10 Geology and Soils

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10 Geology and Soils

10.1 Executive Summary

10.1.1 This chapter provides an assessment of the potential impacts of construction and operation of the Proposed Development associated with geology and soils.

10.1.2 Peat deposits are present across the majority of the Site. Bedrock across the Site comprises psammite with micaceous layers and calc-silicate pods of the Upper Garry Psammite Formation in the west of the Site (also known as Tarvie Psammite Formation), and psammite and semipelite of the Achnaconeran Striped Formation in the east of the Site.

10.1.3 Potential effects in relation to geology are most likely during construction and may relate to effects on peat stability and excavation. The results of a peat slide risk assessment have informed the layout design.

10.1.4 Baseline conditions were identified through desk-based assessment, consultation and field survey, including peat depth probing surveys. The assessment undertaken has identified the presence of sensitive receptors within the Site, namely areas of nationally important carbon rich soils with priority peatland habitat (Class 1 or 2).

10.1.5 As part of the conceptual design, the disruption of peat has been minimised by avoiding areas of thick peat deposits as far as practicable, and the re-use of excavated peat would be maximised in accordance with best practice management. This has been achieved by the early use of a 3D design model, and modification of the design layout to avoid placement of infrastructure in areas of deeper peat.

10.1.6 Assessments of effects to peat, soil and underlying geology have been carried out. The potential construction and operational effects identified have been assessed. With the implementation of appropriate mitigation measures, all residual effects would be negligible, i.e. not significant in terms of EIA Regulations.

10.2 Introduction

10.2.1 This chapter considers the potential effects of the Proposed Development on issues associated with geology and soils. It details the baseline conditions at the Site, followed by the identification and assessment of effects on each receptor and, where relevant, the identification of measures proposed to mitigate potentially significant effects.

10.2.2 Proposed surveys and assessment methodologies are outlined to develop mitigation measures to prevent or reduce identified potential effects.

10.2.3 The geology (including peat) assessment was undertaken by Mott MacDonald Limited.

10.2.4 This chapter is supported by the following figures:

- Figure 10.1: Solid Geology
- Figure 10.2a-g: Peat Depth
- Figure 10.3: Carbon and Peatland Classification

10.2.5 This chapter is supported by the following appendices:

- Appendix 10.1: Borrow Pit Assessment Report (BPAR)
- Appendix 10.2: Peat Slide Risk Assessment (PSRA)
- Appendix 10.3: Stage 1 Peat Management Plan (PMP)

10.3 Legislation, Policy and Guidelines

Legislation

10.3.1 Relevant legislation and guidance documents have been reviewed and taken into account as part of this geological assessment. Of particular relevance are The Environmental Assessment (Scotland) Act 2005 and The Environment Act 1995.

Guidance

10.3.2 Recognisance has been taken of the following best practice guidelines/guidance etc:

- Scottish Renewables *et al* (2019) Good Practice During Windfarm Construction 4th Edition;
- Scottish Government (2017) Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments;
- Scottish Government (2017) Guidance on Development on Peatlands: Peatland Survey (Ref 7); and
- SEPA (2012) Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste.

10.4 Consultation

10.4.1 In undertaking the assessment, consideration has been given to the Scoping responses and other consultation undertaken as detailed in Table 10.1.

Table 10.1 – Summary of Consultation Responses

Consultee	Summary of Response	Response/ Action Taken
The Coal Authority	Site is outside of defined coalfield. No comments and do not require to be consulted at any future stages of the project.	No action required
Scottish Environment Protection Agency (SEPA)	SEPA email response: PCS/171540/3rd June 2020 "Clearly demonstrate that suitable steps have been taken in the layout design to minimise peat disturbance". "We will expect it to be demonstrated that the supporting infrastructure is minimised as much as possible. We would hope to see compound areas, laydown areas and borrow pits from the existing site re-use to minimise overall environmental disturbance".	Stage 1 and Stage 2 peat probing surveys have been undertaken, followed by 3D modelling to refine the proposed design layout and more accurately estimate peat extraction volumes. To minimise disturbance to virgin ground, the construction compound from Bhlaraidh Wind Farm (the Operational Development) will be re-used. As this is some distance from the Proposed Development's construction area, a satellite compound will be required, and this is proposed to be situated on the site of the Operational Development's former batching plant. Borrow pits from the Operational Development's construction will not be utilised due

Consultee	Summary of Response	Response/ Action Taken
		to economics and significant construction logistic issues, including haul distances of materials and blasting in the vicinity of operational turbines. The existing access tracks and also use of hydro access tracks have been utilised as part of the Proposed Development and opportunities for use of former hydro asset borrow pits will be explored further.

