

10 Geology and Soils

10.1 Introduction

- 10.1.1 This chapter assesses the potential effects on geology and soils resulting from the Proposed Development. This chapter (and its associated figures) is not intended to be read as a standalone assessment and reference should be made to the introductory chapters of this EIA Report (**Volume 2, Chapters 15**).
- 10.1.2 The geology, soils and peat assessment has been undertaken and reviewed by Jeff Turner, a Chartered Environmentalist and member of the Society for the Environment, Institute of Environmental Science, and Institute of Environmental Management and Assessment (CEnv, MIEEnvSc, PIEMA, BSc (Hons)). Jeff has over 22 years' experience in the co-ordination and management of Environmental Impact Assessments, including those for renewable energy developments. As part of this experience, Jeff has been responsible for managing the potential effects of electrical transmission infrastructure on peat and carbon rich soils, including the identification of suitable mitigation measures to minimise the effects from development.
- 10.1.3 This chapter is accompanied by the following Figures and Technical Appendices:
- Volume 3a: Figures:
 - **Figure 10.1: Peat Depths;**
 - **Figure 10.2: Superficial Geology;**
 - **Figure 10.3: Bedrock Geology;** and
 - **Figure 10.4: Soils Maps of Scotland.**
 - Volume 4: Technical Appendices:
 - **Technical Appendix 10.1 Peat Survey Results Report;**
 - **Technical Appendix 10.2: Outline Peat Management Plan (PMP);** and
 - **Technical Appendix 10.3: Peat Landslide Hazard Risk Assessment (PLHRA).**
- 10.1.4 Figures and technical appendices are referenced in the text where relevant.
- 10.1.5 For this assessment, the geology of the Site is defined as the bedrock and superficial deposits. The soils are defined as the part of superficial deposits subject to soil-forming processes, distinct from the underlying layers. The peat present in the area has been treated as a type of soil, even though it can extend to depths greater than the depth of typical mineral soil (of about one metre), to ensure that it is treated as one continuous unit.

10.2 Assessment Methodology and Significance Criteria

Scope of the Assessment

- 10.2.1 This chapter considers the likely effects from the construction of the Proposed Development on geology and soils, particularly impacts on peat and carbon rich soils. These include findings from field work (described in **Technical Appendix 10.1: Peat Survey Results Report, EIAR Volume 4**), discussion of peat management proposals (described in **Technical Appendix 10.2: Outline PMP, EIAR Volume 4**), and also consideration of potential peat landslide and hazard risks (as described in **Technical Appendix 10.3: PLHRA, EIAR Volume 4**).
- 10.2.2 The chapter assesses cumulative effects as arising from the addition of the Proposed Development to other cumulative developments. **Figure 15.1: Cumulative Developments (Volume 3a)** illustrates the Proposed Development along with other cumulative developments recorded as consented (under construction or not yet constructed), those in planning and those within the public domain, deemed reasonably foreseeable, within 15 km of the Proposed Development.

- 10.2.3 The assessment is based on the Proposed Development as described in **Chapter 2: Description of the Proposed Development (EIAR Volume 2)** and takes into account **Technical Appendix 2.2: Draft Outline Construction Environmental Management Plan (OCEMP, EIAR Volume 4)**.
- 10.2.4 The scope of the assessment has been informed by consultation responses summarised in **Table 10-1** and the following guidelines/policies:
- The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition)¹; and
 - Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland².

Extent of the Study Area

- 10.2.5 The Study Area covers the ‘Developable Area’ of the Proposed Development as covered by the survey as shown on **Figure 10.1: Peat Depths, EIAR Volume 3a**.

Consultation Undertaken to Date

- 10.2.6 Consultation undertaken to date mainly pertains to EIA Scoping. Scoping responses received at the time of writing that are relevant to this chapter are captured in **Table 10-1**. Further information can be found in **Appendix 4.3: Consultation Register (EIAR Volume 4)**.

