Planning and Environmental Consultants

Environmental Impact Assessment Report (EIAR)

Cunlaghfadda Green Energy Project, Co. Mayo

Chapter 8 Land, Soils and Geology

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8. LAND SOILS AND GEOLOGY

8.1 Introduction

8.1.1 Background and Objectives

Hydro-Environmental Services (HES) was engaged by MKO to carry out an assessment of the potential likely and significant effects of the Proposed Project on the land, soils and geology aspects of the receiving environment.

The Proposed Project is described in full in Chapter 4 of this Environmental Impact Assessment Report (EIAR).

This chapter provides a baseline assessment of the environmental setting of the Proposed Project, as described in Chapter 4, in terms of land, soils and geology and discusses the potential likely significant effects that the construction, operation and decommissioning of the Proposed Project will have. Where required, appropriate mitigation measures to avoid any identified significant effects to land, soils and geology (i.e., natural resources) are recommended and the residual effects of the Proposed Project post-mitigation are assessed.

For the purposes of this chapter, and consistent with Section 1.1.1, the following references are used when referring to aspects of the Proposed Project: the 'Proposed Wind Farm', the 'Proposed Grid Connection', the 'Proposed Project' (encompasses both the Proposed Wind Farm and the Proposed Grid Connection), and the 'Site' (as delineated by the EIAR Site Boundary).

8.1.2 Statement of Authority

Hydro-Environmental Services (HES) are a specialist geological, hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core areas of expertise and experience include soils, subsoils and geology. We routinely complete impact assessments for land, soils and geology, hydrology and hydrogeology for a large variety of project types including wind farms and renewable energy projects.

This chapter of the EIAR was prepared by Michael Gill, Conor McGettigan and Nitesh Dalal.

Michael Gill (P. Geo., B.A.I., MSc, Dip. Geol., MIEI) is an Environmental Engineer/Hydrologist with over 24 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIAR assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions. For example, Michael has worked on the EIS/EIARs for Slievecallan Wind Farm, Cahermurphy (Phase I & II) Wind Farm, Carrownagowan Wind Farm, Garrane Green Energy Project and over 100 other wind farm related projects across the country.

Conor McGettigan (BSc, MSc) is an Environmental Scientist with over 5 years' experience in the environmental sector in Ireland. Conor holds an M.Sc. in Applied Environmental Science (2020) and a B.Sc. in Geology (2016) from University College Dublin. Conor routinely prepares the land, soils and geology chapters of environmental impact assessment reports for renewable energy developments,

bedrock quarries, industrial and residential developments. Conor has worked on the EIARs for over 20 no. wind farms projects across the country, including Ballivor Wind Farm, Seskin Wind Farm, Lackareagh Wind Farm, Knockshanvo Wind Farm, Garrane Green Energy Project and Gannow Renewable Energy Development.

Nitesh Dalal (B.Tech, PG Dip., MSc) is an Environmental Scientist with over 7 years' experience in environmental consultancy and environmental management in India. Nitesh holds a M.Sc. in Environmental Science from University College Dublin (2024), a PG Diploma in Health, Safety and Environment from Annamalai University, India (2021) and B.Tech. in Environmental Engineering (2016) from Guru Gobind Singh Indraprastha University, India (2016). Nitesh has been involved in the preparation of the land, soils and geology chapters of environmental impact assessment reports for several renewable energy developments. Nitesh has worked on the EIARs for several wind farms projects across the country, including Gannow Renewable Energy Development and Littleton Wind Farm.

8.1.3 Relevant Legislation

The EIAR has been prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- Planning and Development Acts, 2000 as amended;
- Planning and Development Regulations, 2001 (as amended);
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment; and,
- The Heritage Act 1995, as amended.

8.1.4 Relevant Guidance

The Land, Soils and Geology chapter of this EIAR was prepared in accordance with, where relevant, the guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Institute of Geologists Ireland (2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Guidelines for Planning Authorities and ACP on carrying out Environmental Impact Assessment (DoHPLG, 2018);
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Commission 2017); and,
- EU Soil Strategy for 2030, Towards healthy soils for people and the planet, European Commission, adopted 17th November 2021;

8.2 Assessment Methodology

8.2.1 Desk Study

A desk study was completed in the spring of 2023 to collect all relevant geological data for the Site and the surrounding area. The desk study was completed in advance of site walkover surveys and site investigations. The desk study information has been checked and updated, where necessary, in January 2026.

The desk study included consultation with the following data sources:

- Environmental Protection Agency database (**www.epa.ie**);
- Geological Survey of Ireland - Groundwater and Geology Databases (**www.gsi.ie**);
- Geological Survey of Ireland – Geological Heritage Site mapping (**www.gsi.ie**);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 11 (Geology of South Mayo). Geological Survey of Ireland (GSI, 1997);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets;
- General Soil Map of Ireland 2nd edition (**www.epa.ie**); and,
- Aerial Photography, 1:5,000 and 6" base mapping.

8.2.2 Baseline Monitoring and Site Investigations

Walkover surveys of the Site, including geological mapping, were undertaken by Michael Gill of HES (refer to Section 8.1.2 above for qualifications and experience) on 14th June 2023, 3rd October 2023, 4th October 2023 and 5th October 2023 and 14th and 15th August 2024. During these surveys gouge cores were completed at all proposed turbine locations and all exposed soils/subsoils were logged. Additional walkover surveys were completed by Conor McGettigan of HES on 5th June and 19th August 2025.

Several phases of geotechnical ground investigations, including the excavation of trial pits at the Site, were completed by Ground Investigations Ireland (GII) between October 2023 and August 2024.

Fehily Timoney and Company (FT) completed site walkover surveys of the Site in September 2024. During the survey and geotechnical inspections, FT completed peat probing investigation and in-situ shear vane testing.

In addition to the above site investigations, MKO and HES completed supplementary peat probing across the Site.

The combined geological and hydrogeological dataset collated by HES, MKO, GII and FT has been used in the preparation of this EIAR Chapter.

The objectives of the Site investigations included, mapping the subsoils lithology for all proposed turbine locations and other key infrastructure locations (i.e. access tracks). The geological data accrued from these site investigations was used to inform the final layout of the Proposed Project.

In summary, site investigations to address the Chapter 8 Land, Soils, Geology of the EIAR included the following:

- A total of 262 no. peat probes has been completed at the Site during walkover surveys and inspections completed by FT in January 2024 and MKO in 2023 and 2025 to determine the depth and geomorphology of the cut peat;
- GII excavated a total of 19 no. trial pits at the Site in October 2023 under the supervision of HES;
- GII completed additional site investigations comprising 9 no. trial pits and 1 no. rotary core boreholes, on the 14th and 15th August 2024, under the supervision of HES;
- Samples were recovered from the trial pit excavations for laboratory analysis;
- HES completed detailed walkover survey, including geological mapping and logging of subsoil exposures across the Site on several dates between 2023 and 2025; and,
- Mineral subsoils and peat were logged according to BS: 5930 and Von Post Scale respectively.

The above site investigations were also used to inform the Geotechnical & Peat Stability Assessment Report (GPSA, FT, 2026) and the Peat and Spoil Management Plan (PSMP, FT, 2026) which are included as Appendix 8-1 and Appendix 4-3 of this EIAR respectively.

8.2.3 Scoping and Consultation

The scope for this EIAR has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties. This consultation process is outlined in Section 2.7 of this EIAR.

Matters raised by Consultees in their responses with respect to the land, soils and geology environment are summarised in Table 8-1 below.

Table 8-1: Summary of Land, Soil & Geology Environment Related Scoping Responses

Consultee	Description of response	Relevant Section
Geological Survey Ireland (GSI)	› **Geoheritage** - Our records show that there are no County Geological Sites (CGS) in the vicinity of the Proposed Project.	› Information relating to Geological Heritage sites are detailed in Section 8.3.7.
	› **Groundwater** - Potential for impact on groundwater resources as the Site is underlain by a Regionally Important Karstified (conduit) Aquifer with areas of Extreme and High groundwater vulnerability.	› The hydrogeological setting of the Proposed Project is outlined in Chapter 9 of this EIAR.
	› **Geohazards** – the GSI recommend that geohazards and particularly flooding be taken into consideration, especially when developing areas where these risks are prevalent, and encourage the use of GSI data when doing so.	› Geohazards are addressed in Section 8.3.9. › Flooding is discussed in Chapter 9 of this EIAR.
Uisce Éireann (UÉ)	IW currently does not have the capacity to advise on scoping of individual projects. However, in general we would like the following aspects of Water Services to be considered in the scope of an EIAR where relevant; › Any physical impact on IW assets – reservoir, drinking water source, treatment works, pipes, pumping stations, discharges outfalls etc. including any relocation of assets.	› UÉ assets and water sources are identified in Section 9.3.7 of Chapter 9, and the potential effects are assessed in Section 9.4.2.10.
Health Service Executive (HSE)	A detailed assessment of the current ground stability of the Site for the proposed renewable energy development and all proposed mitigation measures should be detailed in the EIAR. The assessment should include the impact construction work may have on the future stability of ground conditions, taking into consideration extreme weather events, site drainage, and the potential for soil erosion.	› Ground stability and a detailed Peat Stability/ Geotechnical Assessment within the Site is discussed in Section 8.3.10, with a Geotechnical & Peat Stability Assessment (GPSA) included as Appendix 8-1.