10.5 Assessment Methodology and Significance Criteria

Desk Study

10.5.1 The following data sources have informed the baseline of the geological assessment:

- British Geological Survey (BGS) mapping (BGS, 1993)
- British Geological Survey Onshore GeoIndex (BGS, 2021)
- The Coal Authority Interactive Map (Coal Authority, 2021)
- SEPA / NatureScot Soils Scotland Environment Map (SEPA/NatureScot, 2021)
- Ordnance Survey Mapping (ESRI OS, 2021); and
- National Library of Scotland Map Images (NLS, 2021)

10.5.2 Additional data sources are included in individual technical appendices.

Field Survey

10.5.3 Site reconnaissance, including inspection of potential borrow pit locations and two phases of peat depth probing surveys were completed between July 2019 and September 2020.

10.5.4 The surveys focused on undertaking initial and detailed peat probing to feed into the layout constraints for both peat depth and stability, and identifying appropriate locations for borrow pits.

10.5.5 The initial Phase 1 'low resolution' peat depth survey was undertaken in 2019 with the aim of obtaining wide-spread coverage of the site, to investigate the extent and depth of peat (up to 5m depth) to inform the site infrastructure layout design in line with other constraints. To satisfy planning requirements, the peat probing survey was undertaken in accordance with the relevant guidance for sites in Scotland. This comprised a grid at 100m centres across areas within the Development Area where potential peat deposits were identified during desk-based studies. Data gathered during the 2012 probing survey undertaken for the Operational Development was also included in the assessments, where appropriate.

10.5.6 In addition to peat depth, the following information was recorded:

- Visual description of peat layers and their approximate depth, with peat described as fibrous, semi-fibrous or amorphous;
- Identification of consolidated acrotelmic and unconsolidated catotelmic material;
- A subjective indication of peat moisture content made by visual and tactile assessment;

- A visual description of surface hydrological conditions (e.g. well-drained, boggy, standing water); and
- Local slope angle, using a hand-held inclinometer.

10.5.7 A second phase of 'refined' probing was undertaken in 2020 once the infrastructure layout had been developed to target the track layout and areas of proposed infrastructure such as the substation, compounds, and borrow pit locations. The data gathered included consideration of site characteristics. The following rationale was applied to the phase 2 probing survey:

- Tracks – 50m centres on centre line and 50m offsets on both sides to 50m beyond the end of any spur.
- Hardstandings – 25m centres and 25m and 50m offset through length of hardstanding inclusive of assist pads / lattice boom assembly pads.
- Turning Heads – 25m centres and 25m offset through length.
- Turbines – Turbine centre plus 4 x 25m radial offset and 4 x 50m radial offset.
- Substation Platform – 25m centres
- Batching Plant – 25m centres as extension to track grid.
- Areas of blanket bog / deeper phase 1 peat – 25m centres and
- 25m and 50m offsets of track centre line.
- Cross country cable options 50m centres on centre line and 50m offsets.

10.5.8 Locations of all peat probe survey points are shown on Figure 10.2 – Peat Depth.

10.5.9 A visual assessment of peat conditions and estimated peat extents across the Proposed Development were carried out during the surveys, with pertinent features such as active, incipient or relict instability recorded.

Assessment of Likely Effect Significance

10.5.10 The predicted significance of the effect was determined through a standard method of assessment based on professional judgement, guidance documents and best practice documents, taking account of three key factors:

- Sensitivity of the receiving environment;
- Potential magnitude of the impact; and
- Significance of effect.