Table 10-1 Scoping responses and other consultations of relevance to Chapter 10

Organisation	Type of Consultation	Response	How response has been considered
Energy Consents Unit (ECU)	Scoping Opinion, June 2022	Scottish Ministers consider that where there is a demonstrable requirement for peat landslide hazard and risk assessment (PLHRA), the assessment should be undertaken as part of the EIA process to provide Ministers with a clear understanding of whether the risks are acceptable and capable of being controlled by mitigation measures. The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition), published at http://www.gov.scot/Publications/2017/04/8868 , should be followed in the preparation of the EIA report, which should contain such an assessment and details of mitigation measures.	A PLHRA has been completed for the Proposed Development in accordance with the guidance, and is set out in Technical Appendix 10.3: PLHRA (EIAR Volume 4) .
		The Scoping Report was referred to Ironside Farrar commissioned by the ECU to provide advice regarding PLHRA and relative to the potential for risks posed by peat slides. Scottish Ministers agree with Ironside Farrar that a PLHRA will be required. Please note Ironside Farrar’s comments in their Annex A with regards to PLHRA.	
Ironside Farrar	Scoping Response, June 2022	The Peatland mapping shows sections of the route in the north and central/southern area comprise Class 5 soils, which includes carbon soils with deep peat. Smaller areas of Class 2	A PLHRA has been completed for the Proposed Development in accordance with the

¹ Scottish Government (2017). *Peat Landslide Hazard and Risk Assessments, Best Practice Guide for Proposed Electricity*.

² Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland, on-line version only.

Organisation	Type of Consultation	Response	How response has been considered
		soils, which are defined as supporting nationally important carbon-rich soils, deep peat and priority peatland habitat, are shown present in the northern and central part of the Proposed Development. Smaller areas mapped as Class 3 soils are shown to be present in the central area. Class 3 soils are predominantly peaty soils with some heath vegetation. Mineral soils are shown elsewhere along the route. British Geological Society mapping does not identify peat along the route. OS mapping confirms that slopes of greater than 2 degrees are present along the line of the development. These factors confirm that a PLHRA for the works will be required.	guidance, and is set out in Technical Appendix 10.3: PLHRA (EIAR Volume 4) .
Argyll and Bute Council	Scoping Response, June 2022	The commitment that....'The EIA Report will include an assessment of potential effects on geological and peat resource from the construction and operation of the Proposed Development. The outcomes of the peat study will be included as a technical appendix to the EIA Report and will include a detailed map of peat depths showing all the built elements overlain to demonstrate how the development avoids areas of deep peat....is welcomed as impacts upon peat are becoming ever more material in respect of climate change and carbon storage'.	Technical Appendix 10.1: Peat Depth Results Report (EIAR Volume 4) documents the findings of the peat depth surveys. Chapter 2: Development Description, Chapter 3: Alternatives and Chapter 4: Methodology (EIAR Volume 2) outline embedded mitigation measures and methods used to minimise potential impacts on peat.
		It is also welcomed that the applicant confirms: 'Peat probing will be undertaken in accordance with good practice guidance and relevant methodologies. This will include a coarse resolution grid across the Proposed Development area, based on a 100 m grid (subject to access). The peat depth data will then be used to inform the design of the Proposed Development'.	
		This embedded mitigation approach is considered essential to ensure that impacts upon peat are minimised from the outset of the proposals and tower and access location and construction are informed by peat depth and quality.	
SEPA	Scoping Response, June 2022	Minimising impacts on peat and peatland must be addressed in the EIA.	The alignment design was mature prior to commencement of peat surveys. Technical Appendix 10.1 Peat Depth Results Report (EIAR Volume 4) documents the findings of the peat depth surveys. Technical Appendix 10.2 Outline PMP (EIAR Volume 4) documents the quantities of peat to be excavated and reused.
		The planning submission must a) demonstrate how the layout has been designed to minimise disturbance of peat and consequential release of CO ₂ and b) outline the preventative/mitigation measures to avoid significant drying or oxidation of peat through, for example, the construction of access tracks, drainage channels, cable trenches, or the storage and re-use of excavated peat. There is often less environmental impact from localised temporary storage and reuse rather than movement to large central peat storage areas.	