Consultee	Description of response	Relevant Section
	The Environmental Health Service recommends that a detailed Peat Stability/Geotechnical Assessment of the proposed site should be undertaken to assess the suitability of the soil for the Proposed Project. The EIAR should include provision for a peat stability monitoring programme to identify early signs of potential bog slides.	
National Parks and Wildlife (NPWS)	The proposed layout of access roads and turbines indicate that some areas of infrastructure would occur on areas of cut-over bog. The Department notes that some areas of cut-over bog are now considered to have potential to correspond to Annex I habitat Active Raised Bog. The Department recommends characterising the areas of cut-over bog within the zone of influence of any proposed infrastructure accordingly to help inform the design of any layout. If direct impacts are unavoidable, the effects of those impacts should be correctly characterised in the EIAR. The Department also requests that the potential for indirect hydrological impacts on both the areas of high bog, and cut-over bog, within the application site should be addressed.	› The classification of habitats at the Site and the effects on such habitats is discussed in Chapter 6. › The potential for indirect hydrological impacts on these areas is assessed in Chapter 9.

8.2.4 Impact Assessment Methodology

Using information from the desk study and data from the Site investigations, an assessment of the importance of the land, soil and geological environment within the study area and the Site is assessed using the criteria set out in Table 8-2 (NRA, 2008).

Table 8-2 Estimation of Importance of Soil and Geology Criteria (NRA, 2008).

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource

Importance	Criteria	Typical Example
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying site is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site). Well drained and/or highly fertility soils. Moderately sized existing quarry or pit Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying site is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed Wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral Resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying site is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral Resource.

EPA Guidelines (EPA, 2022) states that there are 7 no. steps in the preparation of the EIAR. The initial steps relate to screening, scoping, the consideration of alternatives and the description of the project. Step 5 relates to the description of the baseline environment which is presented in Section 8.3 for the land, soils and geological environment. Step 6 relates to the assessment of impacts and is presented in Section 8.6. The guideline criteria for the assessment of effects states that the purpose of an EIAR is to identify, describe and present an assessment of the likely significant effects. The likely effects are described with respect to their quality (positive, neutral or negative), significance (imperceptible to profound), extent (i.e. size of area or number of sites affected), context (is the effect unique or being increasingly experienced), probability (likely or unlikely), duration (momentary to permanent), frequency and reversibility. The descriptors used in this chapter are those set out in the 'EPA Guidelines (EPA, 2022) glossary of effects as shown in Chapter 1 of this EIAR. In addition, the two impact characteristics, proximity and probability are described for each impact, and these are defined in Table 8-3.

Table 8-3: Additional Impact Characteristics

Impact Characteristic	Degree/ Nature	Description
Proximity	Direct	An impact which occurs within the area of the Proposed Project, as a direct result of the Proposed Project.

Impact Characteristic	Degree/ Nature	Description
	Indirect	An impact which is caused by the interaction of effects, or by off-site developments.
Probability	Unlikely	A low likelihood of occurrence of the impact.
	Likely	A medium likelihood of occurrence of the impact.

In order to provide an understanding of this descriptive system in terms of the geological/hydrological environment, elements of this system of description of effects are related to examples of potential likely significant effects on the geology and morphology of the existing environment, as listed in Table 8-4.

Table 8-4: Impact descriptors related to the receiving environment

Impact Characteristics		Potential Hydrological Impacts
Quality	Significance	
Negative only	Profound	Widespread permanent impact on: › The extent or morphology of a cSAC. › Regionally important aquifers. › Extents of floodplains. Mitigation measures are unlikely to remove such impacts.
Positive or Negative	Significant	Local or widespread time-dependent impacts on: › The extent or morphology of a cSAC / ecologically important area. › A regionally important hydrogeological feature (or widespread effects to minor hydrogeological features). › Extent of floodplains. Widespread permanent impacts on the extent or morphology of an NHA/ecologically important area. Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.
Positive or Negative	Moderate	Local time-dependent impacts on: › The extent or morphology of a cSAC / NHA / ecologically important area. › A minor hydrogeological feature. › Extent of floodplains. Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends
Positive, Negative or Neutral	Slight	Local perceptible time-dependent impacts not requiring mitigation.
Neutral	Imperceptible	No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

8.2.5 Study Area

The study area for the land, soils and geological environment is limited to within the EIAR Site Boundary (i.e. the Site). The EIAR Site Boundary identifies the primary EIAR study area for the Proposed Project. The EIAR Site Boundary (the Site), as delineated in Chapter 1, Figure 1-2 encompasses an area of approximately 165 hectares (ha). The permanent footprint of the Proposed Project measures approximately 5.5 hectares, which represents approximately 3% of the Site. There is no potential for the Proposed Project to affect the land, soils and geological environment outside of the Site.

Any accommodation works completed along the TDR will be minor and the areas of proposed accommodation works are detailed in Chapter 4, Section 4.6.2. For the purposes of a conservative impact assessment, the potential effects of the TDR accommodation works on land, soils and geology are assessed in Section 8.6.2.9.

8.2.6 Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of the Land, Soils and Geology Chapter of the EIAR. The site investigations and follow up monitoring carried out were iterative, thorough, and exhaustive.

8.3 Existing Environment

8.3.1 Site Description and Topography

The Site is located within a rural setting in south Co. Mayo, approximately 5.3 kilometres (km) to the northwest of the town of Claremorris. The town of Castlebar is located approximately 16 km north-west of the Site.

The Site comprises a mix of agricultural land, peat bogs and private forestry. The Site predominantly consists of cut peat bogs separated by elevated ridges comprising agricultural pastures. An area of inland marsh land is located to the east of the Site surrounding Drumady Lough that defines the Site's boundary in the southeast. Agricultural pastures dominate the wider environ with some smaller areas of coniferous forestry in the east and more pockets of peat land areas mapped to the south.

The N60 National Road runs north-south approximately 2 km to the east. The R331 Regional Road runs northeast-southwest, approximately 5 km from the southern boundary of the Site. Existing access is via the local L1505 road to the south and the local L5536 road to the north. There are several existing forestry/ agricultural tracks and local roads within the Site.

Ground elevations within the Site are relatively flat and low-lying, ranging from approximately 60mOD (metres above Ordnance Datum) to 70mOD. The topography slopes very gently in an easterly direction towards Drumady Lough. In places, topography has been modified through previous peat extraction activities and associated drainage.

8.3.2 Land and Land Use

Based on Corine (2018) mapping (www.epa.ie) the Site comprises predominantly of peat bogs with some agricultural pastures. Inland marshes are also mapped in the lands surrounding Drumady Lough. Historic Corine land cover maps do not record any significant changes to land at the Site.

Land cover at the Site has been verified during site walkover surveys completed by HES, from the inspection of recent aerial imagery and from habitat mapping completed by ecologists as part of the

baseline characterisation for Chapter 6. During the walkover surveys the Site was noted to comprise of peat bogs and agricultural pastures with some coniferous forestry plantations.

The Proposed Wind Farm infrastructure is located either in areas of peat bogs, some of which have evidence of turbary peat cutting, or rough agricultural pasture.

Current land-use along the Proposed Grid Connection underground cabling route comprises agricultural pastures and coniferous forestry.

Land-use in the wider landscape of the Site comprises a mix of agriculture, peat cutting, low density residential and private forestry.

The land cover at the location of the key Proposed Project infrastructure locations is detailed in Table 8-5.

Table 8-5: Existing Land Cover at Key Proposed Project infrastructure/development locations

Proposed Wind Farm Infrastructure Elements	Land Cover
T1, T3, T6, new access tracks, peat and spoil management areas, borrow pit, marsh fritillary enhancement T4, T5, T6, borrow pit and temporary construction compound	Peat Bog
T2, T4, T5, T7, new access tracks, temporary construction compound, peat and spoil management areas, woodland replanting	Agricultural pastures
Proposed Grid Connection Infrastructure Elements	**Land Cover**
110kV Substation and associated compound, western end mast, new access tracks, temporary construction tracks, underground cable trench	Agricultural pastures
Eastern end mast, new access tracks, underground cable trench	Coniferous forestry plantations

8.3.3 Peat/Soils and Subsoils

8.3.3.1 Desk Study

The published Teagasc soil map (www.epa.ie) for the area shows that the Site is mapped to be overlain predominantly by cutover/cutaway peat (cut). Mainly basic, deep well drained mineral soils (BminDW) are also mapped to cover a significant area of the Site, with these soils mapped in the northwest and the southeast. On the perimeter of the deep well drained mineral soils, Teagasc also map smaller pockets of mainly basic poorly drained mineral soils (BminPD).