10.5.11 The predicted significance of the effect was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of change as detailed in Table 10.2 below. Major and moderate effects are considered significant in the context of EIA Regulations.

10.5.12 The probability of occurrence of an effect has been evaluated as being high (≥50%), medium (<50% and ≥20%) or low (<20%) during the phase of work being assessed.

10.5.13 The application of good practice and mitigation measures greatly reduce the probability of an effect occurring.

Table 10.2 - Significance Criteria

Magnitude of Impact	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
Major	Major	Major to Moderate	Moderate	Minor
Moderate	Major to Moderate	Moderate	Moderate to Minor	Minor to Negligible
Minor	Moderate to Minor	Minor	Minor to Negligible	Negligible
Negligible	Minor to Negligible	Negligible	Negligible	Negligible

10.5.14 Table 10.3 below classifies the sensitivity of geological receptors. The receptor sensitivity represents its ability to absorb the anticipated effect without perceptible change resulting. Three levels of sensitivity have been used as shown in Table 10.3. Evaluation of sensitivity of geology and soils requires a considerable degree of judgement, based on defined characteristics and values and calling on professional experience, which is accordingly applied during evaluation.

Table 10.3 - Geology Receptor Sensitivity

Receptor Sensitivity	Criteria
High	Receptor is a designated site protected under national or international legislation, such as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), and Special Protection Areas (SPA), for the disciplines assessed in this chapter; Receptor contains Geological Conservation Review (GCR) sites designated as SSSIs or Candidate SSSIs; Receptor contains geological or geomorphological features considered to be of national importance, i.e. Sites of Special Scientific Interest (SSSI); or Receptor contains areas of nationally important carbon rich soils with priority peatland habitat, i.e. Class 1 or 2. (SEPA / NatureScot Soils Scotland Environment Map (SEPA/NatureScot, 2021)). Class 1 or 2 soils are in areas likely to be of high conservation value and restoration potential.
Medium	Receptor has areas containing geological features of Regionally Important Geological and Geomorphological Sites (RIGS) considered worthy of protection for their research, educational, historic importance; or Receptor has areas of soils with peatland vegetation, i.e. Class 3 and 4.
Low	Receptor contains geological features not currently protected and not considered worthy of specific protection; Receptor contains areas of soils that do not support peatland vegetation or mineral soils, i.e. Class 5 and 0; or Receptor has areas of already altered geology/ soils i.e. within quarries and areas of no soil.

Requirements for Mitigation

10.5.15 Specific additional mitigation measures would be considered for any potential effects of major or moderate significance.

Assessment of Residual Effect Significance

10.5.16 Residual effects would be assessed, taking account of any additional mitigation measures to be implemented.

Limitations to Assessment

10.5.17 Peat probing works were using hand-held GPS units which were noted to be only accurate to <3m, therefore actual positions sampled are within 3m of the recorded data point.

10.5.18 Peat probing represents a record of peat depth at a discrete location and does not account for variations between data collection points.

10.6 Baseline Conditions

10.6.1 The current baseline environmental conditions are described in relation to geology of the Site for the Proposed Development and address the following issues:

- The solid and superficial geology underlying the Site, including peat;
- Designated sites; and
- Historical mining and quarrying

Site History and Land Use

10.6.2 A review of historical maps indicates the Site has remained largely undeveloped, comprising open grazing moorland. The Operational Development is present to the west of the Site and is owned and operated by the Applicant.

Geology

Solid Geology

10.6.3 The BGS GeoIndex viewer 1:50,000 solid geological mapping (BGS, 2021) and BGS Solid Geology Map Sheet 73W (BGS, 1993) indicates that the solid geology underlying the majority of the Site comprises psammite with micaceous layers and calc-silicate pods of the Upper Garry Psammite Formation in the west of the Site (also known as Tarvie Psammite Formation).

10.6.4 The east of the Site is underlain by interbedded psammite and semipelite of the Achnaconeran Striped Formation.

10.6.5 Historical ground investigation records are available for the Operational Development, in the west of the Site, however this only partially overlaps the western extent of the Proposed Development to the east of the Site. Boreholes along the western extent of the Proposed Development (BHT26, BHT31 and BHT32) recorded the solid geology to comprise Psammite to a depth of between 0.5 to 7.2mbgl.