Organisation	Type of Consultation	Response	How response has been considered
		<p>The EIAR must include a detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's guidance on Developments on Peatland - Peatland Survey with all the built elements (including peat storage areas) overlain to demonstrate how the development avoids areas of deep peat and other sensitive receptors such as GWDTEs.</p> <p>The EIAR must include a table which details the quantities of acrotelmic, catotelmic and amorphous peat which will be excavated for each element and where it will be re-used during reinstatement. Details of the proposed widths and depths of peat to be re-used and how it will be kept wet permanently must be included.</p> <p>Scottish Planning Policy states (Paragraph 243) that "Borrow pits should only be permitted if there are significant environmental or economic benefits compared to obtaining material from local quarries, they are time-limited; tied to a particular project and appropriate reclamation measures are in place." The submission must provide sufficient information to address this policy statement.</p>	
NatureScot	Scoping Response, June 2022	<p>The EIA must address impacts on nationally important carbon-rich soils, deep peat and priority peatland habitat</p> <p>The scoping layout indicates that parts of the site are underlain with Class 2 peatlands which are nationally important carbon rich soils, deep peat and priority peatland habitats. As such, there is a requirement for detailed peat and vegetation surveys to be undertaken to ascertain the quality and distribution of peatland and priority habitats across the site as per NatureScot guidance.</p> <p>It is not clear whether constructed tracks would be required to facilitate construction of this line within Class 1 & 2 peatlands, however, we consider that these and construction compounds should not be located within these areas. We advise that the use of low ground pressure vehicles, temporary trackway or bog mats and minimising vehicle movements would reduce impacts to this habitat.</p>	<p>The alignment design was mature prior to commencement of peat surveys.</p> <p>Technical Appendix 10.1 Peat Depth Results Report (EIAR Volume 4) documents the findings of the peat depth surveys.</p>

Effects Scoped Out

- 10.2.7 The Proposed Development would not have a fixed operational life as it is assumed to be operational for 50 years or more. Effects associated with the construction phase can be considered to be representative of the worst-case decommissioning effects and therefore decommissioning effects have been scoped out.

- 10.2.8 The proposed impacts on geology and geological receptors have been scoped out on the basis of no likely significant effects identified. Therefore, the assessment has focussed on the potential impacts on peat and carbon rich soils.
- 10.2.9 An Unexploded Ordinance (UXO) desk study and survey was commissioned by the Applicant to support the Proposed Development⁶. Potential effects from UXO are scoped out of this assessment but the findings were used to inform the peatland survey to ensure these were undertaken safely.

Method of Baseline Data Collation

Desk Study

- 10.2.10 Desk top information covering the baseline geological conditions and peatland data were reviewed and are summarised in this chapter. Sources and background information are included in **Technical Appendix 10.1: Peat Survey Results Report** and **Technical Appendix 10.3 PLHRA (EIAR Volume 4)**.

Field Survey

- 10.2.11 Two rounds of peat survey were undertaken across the Proposed Development, based on the Proposed Development design. The surveys were designed based on best practice guidance for surveying developments on peatland².
- 10.2.12 The first survey was undertaken during April 2022 and included:
- Towers: Peat probing was carried out at 10 m intervals along cardinal points for a total of 50 m from the centre of each tower location; and
 - Access tracks: 50 m intervals along the track and at points every 10 m perpendicular to the centreline on either side of the proposed track.
- 10.2.13 The second survey was undertaken in June 2022 and included the access tracks (revised layout as June 2022) and based on peat probing at 50 m intervals along the track and at points every 10 m perpendicular to the centreline on either side of the proposed track.
- 10.2.14 Peat cores were taken using a Russian auger, with a sample volume of 0.5 l, and a number of field tests and observations were undertaken to identify:
- Depth of acrotelm;
 - Degree of humification, to establish amorphous, intermediate, fibrous and content; and
 - Degree of humification using the Von Post classification.
- 10.2.15 Samples were subsequently submitted to a soils testing laboratory to analyse each sample for Bulk Density, Loss on Ignition (Organic Content), Moisture Content, and pH. Results of the testing are required for peat stability analysis detailed within this report.
- 10.2.16 During each survey observations of peat instability or peat geomorphological conditions were recorded to inform the assessment. The surveys were undertaken by experienced geotechnical and geological consultants.

