and increased erosion.

7.6.28 Mining is considered to represent a negligible baseline sensitivity. Information from geotechnical site investigations would be used by the Principal Contractor to design the tower foundations appropriately.

7.6.29 The magnitude of impact on geotechnical aspects and ground stability is considered negligible due to the careful micro-siting that has occurred during the site design and with the safeguards referred to in **Appendix V2-7.2 and V2-7.3.** Therefore, the significance of effect to potential instability is assessed as **Negligible** and requires no further mitigation.

Contaminated Land

7.6.30 Information from site walkovers and consultation indicates that contaminated land is unlikely to be encountered along the majority of the study area. The incurrence of contaminated land is predicted to be minor but ground conditions for each tower location would be assessed by the contractor as part of the detailed project design. Enabling works and construction would take place in accordance with current legislation and best practice.

7.6.31 The controls which would be adopted at site in accordance with best practice would ensure that the potential effect on contaminated land is considered Negligible. Therefore, the significance of effect to potential instability assessed as **Negligible** and requires no further mitigation.

Operational effects of the Proposed Development

7.6.32 During the operation of the Proposed Development, it is anticipated that routine maintenance of infrastructure would be required. It is not anticipated that there would be any excavation or need to stockpile large volumes of soils or peat, reducing the potential effects on soils or ground stability. Should any excavation be required, this is likely to be limited. Any excavation, handling and placement of material would be subject to the same safeguards that would be used during the construction phase of the project.

7.6.33 Should any maintenance be required onsite which would involve construction activities, mitigation measures would be adhered to along with the measures in the CEMP to avoid potential effects.

Effects of Dismantling the Existing OHL

7.6.34 All dismantling works would be carried out in accordance with industry best practice construction measures, guidance and legislation.

7.6.35 The dismantling of the existing steel towers would typically require access by tracked vehicles utilising existing access tracks where practicable. Construction equipment would be fitted with standard embedded spill prevention systems and mitigation measures will be applied to prevent spills of oils, hydrocarbons and other contaminants by providing spill response equipment.

7.6.36 The dismantling of the tower foundations would involve excavation below ground level where access can be achieved. Foundation material would be safely removed offsite for disposal. The dismantling would not result in the requirement to dispose of, or import, significant volumes of soils (including topsoil and subsoil) as part of the Proposed Development. Any excavations associated with the tower locations would be backfilled with arisings in reverse order. Any excess natural soil would be spread on the surface in the vicinity of the excavation.

7.6.37 The dismantling plan is described in detail within **Appendix V1-3.8**.

7.6.38 The dismantling of the existing OHL is not likely to result in significant adverse effects on the geology and soils environment, subject to the implementation of a CEMP, with appropriate safeguards for pollution prevention, and similar to those adopted for construction of the Proposed Development.

7.7 Mitigation

7.7.1 As there are no predicted significant effects under the terms of the EIA Regulations, other than the good practice measures that the Applicant would implement as standard (and as described above), no specific mitigation, during construction, is required.

7.8 Residual Effects

7.8.1 Existing ground conditions have been identified and used to assess the potential impacts the Proposed Development might have on the geology and soils environment. No significant effects are predicted on the geology or soils environment receptors during the construction and operation of the Proposed Development as well as dismantling of the existing OHL.

7.8.2 Best practice construction techniques that would safeguard the geology and soils environment and would be incorporated in the detailed design of the works, have been identified.

7.9 Summary of Effects

7.9.1 A summary of effects and the proposed mitigation measures that are required to reduce such effects are identified in **Table V2-7.5** Summary of Effects and Proposed Mitigation Measures**.5.**

Table V2-7.5 Summary of Effects and Proposed Mitigation Measures

Potential effect	Proposed mitigation/ enhancements	Significance of residual effect
Construction Phase		
• Soil compaction and erosion • Peat erosion or instability • Adverse effect on geological designated sites • Adverse effect on ground stability • Adverse effects on contaminated land	• Mitigation by design • Good practice construction techniques	Negligible
Operation		
No additional effects or mitigation / enhancement identified.		