10.6.6 Bedrock is expected to be present at shallow depth based on the historical ground investigation information from the Operational Development. During the site reconnaissance, psammite outcrops were observed.

10.6.7 A Borrow Pit Appraisal Report (Appendix 10.1) completed for the Proposed Development was informed by assessment of eight potential borrow pit areas identified at the Site, including three existing borrow pits utilised during the construction of the existing hydro scheme access road in the south of the Site.

10.6.8 The total estimated aggregate requirement for the Site was derived using the AutoCAD Civils 3D model for the Site. This has provided a high level of accuracy through modelling individual infrastructure components such as access tracks, turning heads and hard standings.

10.6.9 An estimate has been provided for the potential quantity of rock available at the Site through sizing of the identified potential borrow pits which has indicated that sufficient rock will be available on Site for use during construction of the Proposed Development.

Structural Geology

10.6.10 A number of faults are inferred across the western half of the Site, as shown on the BGS GeoIndex viewer, generally trending north east to south west.

10.6.11 An axial plane trace of antiform and an axial plane trace of a synform are indicated to the west the Site, located generally parallel, and trending north to south. The axial plane of another major synform is indicated to underly turbine location T02 in the west of the Proposed Development.

Superficial Geology

10.6.12 The 1:50,000 BGS Superficial Geology Map from the BGS Onshore GeoIndex Viewer (BGS, 2021) indicates that superficial cover is absent across the majority of the Site, suggesting that bedrock is at or close to the surface. Peat is indicated to be present in a number of localised areas across the Site, predominantly within depressions in the landscape.

Peat

10.6.13 The Scotland's Soils Scotland Environment Map, Carbon and Peatland data set (SEPA/NatureScot, 2021) presents soil classes of importance of environmental interest. The classes have been derived using a matrix of soil carbon categories (derived from Soil Survey of Scotland maps) and peatland habitat types (derived from Land Cover of Scotland 1988 map). The map is a strategic planning tool, mapped at a coarse scale, and was used to initially identify the likely presence of carbon-rich soils, deep peat and priority peatland habitat at the Site. Class 1 and 2 soils are considered priority peatland. On the basis of this mapping, as shown in Figure 10.3:

- The central area of the Site around T12 and T15 is predominantly Class 1 soils;
- The eastern and southern areas of the Site are predominantly Class 2 soils around T04, T10, T16 and T18;
- The areas around T02, T03, T07, T08, T09, T13, T14 and T15 are predominantly Class 5 soils; and
- Class 0 soils are present around T01, T06 and T11.

10.6.14 The presence of priority Class 1 and Class 2 peatland habitat soils places the Site within Group 2 of the Scottish Government planning policy category, where wind farms may be appropriate in some circumstances and further consideration is required to demonstrate that any significant effects on the qualities of these areas are substantially overcome by siting, design or other mitigation. Detailed site-specific peat depth surveys and a peatland condition assessment have been completed to confirm the quality and distribution of peatland across the Site and this information has been used to inform design, micrositing and mitigation. A Peatland Condition Assessment is included in Appendix 5.5.

10.6.15 Peat depth probing surveys were completed at the Site between July 2019 and September 2020 to inform the iterative design of the Proposed Development and the results are summarised in the Peat Stability Risk Assessment (PSRA) Report (Appendix 10.2) and Stage 1 Peat Management Plan (PMP) (Appendix 10.3). Previous peat probing data was available from the Operational Development and this was considered in the assessment.

10.6.16 Peat depths were found to vary across the Site, but most of the peat was found to be less than 1.0m depth (92% of probe locations). Two peat depth probes encountered peat of greater than 3.0m depth out of a total of 2,909 probes undertaken (<0.1% of probe locations). Peat depths are shown on Figure 10.2.