Limitations and Assumptions

- 10.2.17 This assessment makes use of opensource and publicly available data resources, complimented by further site-specific surveys. The assessment of potential impacts within this chapter is reliant on the accuracy of the public data, which is considered robust and sufficient to enable this assessment to be completed.
- 10.2.18 Where access to the locations of surveys was not possible during field surveying (due to land access or the presence of dense vegetation cover) observation of indicative features or adjacent areas where safe access was possible, was undertaken. Alternatively, conditions have been drawn from the desk-based assessment.

- 10.2.19 It should be noted that the peat surveys were undertaken based on a mature design alignment and it was only possible to microsite towers based on the findings of the peat depth survey.

Method of Assessment

- 10.2.20 Potential impacts on geology and soils have been predicted and assessed based on the Proposed Development as described in **Chapter 2: Description of the Proposed Development (EIAR Volume 2)** and in accordance with best practice guidance for EIA assessment³. The Proposed Development would involve a range of enabling works, construction, and the eventual operation of the Overhead Line (OHL).
- 10.2.21 Potential effects which may occur as a result of the Proposed Development were identified throughout the scoping process and on the basis of the responses listed in **Table 10-1**. Effects are described as: direct or indirect; permanent or temporary; and beneficial or adverse.

Sensitivity of Receptor

- 10.2.22 Effects on geology and peat resources are described as beneficial, neutral or adverse and are considered with reference to the value or sensitivity of the receptor, as described in **Table 10-2**.

Table 10-2 Sensitivity of Environmental Resource

Sensitivity of Receptor	Definition	Typical Criteria
High	International or national level importance. Receptor with a high quality and rarity, regional or national scale and limited potential for substitution / replacement.	Average peat depth >1 m within the sub-catchment.
Medium	Regional, county and district level importance. Receptor with a medium quality and rarity, regional scale and limited potential for substitution / replacement.	Average peat depth >0.5 m within the sub-catchment.
Low	Local importance. Receptor is on-site or on a neighbouring site with a low quality and rarity, local scale. Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations without detriment to its present character	Average peat depth <0.5 m within the sub-catchment.

Magnitude of Impact

- 10.2.23 Detailed consideration of impact magnitude is a standard component of geology and soils. It is incorporated to succinctly describe the scale of individual impacts. The magnitude of effects is predicted quantitatively where possible, taking into account the duration and reversibility of effects, and is considered spatially and temporally as described within **Table 10-3**. Effects can be adverse, neutral or beneficial.

Table 10-3 Description of spatial impact magnitudes

Spatial impact magnitude	Description
High	Large alteration / change in the quality or quantity of and / or to the physical or biological characteristics of environmental resource.
Medium	Medium alteration / change in the quality or quantity of and / or to the physical or biological characteristics of environmental resource.
Low	Small alteration / change in the quality or quantity of and / or to the physical or biological characteristics of environmental resource.

³ Scottish Natural Heritage, 2018. Environmental Impact Assessment Handbook, Version 5. Available online: <https://www.nature.scot/> [Accessed July 2022]

Negligible	No alteration / change detectable in the quality or quantity of and / or to the physical or biological characteristics of environmental resource.
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10.2.24 In describing a potential effect, consideration has also been given to its geographical scale and duration, which have been defined as follows:

- The geographical scale of an impact refers to the zone of influence, and can be described as localised, site-wide, a specific distance / range from a source, regional, national, global; and
- The duration of an impact can be described as: short to long term, permanent or temporary for the duration of the construction / operational period.

Significance Criteria

10.2.25 **Table 10-4**, illustrates how residual effects are determined by comparison of the sensitivity of receptors with the magnitude of predicted change. For the purposes of this assessment significant effects are major or major/moderate. Minor and negligible effects are not considered significant in EIA terms.

Table 10-4 Significance Criteria

Level of significance	Description
Major	This is a significant effect (either beneficial or adverse), as the effect is likely to result in a long term significant adverse effect on the integrity of the receptor at a particular geographical scale.
Moderate	This is a significant effect (either beneficial or adverse), as the effect is likely to result in a medium term or partially significant adverse effect on the integrity of the receptor at a particular geographical scale.
Minor	The effect is likely to adversely affect the receptor at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. This is not a significant effect.
Negligible	No discernible effect is expected as a result of the Proposed Development.