In terms of the Proposed Wind Farm infrastructure, 3 no. proposed turbines (T3, T4 and T6), the met mast and the northern section of the proposed borrow pit, are mapped in areas overlain by peat. 2 no. turbines (T5 and T7) and the temporary construction compound are mapped in areas overlain by basic, deep, well drained mineral soils. 2 no. turbines (T1 and T2) and the southern section of the proposed borrow pit are mapped in areas overlain by basic poorly drained mineral soils.

In terms of the Proposed Grid Connection infrastructure, the onsite 110kV substation and temporary construction compound are located in areas mapped at the boundary between peat, basic well drained mineral soils, and basic poorly drained mineral soils.

The GSI subsoil map for the local area (www.gsi.ie) shows that Site is underlain largely by cut over raised peat (cut). Till derived from limestones (TLs) are also mapped in the northwest and the southeast of the Site. Other subsoils mapped in the surrounding lands include gravels derived from limestones (GLs) which are mapped to the north/northeast of the Site. No areas of bedrock outcrop or subcrop are mapped within the Site or in the surrounding lands. A subsoil geology map for the Site is included as Figure 8-1.

In terms of the Proposed Wind Farm infrastructure, a total of 3 no. turbines (T3, T4 and T6), the met mast and the northern section of the proposed borrow pit are mapped to be underlain by peat. 4 no. turbines (T1, T2, T5 and T6), the temporary construction compound and the northern section of the proposed borrow pit are mapped to be underlain by till.

In terms of the Proposed Grid Connection infrastructure, the onsite 110kV substation and temporary construction compound are mapped at the boundary between the peat and till deposits. The western end mast is located in an area mapped to be underlain by till, whilst the eastern end mast is mapped in an area underlain by peat.

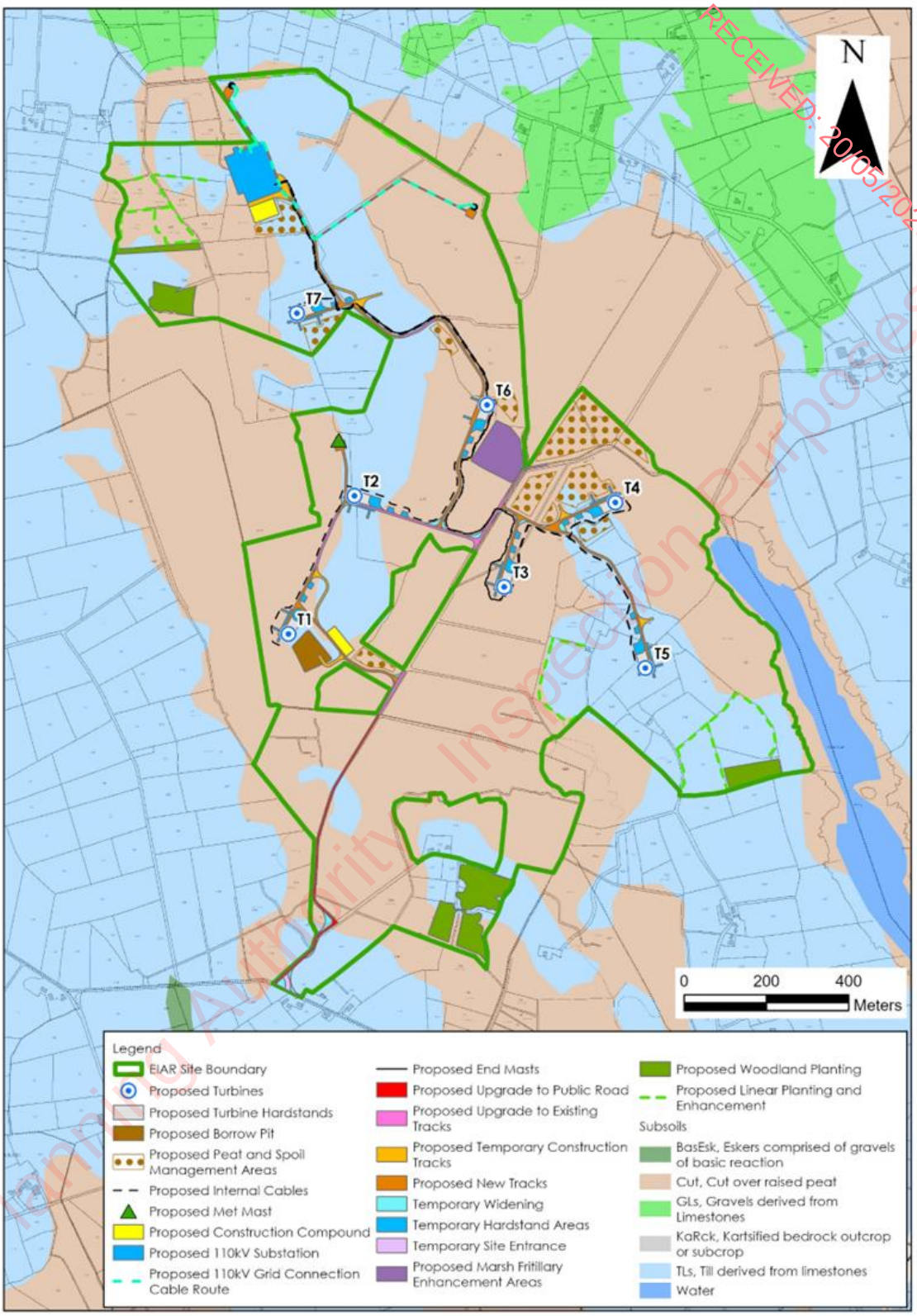

Figure 8-1: Local Subsoils Map

8.3.3.2 Site Investigations

The soils and subsoils present at the Site have been confirmed by site investigations comprising of peat probing, shear vane testing, gouge cores, trial pits and borehole drilling.

A total of 262 no. peat probes were completed at the Site. The peat depths recorded from the peat probing investigations ranged from 0 to 6.1m, with an average peat depth of 1.2m. Approximately 91% of the peat depth probes recorded peat depths of less than 3.0m. A number of localised readings recorded peat depths were between 3.5 and 6.1m. The layout of the Proposed Project was designed to avoid the areas of deepest peat. A peat depth distribution plot for the Site is included as Figure 8-2 below.

Peat depths at the proposed turbine locations ranged from 0 to 2.8m, with an average peat depth of 0.8m. Peat depths along the new proposed access tracks are typically less than 3.5m with localised peat depths of 5.2m. The peat depth at the key Proposed Project infrastructure locations is presented in Table 8-6.

In addition to probing, in-situ shear vane testing was completed by FT. The hand vanes results indicate undrained shear strengths between 12 and 65kPa, with an average of 40kPa. The recorded strengths would be typical of well drained peat.

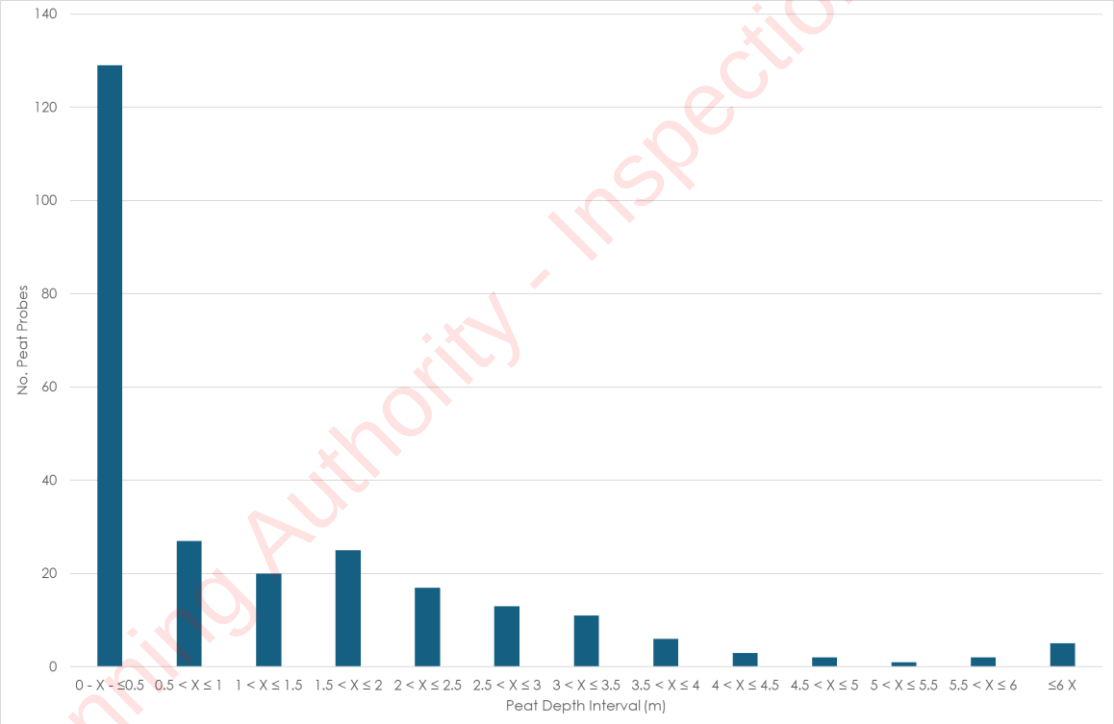

Figure 8-2: Peat Depth Distribution Plot

Table 8-6: Peat Depth at Key Proposed Project infrastructure/development locations