10.6.17 Of the 2,909 peat probes undertaken at the Site, 40% of peat deposits on site were recorded as fibrous, 59% as semi-fibrous and only 1% as amorphous material. It is considered from field observations that all excavated catotelmic peat will have sufficient structural strength to be able to be used in verge restoration i.e. it can be excavated in intact 'lumps' and it will not be 'fluid'. This semi-fibrous catotelmic peat will be dressed with a surface layer of acrotelm to re-establish the peat vegetation.

10.6.18 A Qualitative Risk Assessment (QRA) was undertaken to determine the baseline peat stability conditions within the development area of the Proposed Development. The QRA approach is based on a system where factors and influences are multiplied together to generate Risk Rating Scores and corresponding qualitative risks. The QRA methodology is described in more detail in the PSRA.

10.6.19 The baseline assessment found that the risk of peat slide events occurring were found to be Very Low to Low, with localised areas of the Site indicated to have a Medium risk. The rating of Medium was based on the following factors: - peat depths were found to be relatively thick (typically between 1-2m, locally >2m), on moderately sloping ground (6 – 10°) that was found to be saturated/boggy ground within an area where both convex and concave changes in slope are present (i.e. topographic saddle). Evidence of instability was also noted in the form of peat hags. Those areas identified as being of Medium risk were considered through the iterative design process and those areas have been avoided.

10.6.20 As part of the peat slide risk assessment, changes to the baseline peat stability conditions from the construction of tracks was assessed using Quantitative Slope Stability Analysis (based on the infinite slope model). Details of the methodology and assumptions made for the parameters used in the infinite slope stability analysis are provided in the PSRA. Using both engineering judgement and the findings of the slope stability analysis, risks from peat instability during the construction of the development are considered to remain Low to Very Low, provided recommendations and constraints described in the PSRA are followed.

Mining and Quarrying

10.6.21 The Site is not located within a Coal Authority Reporting Area.

10.6.22 No known quarries are located within the Site.

Designated Sites

10.6.23 Levishie Wood SSSI and the River Moriston (designated SAC) are within 5km of the Site. Neither of these are directly relevant to this assessment.

10.7 Receptors Brought Forward for Assessment

10.7.1 The geological receptors considered in the assessment are as listed below. All potential effects would be relevant to the construction phase only.

- Peat: peat slides or collapse of internal peat structure;
- Peat: active or passive dewatering;
- Soil erosion; and
- Fracturing of bedrock (e.g. during blasting in borrow pits or turning heads/access track).

10.8 Standard Mitigation

Construction

10.8.1 Site layout design has taken cognisance of areas of deep peat, areas of Medium Risk Rating for peat slide and Class 1 and Class 2 peatland condition (as further described in Chapter 5 (Ecology and Nature Conservation)). These areas have been avoided where possible.

10.8.2 The 'undercutting' of peat slopes would be minimised to prevent instability, but where this cannot be avoided, a more detailed assessment of the area of concern by a Geotechnical Engineer would be undertaken.

10.8.3 The Contractor will consider the location of any temporary peat or soil storage areas such that erosion and run-off is limited, leachate from the stored material is controlled and stability of the existing ground, particularly in peatland areas, is not affected. The Contractor will also give consideration to the impacts of poor drainage control in any areas where peat is used in reinstatement (refer to Appendix 2.1 Outline CEMP for further details). Appropriate and robust drainage systems and associated measures (i.e. silt traps, etc.) will be designed to minimise sedimentation into natural watercourses. Method statements will be prepared in advance to mitigate against a slide occurring and would include, but not be limited to, the use of check dams and erosion protection to limit flows and prevent contamination of watercourses.

10.8.4 Measures shall be put in place to ensure drainage systems are well maintained, to include the identification and demarcation of zones of sensitive drainage or hydrology in areas of construction, e.g. inclusion of maintenance regimes for drainage systems into a CEMP or similar.

10.8.5 Blasting activities would be controlled through reference to key guidance including Planning Advice Note (PAN) 50 Annex D 'The Control of Blasting at Surface Mineral Workings' (Scottish Executive, 2000) and BS5607 'Code of practice for the safe use of explosives in the construction industry' (BSI, 2017). A programme of trial blasts would be completed post-consent following review of detailed ground investigation information.