10.3 Baseline Conditions

Current Baseline

Desk Study

- 10.3.1 The 1:50,000 scale geological mapping available from the British Geological Survey (BGS)⁴ shows the majority of the northern and central regions of the Site to be underlain by the Tayvallich Volcanic Formation of the Argyll Group comprising Metalava and Metatuff. Originally igneous rocks formed by eruptions of magma, which later were altered by low-grade metamorphism. These rocks were formed approximately 541 to 1000 million years ago. To the south of the Site BGS mapping shows similar aged rocks of the Crinan Grit Formation, quartzite and pellicite Metamorphic Bedrock also of the Argyll Group.
- 10.3.2 Dalradian Supergroup, Metagabbro and Metamicrogabbro metamorphic rock is also noted to be present where igneous intrusions have occurred.
- 10.3.3 The superficial geology of the Site predominantly comprises Glacial deposits of Hummocky Till (diamiction), sands and gravels. Alluvial River terrace deposits are also shown to be present within river valley formations to the east of the Site.

⁴ BGS Geological Mapping <https://mapapps.bgs.ac.uk/geologyofbritain/home.html> [Accessed July 2022]

- 10.3.4 The 1:50,000 BGS mapping is shown on **Figures 10.2: Superficial Geology** and **Figure 10.3: Bedrock Geology (EIAR Volume 3a)**. BGS mapping shows peat deposits are located outside of the Proposed Development.
- 10.3.5 Areas of the Site, predominantly surrounding hill formations, are mapped as having no superficial deposits present which could imply that rockhead is relatively shallow in these areas.
- 10.3.6 The Scottish Natural Heritage (SNH) carbon rich soils, deep peat and priority habitat mapping⁵ shows limited areas of peat to the north and south of the Site located on forestry. The peat deposits are shown to be either 'Class 2' or 'Class 5' soils, the former being defined as 'Nationally important carbon-rich soils, deep peat and priority peatland habitat'. Class 5 soils are defined as 'Dominant vegetation cover is not a priority peatland habitat'. An extract of the SNH carbon rich soils, deep peat and priority habitat mapping is shown on **Figure 10.4: Soils Maps of Scotland, EIAR Volume 3a**.
- 10.3.7 The Site is not located in a coal mining area based on the underlying geology and no evidence of coal mining activities have been recorded. Evidence of small scale, local rock quarrying has been recorded and shown on historical Ordnance Survey mapping.
- 10.3.8 During World War Two (WWII) parts of the Site were used by No. 1 Combined Training Centre (CTC) Inveraray, which was responsible for training approximately 250,000 No. troops before its closure in 1945.
- 10.3.9 Records have been found indicating that intense military training exercises involving the use Small Arms Ammunition (SAA), mortars and 25lb artillery shells were undertaken across Glen Aray, encompassing the Site.
- 10.3.10 Live firing was concentrated around Taynafead and the hills above it, on the northern part of the Site, with further firing recorded south towards Ladyfield Farm. A desk study was undertaken by Zetica⁶ on behalf of the Applicant to understand the potential effects of UXO.
- 10.3.11 This concluded that the northern part of the Site is considered a high UXO hazard level, and the central part of the Site, down to Ladyfield Farm a moderate UXO hazard level.
- 10.3.12 No records of any significant firing south of Ladyfield Farm were found and were assigned a low UXO hazard level, although the potential for encountering UXO cannot be discounted.
- 10.3.13 Whilst this is not a material part of the geology and soils assessment, the information was used to inform the peat survey, particularly with regards to health and safety implications. The Applicant will use the recommendations of the desk study to inform construction methodologies and process to be used.