Proposed Project Infrastructure	Peat Depth Range (m)	Average Peat Depth (m)
T01	0 – 0.2	0.8
T02	0 – 0.1	0.1
T03	0.9 – 2.8	2.8
T04	0.1 – 1.1	0.32
T05	0.1 – 0.2	0.16
T06	1.4 – 2.7	2.12
T07	0.1	0.1
Borrow Pit	0 – 2.2	1.1
Met Mast	0.2	0.2
Substation	0 – 0.9	0.29
Temporary Construction Compound (Substation)	0 – 0.4	0.2
Temporary Construction Compound (Wind Farm)	0 – 0.5	0.2

GII completed site investigations at the Site between the 3rd and 5th October 2023. These investigations included the excavation of 19 no. trial pits under the supervision of HES and laboratory testing of the recovered soil samples. The GII site investigations are presented in full in Appendix E of the PSRA which has been prepared by FT (Appendix 8-1). Summary logs at the key Proposed Project infrastructure locations are provided in Table 8-7 below. The depth of these trial pits ranged from 1.7m to 3.3m. The locations of these trial pits are shown on Figure 8-3. The results of the trial pit excavations are summarised as follows:

- A thin layer of TOPSOIL (0.3m maximum thickness) was encountered at most excavation locations;
- PEAT was encountered at the surface of 6 no. locations (TPR3, TPR5, TPR6, TPR7, TPT1 and TPT4) and extended to depths of 0.6 to 3.1mbgl. Peat was also encountered below the made ground at 2 no. locations (TPR1 and TPSS1).
- MADE GROUND described as *brown, slightly sandy, slightly gravelly CLAY with cobbles and rare fragments of plastic* was encountered at the surface at BPTP1, and beneath the topsoil at TPR1 and TPSS1.
- Cohesive deposits typically described as brownish grey, slightly sandy, gravelly CLAY/SILT with cobbles and boulders were encountered at most excavation locations.
- Granular deposits were encountered below the peat and cohesive subsoils and were typically described as *grey, clayey, sandy, subangular to subrounded, fine to coarse GRAVEL with cobbles and boulders*. A *grey clayey, gravelly, fine to coarse SAND* was encountered beneath the peat at TPR3.

GII completed additional 9 no. trial pit excavations (TP201-TP209) at the Site on the 14th August 2024. These trial pit excavations were completed at the proposed onsite 110kV substation (TP201-TP207) and at the Proposed Grid Connection end mast locations (TP208 and TP209). These excavations extended to maximum depths of between 1.3 and 2.7mbgl. These site investigations largely encountered the same soil profile as the 2023 site investigations with TOPSOIL/MADE GROUND or PEAT underlain by cohesive CLAY deposits. GRAVEL subsoils as were encountered below the cohesive clay deposits at TP202 (1.8mbgl) and TP205 (0.4mbgl). However, granular deposits were found to directly underlie

the TOPSOIL at 2 no. locations. GRAVEL was encountered at a depth of 0.3mbgl at TP207 whilst gravelly, fine to coarse SAND was encountered at a depth of 0.1mbgl (0.1-2.6mbgl) at TP206. The locations of these site investigations are also shown in Figure 8-3. The logs associated with these trial pit excavations are included in Appendix E of the PSRA (Appendix 8-1).

The full soil/subsoil profile was not encountered in any of the trial pit excavations. A rotary core hole (RC01) was drilled at the location of the proposed borrow pit by GII on the 14th and 15th August 2024. This borehole encountered rock at 10.6mbgl. The borehole encountered GRAVEL beneath the TOPSOIL to a depth of 5mbgl. *Very stiff, brown, slightly sandy gravelly Clay with cobbles and boulders* was recorded from 5 to 8.7mbgl and was underlain by a layer of *dense, dark grey, slightly clayey fine to coarse SAND* (8.7 to 9.5mbgl). The rock was overlain by a layer of *dark grey, slightly, clayey, subangular to subrounded, fine to coarse GRAVEL*.

Particle Size Distribution (PSD) analysis of recovered soil/subsoil samples was carried out by National Material Testing Laboratory Ltd's Geotechnical Laboratory in County Carlow. A total of 22 no. samples were analysed from 17 of the trial pit locations excavated in October 2023 (note that multiple samples were obtained at different depths from several excavations). The samples recovered for analysis were described in the logs as SILT (8 no.), SILT/CLAY (5 no.), PEAT (6 no.), GRAVEL (2 no.) and SAND (1 no.). Based on the PSD analysis, percentage of silt in these subsoils ranges from 11.7% at TPR8 (sample described on the logs as gravelly SAND) to 95.5% at TPR6 (sample described on the logs as fibrous PEAT). The percentage of sand ranges from 2.9% at TPR6 (PEAT) to 45.7% at TPT7 (described on the log as sandy SILT). The percentage of gravel ranges from 1.5% at TPR6 (PEAT) to 50.4% at TPT1 (GRAVEL). The results of the PSD analysis are shown on Figure 8-4 below.