Operation

10.8.6 A Geotechnical Risk Register (GRR) developed during the Construction phase would be maintained and updated throughout the operational phase via a regular monitoring regime by a Geotechnical Engineer. This would be used to highlight and communicate risk and proposed mitigation.

Decommissioning

10.8.7 No significant decommissioning effects are predicted on the geology and soils discussed in this chapter. As a result, no specific mitigation is required.

10.9 Likely Effects

Construction

10.9.1 Construction in peat areas may cause overloading and compaction of peat deposits, increasing the risk of peat slides or collapse of the internal peat structure with potential effects on the hydrological regime of relatively large areas. Peat is considered to be a receptor of high sensitivity. However, floating tracks are not proposed to be constructed on Site, therefore the risk of compaction of peat deposits is expected to be low, and the magnitude of impact to be major. Therefore, taking into consideration the standard mitigation practices detailed in section 10.8 above, the likely effect of peat instability would be major adverse.

10.9.2 Active or passive dewatering of peat deposits during construction may degenerate the structure of the peat by decreasing its water content and making it more susceptible to erosion. With implementation of standard mitigation measures, as detailed in section 10.8 above, the magnitude of impact of dewatering of peat is considered to be major, and the resulting effect would be major adverse.

10.9.3 Erosion of soils can be caused by stripping of vegetation, excavations, ground disturbance, installation of drainage ditches and construction of access tracks. Excavations will only be left open for the minimum of durations to limit any potential impacts.

10.9.4 Soils are considered to be a low sensitivity receptor. Mineral soils are expected to be thin across the site, therefore, when standard mitigation measures have been implemented (refer to section 10.8), the potential risk of erosion and instability is low, and the magnitude of impact moderate. Therefore, the likely effect of soil erosion would be moderate to minor adverse.

10.9.5 Activities that interact with bedrock such as blasting have the potential to increase fracturing, which may cause instability. Blasting will be undertaken in isolated locations only and will only be used as required for extraction of material where conventional digging of material is not achievable. Therefore, due to a negligible magnitude of impact and the low sensitivity of bedrock, the likely effects would be negligible.

Operation

10.9.6 No adverse effects are anticipated during operation providing the appropriate best practice is followed and relevant mitigation is employed.

Decommissioning

10.9.7 Decommissioning impacts would involve personnel and machinery accessing locations across the Site to dismantle and remove infrastructure, including turbines, hardstanding and site buildings, as detailed in Chapter 2. The turbines and substation would be removed to ground level, with the concrete turbine foundations left in-situ and broken down to approximately 1m below ground level. the substation foundation would also be removed. The access tracks and electrical cables would be left in-situ to minimise disturbance of the ground. The overall impacts of decommissioning would be short-term, intermittent and temporary. Decommissioning would make use of existing access tracks to infrastructure. Construction compounds would be re-installed on the Site at the same locations used during construction. As a result, no effects on geology and soils are expected, with habitats allowed to recover and regenerate following the removal of infrastructure.

10.10 Additional Mitigation and Enhancement

Construction

10.10.1 A draft Pre-construction Geotechnical Risk Register (GRR) has been produced for the Site based on the findings of the PSRA (Appendix 10.2). This should be developed as the project progresses to highlight and communicate risk and proposed mitigation.

10.10.2 A detailed geotechnical design will be undertaken for each turbine location, access track and borrow pit. This would be undertaken post-consent based on site-specific ground investigation and material properties. The detailed design would aim to avoid areas of potential deep peat and potential areas of instability through the use of micrositing and the use of appropriate foundations and founding stratum (including piles if required). During construction, excavated material would not be placed / stockpiled on peat areas such that extra loading would increase the likelihood of failure and the excavations within peat would be minimised wherever possible.

10.10.3 Potential erosion and drying of peat will be mitigated through a robust drainage design, use of silt traps where required and localised protection such as cut-off trenches, settlement ponds or barriers at watercourses and crossings.