Field Survey

- 10.3.14 During the peat depth probing surveys, a total of 2,183 peat depth probes were taken as shown in **Figure 10.1: Peat Depths, EIAR Volume 4**, which also shows the results of the peat depth survey and the specific depth class at each sample location. This is based on IDW data interpolation and consequently the peat depth contours and boundaries are to a degree indicative.
- 10.3.15 The peat depth survey results (**Technical Appendix 10.1, EIAR Volume 4**) indicate that most of the Site has either no peat present or has a shallow depth of peat present (approximately 84% of peat probes were <0.5 m in depth). These areas of shallow peat can be considered as organo-mineral soils. These are further summarised as follows:
- 1,395 no. samples (64%) located on land with no peat/ absent;
 - 442 no. samples (20 %) located on land with less than or equal to 50 cm depth of peat or organomineral soil;
 - 145 no. samples (7%) on land with between 51 cm and 100 cm depth of peat; and

⁵ Scottish Natural Heritage. (2016). Carbon and Peatland 2016 map (http://map.environment.gov.scot/soil_maps/) [Accessed July 2022]

⁶ Zetica (February 2022) *Argyll Estate OHL - UXO Desk Study & Risk Assessment*.

- 201 no. samples (9%) located on land with more than 100 cm depth of peat.

- 10.3.16 The peat thickness along the Proposed Development was found to be mostly shallow (where present), with some deep pockets near to Towers T2 and T3 and between Towers T1, T2 and T3. The peat probe depth and interpolated contours are shown on **Figure 10.1: Peat Depths, EIAR Volume 3a**. The mean peat depth recorded was approximately 0.11 m (10.6 cm).
- 10.3.17 A review and assessment of peat landslide risks is summarised in **Technical Appendix 10.3 PLHRA, EIAR Volume 4**.
- 10.3.18 Hydrological and hydrogeological baseline and assessment is included in **Chapter 11: Water Environment (EIAR Volume 2)**.

Future Baseline

- 10.3.19 In the absence of the Proposed Development, it is assumed that the existing peat and carbon rich soils present would be subject to existing land use factors, such as drainage and forestry plantation, which has the potential to result in modification to peat. However, it is also assumed that in the absence of the Proposed Development there would be no requirement to excavate peat and carbon rich soils.

Sensitive Receptors

- 10.3.20 Peatland and carbon rich soils (blanket bog, wet modified bog, wet and dry heath, and flushes) is a sensitive receptor. These habitat types are included in Annex 1 of the EC Habitats Directive⁷ and are sensitive to environmental change and are of regional importance. Peatlands which are classified as Class 2 on the SNH Carbon and Peatland Map⁵ are considered to be of national importance.

10.4 Assessment of Effects

Mitigation by Design

- 10.4.1 The Proposed Development has been designed to avoid areas of deep peat (>0.5 m) where practicable. Where this is not possible it has been assumed that industry standard construction techniques and methodologies can be used to minimise effects and disturbance of peat and carbon rich soils (i.e., through the Applicant's own General Environmental Management Plans (GEMPs), and Construction Environmental Management Plan (CEMP)).
- 10.4.2 The design of access tracks shall be carried out in line with best practice measures^{8,9} and as detailed in the CEMP to be prepared by the contractor such that track construction shall not significantly affect peat and carbon rich soils.

Potential Effects

Potential Construction Effects

- 10.4.3 Changes to local soils and peat habitats could occur as a result of:
- Compaction of soils;
 - Potential for increased erosion of peat soils through disturbance, either through direct disturbance/peat landslide or localised drying caused by infrastructure; and

⁷ EC Directive on the Conservation of Natural Habitats and Wild Flora and Fauna (1992): http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm [Accessed July 2022]

⁸ Scottish Natural Heritage, 2015. Constructed tracks in the Scottish Uplands. 2nd Edition Updated September 2015.

⁹ Forestry and Land Scotland (FLS) 2019 Forest Road Specification. Available online: <https://forestryandland.gov.scot/> [Accessed July 2022]

- Loss of peatland habitats and carbon rich soils through excavations for infrastructure and/or peat landslides.

- 10.4.4 An Outline PMP has been prepared for the Proposed Development (see **Technical Appendix 10.2, EIAR Volume 4**) which documents measures to mitigate potential impacts, as listed above, on peat and carbon rich soils through the construction phase. This is a working document that will be updated as the project progresses through detailed design, construction and operation. Peat habitats are considered to be of Medium or High sensitivity. Loss and degradation of peat can result in the release of carbon dioxide and result in habitat loss. The detailed PMP would seek to ensure that any impacts on peat and carbon rich soils are reduced to a Low or Negligible magnitude, particularly with regard to any areas of deeper peat, such that **no significant** effects are predicted.
- 10.4.5 Potential impacts on Groundwater Dependent Terrestrial Ecosystems (GWTDEs) and hydrological effects are assessed in **Chapter 11: Water Effects (EIAR Volume 2)**.