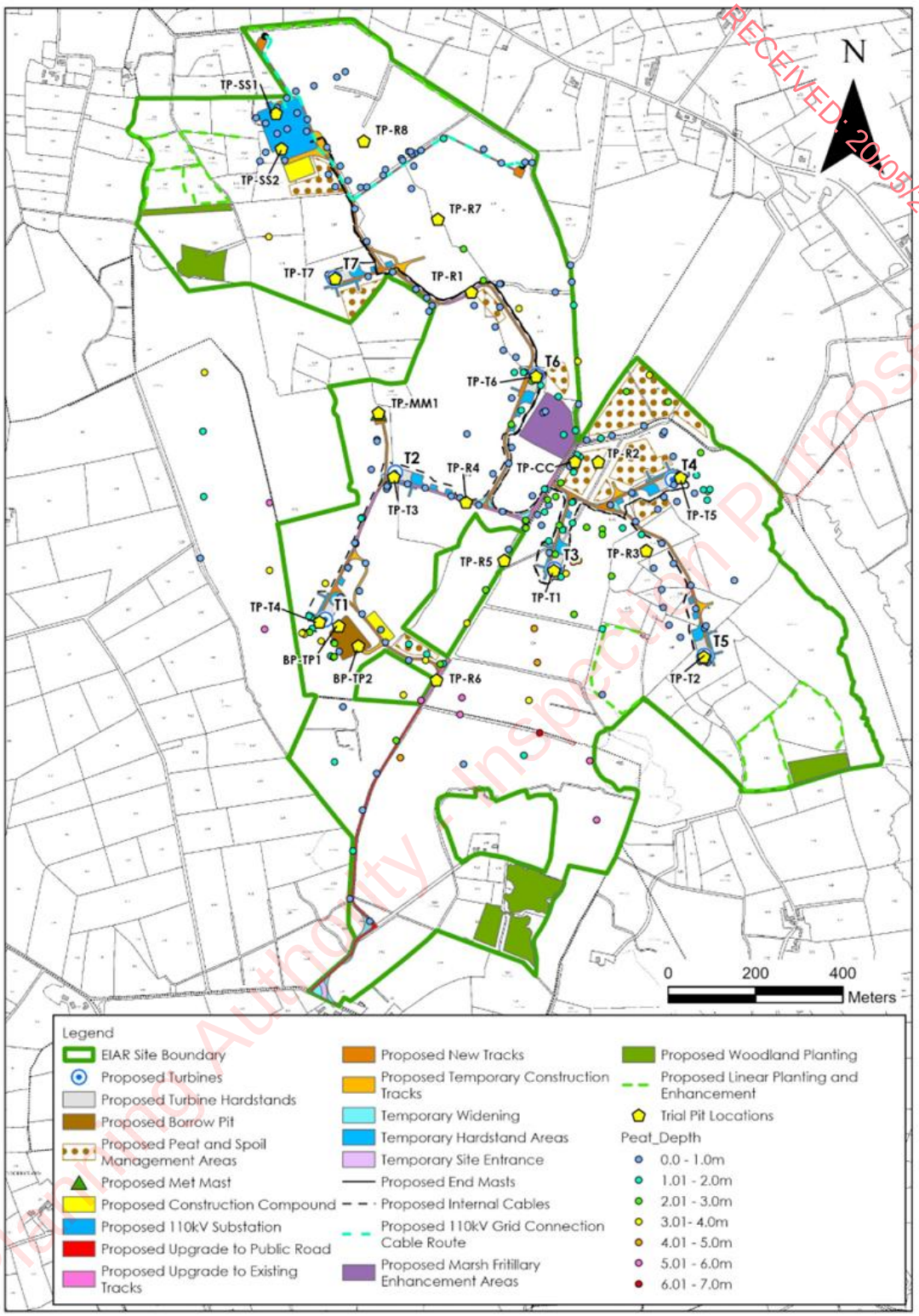

Figure 8-3: Site Investigation Map

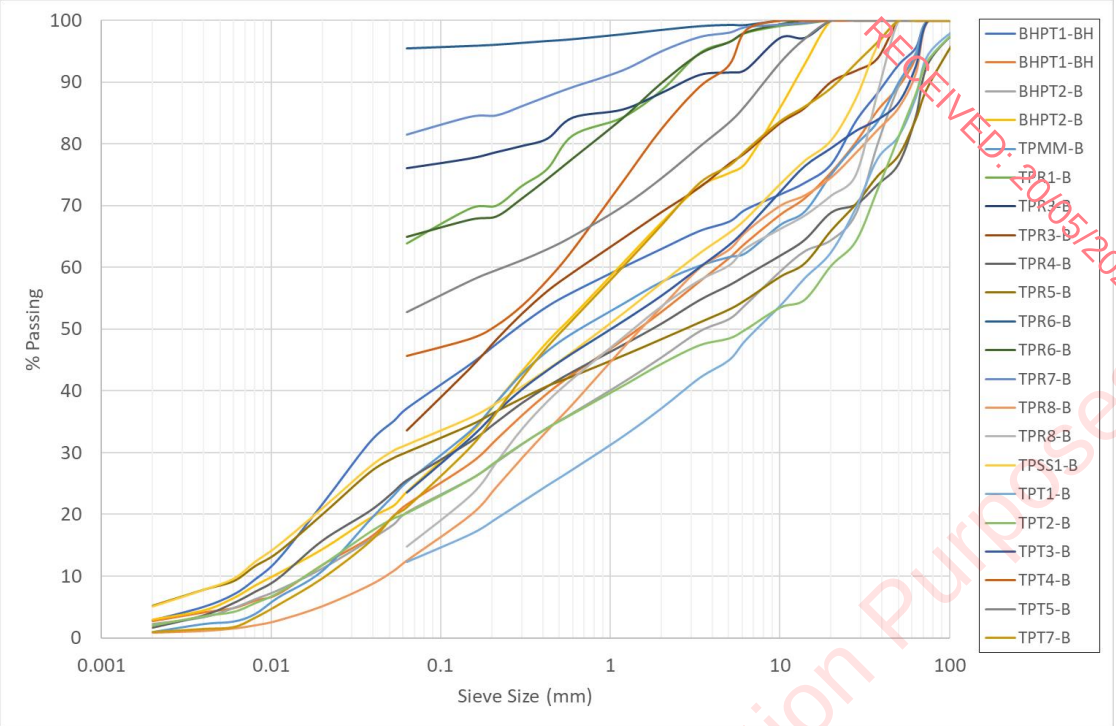

Figure 8-4: PSD Analysis of subsoils

Table 8-7: Summary of Trial Pits Logs at Proposed Project Locations (GII, 2023)

Infrastructure Location	TP ID (GII, 2023)	Depth Interval (m)	Summary of Underlying Mineral Subsoil Lithology
Borrow Pit	BPTP1	0-1.5	MADE GROUND: gravelly CLAY with cobbles and boulders
		1.5-2.1	sandy gravelly CLAY with cobbles and boulders
		2.1-2.7	clayey sandy fine to coarse GRAVEL with cobbles and boulders
	BPTP2	0-0.1	TOPSOIL
		0.1-0.6	sandy gravelly CLAY with cobbles and boulder
		0.6-2.3	clayey sandy fine to coarse GRAVEL with cobbles and boulders
Met Mast	TPMM	0-0.3	TOPSOIL
		0.3-0.7	sandy gravelly CLAY with cobbles
		0.7-1.7	sandy gravelly CLAY with cobbles and boulders
Sub-Station	TPSS1	0-0.2	TOPSOIL
		0.2-0.4	MADE GROUND
		0.4-0.8	PEAT
		0.8-1.8	clayey sandy fine to coarse GRAVEL with cobbles and boulders
		1.8-2.5	sandy fine to coarse GRAVEL with cobbles and boulders
	TPSS2	0-0.1	TOPSOIL
		0.1-0.6	slightly sandy slightly gravelly CLAY

Infrastructure Location	TP ID (GII, 2023)	Depth Interval (m)	Summary of Underlying Mineral Subsoil Lithology
		0.6-1.0	slightly sandy gravelly CLAY with low cobble and boulder content
		1.0-1.9	sandy fine to coarse GRAVEL with cobbles and boulders
T1	TPT4	0-1.9	PEAT, Soft to firm light grey slightly sandy gravelly CLAY with high cobble and boulder content
		1.9-2.9	sandy gravelly CLAY with cobbles and boulders
T2	TPT3	0-0.2	peaty TOPSOIL
		0.2-0.4	sandy gravelly CLAY
		0.4-1.6	sandy gravelly CLAY cobbles
		1.6-2.6	sandy gravelly CLAY with cobbles and boulders
T3	TPT1	0-1.7	PEAT
		1.7-2.8	clayey sandy fine to coarse GRAVEL with cobbles and boulders
T4	TPT5	0-0.3	peaty TOPSOIL
		0.3-0.9	sandy gravelly CLAY with cobbles and boulders
		0.9-1.7	clayey sandy fine to coarse GRAVEL with cobbles and boulders
T5	TPT2	0-0.3	TOPSOIL
		0.3-1.2	sandy slightly gravelly CLAY
		1.2-2.9	clayey sandy fine to coarse GRAVEL with cobbles and boulders
		2.9-3.1	sandy gravelly CLAY with cobbles and boulders
T6	TPT6	0-0.2	peaty TOPSOIL
		0.2-1.1	sandy gravelly CLAY
		1.1-1.8	clayey sandy fine to coarse GRAVEL with cobbles and boulders
T7	TPT7	0-0.3	TOPSOIL, slightly sandy slightly gravelly CLAY, Grey clayey sandy fine to coarse grained angular to subangular GRAVEL
		0.3-0.9	slightly sandy slightly gravelly CLAY
		0.9-2.7	clayey sandy fine to coarse GRAVEL with cobbles and boulders

8.3.4 Bedrock Geology

8.3.4.1 Desk Study

Based on the GSI bedrock mapping (www.gsi.ie) the Site is underlain by a total of 4 no. bedrock geological formations. The majority of the Site is underlain by the Ardnasillagh Formation which comprises dark cherty limestone and thin shales. The south of the Site is underlain by the Cong Canal Formation consisting of medium to thick-bedded pure limestone. A very small area in the east of the Site is mapped to be underlain by the Visean Limestones (undifferentiated). The very northern section of the Site is mapped to be underlain by the Illaunagappul Formation, which consists of limestone and thin shale partings.

The GSI do not map the presence of any bedrock geological faults within the Site or in the surrounding lands. There are no GSI mapped bedrock outcrops in the Site. The closest mapped bedrock outcrop is located approximately 1.2 km to the west/southwest of T1.

The majority of the Proposed Wind Farm infrastructure and the Proposed Grid Connection infrastructure are mapped to be underlain by the Ardnasillagh Formation. T5 in the southeast of the Site is mapped to be underlain by the Cong Canal Formation. Meanwhile, the western end mast associated with the Proposed Grid Connection is underlain by the Illaunagappul Formation. No infrastructure is proposed in the area mapped to be underlain by the Visean Limestones.

A bedrock geology map for the local area is shown as Figure 8-5.

8.3.4.2 Site Investigations

No bedrock was encountered in any of the trial pit excavations or during the walkover surveys of the Site. The trial pits excavated at the proposed borrow pit location (BPTP1 and BPTP2) extended to depths of only 2.7mbgl and 2.3mbgl and were obstructed due to large cobbles and boulders.