10.10.4 Mitigation measures will be outlined in the CEMP (refer to Appendix 2.1) and the PMP. Appendix 10.3 (Stage 1 Peat Management Plan (PMP)) outlines measures for how peat excavated during the construction of the Proposed Development will be managed and reused. The PMP will be refined and updated through the development of the wind farm. It would be expected that site staff would be trained in how to manage peat materials to minimise adverse effects. Similarly, a Geotechnical Engineer should undertake inspections of peat excavations at regular intervals during the construction phase.

10.10.5 Detailed design and construction practices will need to take into account the particular ground conditions and the specific works at each location throughout the construction period. It is recommended that an appropriately experienced and qualified Geotechnical Engineer is appointed during the construction phase, to provide advice during the setting out, micro-siting and construction phases of the works.

Further Survey Requirements and Monitoring

10.10.6 Intrusive ground investigation is required to be completed within critical areas at the Site (i.e. turbine foundations, crane hardstandings, laydown and borrow pit areas) to inform civil design, quantify borrow pit resource and finalise the Peat and Waste Management Plan.

Operation

10.10.7 No additional operational mitigation and enhancement is expected to be required, providing the mitigation recommendations employed during the construction phase are followed.

Decommissioning

10.10.8 In the absence of mitigation, no significant decommissioning effects are predicted on the geology and soils discussed in this chapter. As a result, no specific mitigation is required. However, the Applicant proposes to implement a suite of standard good practice working measures that will provide additional protection. It is anticipated that these measures will be similar to those detailed in the CEMP; however, the proposed measures would be refined to account for changes in good practice, amendments to existing legislation, future enactment of pertinent legislative instruments (e.g. regulation in relation to waste), policy direction and recorded, site-specific environmental data gathered during the operational phase of the Proposed Development. Decommissioning proposals will be agreed with THC prior to decommissioning works commencing.

10.11 Residual Effects

Construction

10.11.1 Implementation of the mitigation measures summarised above would greatly reduce the significance of effects to peat and soils.

10.11.2 The risk of peat slides or collapse of the internal peat structure would be controlled by the mitigation measures set out above. Residual effects would be minor.

10.11.3 Implementation of appropriate mitigation measures would sufficiently reduce the risk of active or passive dewatering of peat deposits. Residual effects would be negligible.

10.11.4 Similarly, with the implementation of appropriate mitigation measures, soil erosion caused by stripping of vegetation, excavations, ground disturbance, installation of drainage ditches and construction of access tracks would be avoided. Residual effects would be negligible.

10.11.5 Predicted effects to bedrock from blasting do not need any further mitigation measures and would remain negligible.

Operation

10.11.6 No residual operational effects are anticipated providing the appropriate best practice is followed and relevant mitigation is employed.

Decommissioning

10.11.7 No residual decommissioning effects are anticipated providing the appropriate best practice is followed and relevant mitigation is employed.

10.12 Cumulative Assessment

Construction

10.12.1 There are no proposed wind farm schemes sufficiently close to the Proposed Development that would result in any cumulative effects to any receptors associated with geology or soils.

Operation

10.12.2 No cumulative operational effects are anticipated.

Decommissioning

10.12.3 No cumulative decommissioning effects are anticipated.

10.13 Summary

10.13.1 Table 10.5 below summarises the predicted effects of the Proposed Development on the Site prior to and following the implementation of proposed mitigation.

Table 110.5 – Summary of Effects

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Peat instability	Major	Adverse	Detailed investigation and design. Use of micro-siting to avoid localised areas of potential instability. A minimisation of 'undercutting' of peat slopes Communication of risk through the GRR and mitigation measures in the CEMP. Inspections by a Geotechnical Engineer during construction works.	Minor and not significant.	Adverse
Erosion and drying out of peat	Major	Adverse	Appropriate and robust drainage systems and associated measures (i.e. silt traps, etc.) to minimise sedimentation into natural watercourses. Peat Management Plan	Negligible and not significant	Adverse
Soil erosion	Moderate to Minor	Adverse	Appropriate soil stripping techniques and drainage design, development of CEMP to outline construction methods.	Negligible and not significant	Adverse
Fracturing of bedrock	Negligible	n/a	None required; blasting will be undertaken in isolated locations only.	Negligible	n/a

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