Potential Operational Effects

- 10.4.6 No potential operational phase impacts on peat and carbon rich soils are anticipated.

10.5 Mitigation

- 10.5.1 The key measures to prevent impacts to geology and soils are set out in the Outline CEMP (see **Technical Appendix 2.2: OCEMP, EIAR Volume 4**) and Outline PMP (see **Technical Appendix 10.2: Outline PMP, EIAR Volume 4**), which will be prepared by the Principal Contractor following the determination of the Application for s37 consent.
- 10.5.2 The CEMP would include construction methods and environmental protection measures applying best practice guidance as set out in applicable SEPA Pollution Prevention Guidelines (PPGs) and applicable SSEN Transmission GEMPS, as presented in **Technical Appendix 2.3: SSEN Transmission GEMPs (EIAR Volume 4)**. Implementation of these measures during all aspects of the construction phase would ensure construction activity would not cause adverse effects to sensitive receptors.
- 10.5.3 Key measures to minimise and prevent impacts to peat and carbon rich soils are included within the Outline PMP (**Technical Appendix 10.2: Outline Peat Management Plan, EIAR Volume 4**) and PLHRA (**Technical Appendix 10.3: Peat Landslide Hazard Risk Assessment, EIAR Volume 4**). These set out good practice measures and specific mitigation measures to minimise the potential effects on peat and carbon rich soils. Specific mitigation to be included to minimise and reduce potential impacts on peat and carbon rich soils include:
- Proposed access tracks located over deep peat (>1 m in depth) would be ‘floated’ to minimise the volume of excavated peat. If required, bog mats would be used to cross waterlogged areas or minor watercourses without causing damage to bank integrity or compaction of soils;
 - Towers located over deep peat would be constructed using a piled foundation solution where practicable to minimise the peat excavation and disturbance required. Working areas will be constructed using a layer of geotextile and stone over the peat, which can be reinstated on completion;
 - Avoid cutting trenches or aligning excavations across slopes (which may act as incipient ‘back scars’ for peat failures) unless appropriate mitigation has been put in place;
 - Awareness of peat instability and pre-failure indicators would be incorporated in site induction, tool box talks, and training to enable all site personnel to recognise ground disturbances and features indicative of incipient instability;
 - Peat and carbon rich soils would be stored temporarily on site during the works in accordance with the Outline PMP to avoid desiccation and creation of run-off; and

- Peat and carbon rich soils excavated during the works would be used for the reinstatement of infrastructure such as track verges/ shoulders and tower locations. Surplus excavated peat could be used to backfill drainage ditches and depressions.

10.6 Residual Effects

Residual Construction Effects

- 10.6.1 No significant residual effects to geology and soils as a result of the construction and operation of the Proposed Development have been identified. On this basis, no further mitigation will be required beyond the good practice measures outlined in this chapter and through the detailed CEMP and PMP that shall be prepared by the appointed contractor.

10.7 Cumulative Effects

- 10.7.1 Cumulative schemes within 15 km of the Proposed Development are shown on **Figure 15.1: Cumulative Developments (EIAR Volume 3a)**.
- 10.7.2 Cumulative impacts (i.e. impact of more than one development upon a single environmental factor) is not considered relevant to the assessment of geology and soils as these are limited to the footprint of the Proposed Development. In addition, impacts associated with geology are not considered relevant to assessing likely combined impacts of environmental factors upon single receptors such as may be assessed for other environmental impacts on one receptor.

10.8 Summary

- 10.8.1 This chapter has considered potential impacts and their associated effects on soils and peatland features, such as carbon rich soils.
- 10.8.2 Without the application of mitigation, significant effects could occur to sensitive receptors such as peatland soil. Following the application of mitigation, and the implementation of a CEMP and PMP to protect peat, no significant residual effects are predicted.