GII drilled a rotary core hole (RC01) at the location of the proposed borrow pit between 14th And 15th August 2024. This borehole extended to a depth of 12mbgl and encountered bedrock at a depth of 10.6mbgl. The returns were described as medium strong to strong, thinly to thickly bedded, light grey, fine grained LIMESTONE with clay infill. The rock was noted to be slightly to moderately weathered. This borehole log is included in Appendix E of the PSRA (Appendix 8-1).

8.3.5 Karst Features

According to the GSI Groundwater Resources mapping (www.gsi.ie) the bedrock underlying the Site is a Regionally Important Aquifer – Karstified (conduit).

However, the GSI karst features database (www.gsi.ie) does not record the presence of any karst features within the Site. The closest mapped karst features are a turlough and 2 no. swallow holes mapped
~2.5 km southwest of T2. Although, the GSI have recorded numerous karstic features in the wider area. Large clusters of enclosed depressions are mapped approximately 1 km to the north, approximately 2.7 km to the east and approximately 4.2 km west of the Site. Other than enclosed depressions, which seem to be the dominant karst feature in this area, a turlough is situated approximately 3.8 km northwest of the Site and a borehole with karst is mapped approximately 2.7 km to the west.

No karst features were recorded during the walkover surveys of the Site or during the intrusive site investigations.

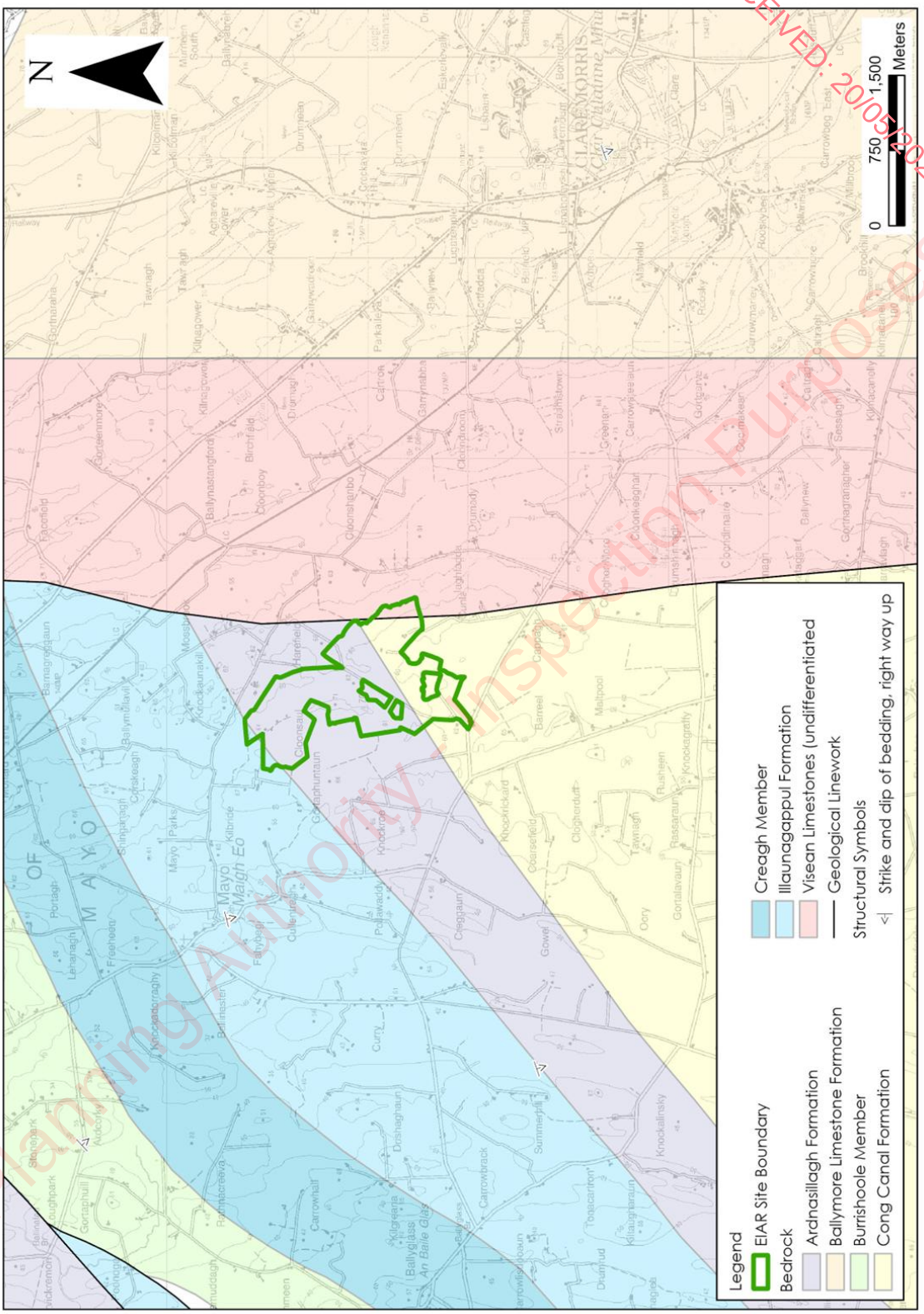

Figure 8-5: Bedrock Geology Map

8.3.6 Geological Resource Importance

The GSI Online Database, accessed via the Public Data Viewer (www.gsi.ie), does not record the presence of any active quarries or sand and gravel pits within the Site or in the surrounding lands. The nearest active quarry is a crushed rock quarry mapped approximately 6 km southwest of the Site.

Furthermore, the GSI do not record the presence of any historic quarries or pits within the Site. The closest mapped historic quarry/pit is situated approximately 4.5 km north of the Site in the townland of Derrowel More and is noted to have been active in 1975 to 1995. No evidence of historic extraction activities was recorded during the site walkover surveys.

The GSI do not record any mineral localities within the Site.

The GSI online Aggregate Potential Mapping Database (www.gsi.ie) shows that the crushed rock aggregate potential of the Site ranges from 'Low' to 'Very High'. The majority of the Site is noted as being of 'Low' to 'Moderate' potential. Some small areas of 'High' to 'Very High' potential are found in the central portion of the Site. The only area mapped as having 'Very High' potential corresponds with the location of the proposed borrow pit. The bedrock at the Site could be used on a "sub-economic" local scale for construction purposes.

The Site is not located within an area mapped for granular aggregate potential (i.e., potential for gravel reserves). Some lands immediately to the north and northeast of the Site are mapped as having 'Moderate' granular aggregate potential. The peat and subsoil deposits at the Site can be considered to be of 'Low' importance as the peat is not designated in this area and is significantly degraded in most places due to drainage and extraction.

8.3.7 Geological Heritage and Designated Sites

There are no recorded Geological Heritage sites within the Site or in the surrounding lands. The closest mapped geological heritage site is the Kock – Ballyhaunis Area County Geological Site (CGS) located more than 10 km to the northeast of the Site.

Within the Republic of Ireland designated sites include Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs).

The Site is not located within any designated conservation site. The nearest designated site to the Site is the River Moy SAC (Site Code: 002298) located ~1.95 km to the west. This SAC is hydrologically connected to the Site via the Meander River. The potential effects via this connection are assessed in Chapter 9 of this EIAR.

The locations of nearby Geological Heritage sites and Designated Sites and are shown on Figure 8-6.

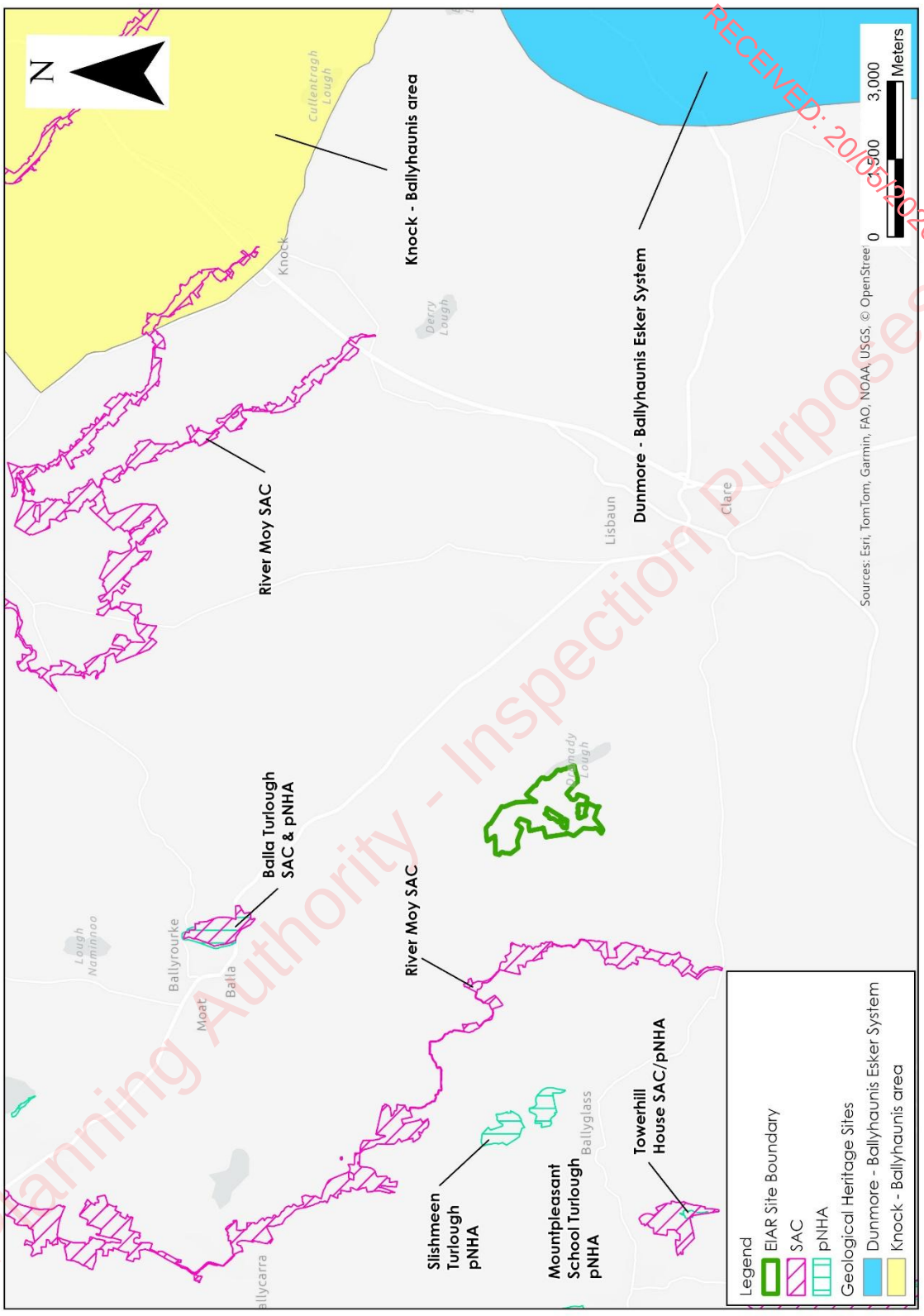

Figure 8-6: Geological Heritage Sites and Designated Sites

8.3.8 Soil Contamination

There are no known areas of soil contamination at Site. During the site walkovers or investigations, no areas of contamination concern were identified.

There are no historic mines at or in the immediate vicinity of the Site that could potentially have contaminated tailings.

According to the EPA online mapping (www.epa.ie) there are no licensed waste facilities on or within the immediate environs of the Site.

8.3.9 Geohazards

The GSI Landslide database (www.gsi.ie) does not record any historic landslides in the vicinity of the Site or in the surrounding lands.

The GSI Landslide Susceptibility Map (www.gsi.ie) classifies the probability of a landslide occurring at a given location. The probability of a landslide occurring at the Site is mapped as being Low. Refer to Section 8.3.10 below for a summary of the Geotechnical & Peat Stability Assessment (GPSA).

8.3.10 Peat Stability Assessment

8.3.10.1 Introduction

FT was engaged to undertake a geotechnical and peat stability assessment of the Proposed Project. A Geotechnical & Peat Stability Assessment (GPSA) (FT, 2026) is included as Appendix 8-1.

Hydrological, hydrogeological and ecological factors were also assessed in the GPSA (FT, 2026), and interaction between FT, HES and MKO were undertaken throughout the iterative design process. The assessment was done in accordance with Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (PLHRAG, Scottish Government, 2017).

A constraints study was initially undertaken by the Environmental (MKO), Hydrological (HES) and Ecological (MKO) members of the project design team to determine the developable area at the Site, prior to the site reconnaissance by engineering geologists/geotechnical engineers from FT.

8.3.10.2 Hydrological Considerations

The hydrological factors with regard peat stability were assessed using a combination of desk study data, aerial photography (historical and contemporary), topographic lidar data flow path drainage analysis, site walkovers, field drainage mapping and gouge coring. Detailed drainage maps were prepared along with hydrological constraints mapping for on-site drainage features and wet areas.

Many of the pre-conditions as described by (PLHRAG, 2017) are hydrological in nature and are listed in the guidance as follows:

- Impeded drainage caused by a peat layer overlying an impervious clay or mineral base (hydrological discontinuity, especially an iron pan at the base of the peat deposit);
- A convex slope or a slope with a break of slope at its head (concentration of subsurface flow);
- Proximity to local drainage, either from flushes, pipes or streams (supply of water); and
- Connectivity between surface drainage and the peat/impervious interface (mechanism for generation of excess pore pressures).

Identifying the above pre-conditions at the Site was a key part of the hydrological constraints assessment carried out in conjunction with project design team.

8.3.10.3 Peat Slides – Lessons Learned

The GPSA (FT, 2026) has been undertaken, taking into account peat failures that have occurred on peatland sites (such as recent failures at Shass Mountain 2020, Co. Leitrim and Meenbog 2020, Co. Donegal). The lessons learned from both peat slide events have been incorporated into the design of the Proposed Project and the construction methodologies to be implemented.

The peat present on the Site has historically been used for small scale turbary peat extraction. The Site is largely comprised of cutover bog which has been drained with only localised areas of remnant high bog. The Site is flat in nature, and the areas where peat has been extracted have been drained to locally lower the water level within the peat. This has led to an increase in the strength of the in-situ peat when compared to undrained areas. Given the flat site and the higher strength of the peat, the conditions at the Site are not similar to Shass Mountain or Meenbog, nor is it considered likely that a similar failure could occur at the Site.

8.3.10.4 Geotechnical Peat Stability Assessment

FT completed a peat stability analysis at all the main infrastructure locations across the Site for both the undrained and drained conditions. The purpose of the analysis was to determine the Factor of Safety (FoS) of the peat slopes. The minimum required FoS is 1.3 based on BS6031:1981: Code of Practice for Earthworks (BSI, 2009). The assigned probability of instability associated with a given FoS value is described in Table 8-8.

Table 8-8: Probability Scale for Factor of Safety.

Scale	Factor of Safety	Probability
1	1.30 or greater	Negligible/None
2	1.29 to 1.20	Unlikely
3	1.19 to 1.11	Likely
4	1.01 to 1.10	Probable
5	<1.0	Very Likely

8.3.10.5 Peat Stability Assessment Results

Stability of a peat slope is dependent on several factors working in combination. The main factors that influence peat stability are slope angle, shear strength of peat, depth of peat, pore water pressure and loading conditions.

An adverse combination of factors could potentially result in peat sliding. An adverse condition of one of the above-mentioned factors alone is unlikely to result in peat failure. The infinite slope model (Skempton and DeLory, 1957) is used to combine these factors to determine a factor of safety for peat sliding. This model is based on a translational slide, which is a reasonable representation of the dominant mode of movement for peat failures.

To assess the factor of safety for a peat slide, an undrained (short-term stability) and drained (long-term stability) analysis has been undertaken to determine the stability of the peat slopes on site.

- The undrained loading condition applies in the short-term during construction and until construction induced pore water pressures dissipate.
- The drained loading condition applies in the long-term. The condition examines the effect of in particular, the change in groundwater level as a result of rainfall on the existing stability of the natural peat slopes.

As mentioned above, the GPSA (FT, 2026) is attached in Appendix 8-1.

Undrained Analysis

The results of the undrained analysis for the peat at the Proposed Project infrastructure locations are presented in Table 8-9. The analysis was done for 2 no. conditions: Condition 1 with no surcharge loading and Condition 2 with a surcharge of 10kPa, equivalent to 1m of stockpiled peat. As outlined above the undrained loading condition applies in the short-term during construction and until construction induced pore water pressures dissipate.

The calculated FoS for Condition 1 is in excess of 1.30 for all of the key infrastructure locations and across the 262 no. locations subject to the analysis. The calculated FoS for Condition 1 was found to range from 2.21 to 172.03 across the Site, indicating a low risk of peat instability. The FoS at the proposed infrastructure locations (wind turbines, substation, met mast, temporary construction compounds and peat and spoil management areas) ranged from 2.75 to 86.22.

The calculated FoS for Condition 2 is in excess of 1.30 for all key infrastructure locations and across the 262 no. locations subject to the analysis. The calculated FoS for Condition 2 was found to range from 1.85 to 17.19 across the Site, indicating a low risk of peat instability. The FoS at the proposed infrastructure locations (wind turbines, substation, met mast, temporary construction compounds and peat and spoil management areas) ranged from 2.75 to 9.57.

Table 8-9: Factor of Safety Results (undrained condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T01	528306	777860	2.75	3.83
T02	528467	778197	86.22	7.84
T03	528831	777975	4.10	3.02
T04	529101	778181	5.25	2.75
T05	529174	777777	28.86	4.81
T06	528789	778419	4.25	3.10
T07	528329	778643	86.22	7.84
Met Mast	528428	778335	28.86	4.81
Substation	528196	779034	28.7	8.20
Construction Compound (Substation)	528249	778889	57.40	9.57
Construction Compound 2	528434	777832	17.24	5.75
Peat and Spoil Management Area 1	528512	777792	6.60	5.73
Peat and Spoil Management Area 2	528949	778148	4.59	3.28
Peat and Spoil Management Area 3	529048	778114	43.54	3.96
Peat and Spoil Management Area 4	528897	778200	4.54	2.97

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Peat and Spoil Management Area 5	529022	778222	5.25	2.75
Peat and Spoil Management Area 6	529023	778356	6.14	4.53
Peat and Spoil Management Area 7	528843	778419	2.79	3.08
Peat and Spoil Management Area 8	528685	778582	8.62	4.31
Peat and Spoil Management Area 9	528375	778595	No peat	
Peat and Spoil Management Area 10	529297	778859	No peat	

Drained Analysis

Drained analysis results are presented in Table 8-10. Similar to the undrained analysis, the drained analysis was done for 2 no. conditions: Condition 1 with no surcharge loading and Condition 2 with a surcharge of 10kPa, equivalent to 1m of stockpiled peat. As outlined above, the drained loading condition applies in the long-term. The condition examines the effect of in particular, the change in groundwater level as a result of rainfall on the existing stability of the natural peat slopes.

The calculated FoS for Condition 1 was in excess of 1.30 at all key infrastructure locations (and at all of the 262 no. locations subject to the analysis). The FoS across the Site ranges from 1.47 to 114.68, whilst the FoS at the key infrastructure locations ranged from 2.83 to 57.48, indicating a low risk of peat instability.

The calculated FoS for Condition 2 was in excess of 1.30 at all key infrastructure locations (and at all of the 262 no. locations subject to the analysis). The FoS across the Site ranges from 2.67 to 38.18, whilst the FoS at the key infrastructure locations ranged from 3.94 to 17.18, indicating a low risk of peat instability.

Table 8-10: Factor of Safety Results (drained condition)

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
T01	528306	777860	3.83	5.52
T02	528467	778197	57.48	11.29
T03	528831	777975	2.73	4.36
T04	529101	778181	3.50	3.94
T05	529174	777777	19.24	6.90
T06	528789	778419	2.83	4.47
T07	528329	778643	57.48	11.29
Met Mast	528428	778335	19.24	6.90
Substation	528196	779034	19.13	11.82
Construction Compound (Substation)	528249	778889	38.27	13.79
Construction Compound 2	528434	777832	11.50	8.28
Peat and Spoil Management Area 1	528512	777792	19.09	17.18

Turbine No./Waypoint	Easting	Northing	Factor of Safety for Load Condition	
			Condition (1)	Condition (2)
Peat and Spoil Management Area 2	528949	778148	11.96	11.08
Peat and Spoil Management Area 3	529048	778114	29.02	5.63
Peat and Spoil Management Area 4	528897	778200	9.69	8.65
Peat and Spoil Management Area 5	529022	778222	3.50	3.94
Peat and Spoil Management Area 6	529023	778356	16.83	16.02
Peat and Spoil Management Area 7	528843	778419	3.19	4.43
Peat and Spoil Management Area 8	528685	778582	5.75	6.21
Peat and Spoil Management Area 9	528375	778595	No peat	
Peat and Spoil Management Area 10	529297	778859	No peat	

8.3.10.6 Geotechnical & Peat Stability Assessment

A Geotechnical & Peat Stability Assessment was carried out for the infrastructure elements at the Site. This approach adheres to best practice guidance for geotechnical/peat stability risk assessments as given in PLHRAG Guidance and MacCulloch (2005). The risk assessment uses the results of the stability analysis (deterministic approach) in combination with qualitative factors, which cannot be reasonably included in a stability calculation but nevertheless may affect the occurrence of peat instability, to assess the risk for each infrastructure element.

For each of the main infrastructure elements, a risk rating (product of probability and impact) is calculated. Where a location is rated 'Medium' or 'High', control measures are required to reduce the risk to at least a 'Low' risk rating. Where a subsection is rated 'Low' or 'Negligible', only routine control measures are required.

The results of the Geotechnical & Peat Stability Assessment for potential peat failure at the Site infrastructure is presented as a Geotechnical Risk Register in Appendix B of Appendix 8-1.

The risk rating for each infrastructure element of the Proposed Project is designated as Negligible following some mitigation/control measures being implemented.

Details of the required infrastructure specific mitigation/control measures can be found in Appendix B of Appendix 8-1 and the general infrastructure specific control measures are summarised below:

- Detailed ground investigation to confirm peat, mineral soil and bedrock condition and properties.
- Use of experienced geotechnical staff for confirmatory site investigation.
- Maintain hydrology of area as far as possible by maintaining the flow of water in existing drains to prevent the build-up of water pressures in the peat, leading to the peat becoming "buoyant".
- Use of contractors with experience in working peat and trained operators to carry out the work.

8.3.10.7 Peat Stability Assessment - Conclusions

In summary, the findings of the peat stability assessment showed that the Site has an acceptable margin of safety, is suitable for the Proposed Project and is considered to be at low risk of peat failure. The findings include recommendations and control measures for construction work in peat lands to ensure that all works adhere to an acceptable standard of safety.

8.4 Receptor Sensitivity and Importance

Based on the criteria set out in Table 8-2, the soils and peat at the Site can be classed as being of low importance as the overlying peat deposits are not designated in this area and are significantly degraded as a result of the drainage and extraction.

The bedrock geology underlying the Site can be classed as being of medium importance where the bedrock could be used on a sub-economic scale.

The land, peat, soils and bedrock geological formations underlying the Site will be included in the impact assessment due to their proximal location to the Proposed Project and the potential direct effects that the Proposed Project may have on these receptors.

All geological heritage sites and designated sites have been screened out of the impact assessment due to their distal location from the Proposed Project. There is no potential for effects to occur in terms of land, soils and geology characteristics of any geological heritage site or designated site.

8.5 Characteristics of the Proposed Project

The Proposed Project is described in full in Chapter 4.

The Proposed Project will involve the removal of peat, soils, subsoils and bedrock for the construction of access tracks, hardstanding emplacement including temporary hardstand areas, turbine foundations, temporary construction tracks and temporary widening areas, substation compound, grid connection underground cabling, crane hardstands, temporary construction compounds, drainage works, met mast excavation and the removal of wooden polesets.

Generally, the construction methodology for constructing any structure or platform foundation, such as a turbine base, hardstand or substation, involves removing all soft material to a depth where a suitable bearing material is encountered. Based on the site investigations data, gravity foundations are proposed at all turbine locations, for the substation and also for the met mast.

It is proposed to construct ~3.7 km of new access tracks and ~615m of temporary construction tracks. The new access tracks will be a mixture of founded and floating tracks, with floating access tracks considered to be the most appropriate given the ground conditions and terrain at the Site. It is also proposed to upgrade ~1 km of existing access tracks at the Site, in addition to the upgrade of ~772m of existing public road.

Crane hardstands, the substation platform, temporary construction compound and the met mast foundation will all be constructed using the founded technique.

The material excavated is required to be properly managed and stored and should be re-used where possible. The Applicant will comply with Circular Economy requirements and ensure that waste is prevented as much as possible. Any potential waste will be treated as a by-product as much as possible and where it is possible, materials removed off-site will be re-used in accordance with the Article 27 notification procedure or treated to comply with Article 28 if practicable (under the European Union (Waste Directive) Regulations 2011 as amended). Other materials will be recycled where possible. Any materials containing invasive species will be appropriately managed and sent to authorised facilities.

The quantities of peat and spoil requiring management at the Site have been calculated and are presented in Table 8-11 below. The total estimated combined volume of peat and spoil to be managed following excavations during the construction phase of the Proposed Project is approximately 94,200 m^3 (this includes a contingency factor of 10% to allow for increase in volume upon excavation). It is proposed to manage overburden generated through construction activities locally within the Site, in the 10 no. designated peat and spoil management areas, for landscaping at the proposed turbine locations and along proposed accessed tracks, and in the reinstatement of the proposed borrow pit. The total combined capacity of these areas is approx. 101,500 m^3 and therefore, there is more than enough capacity to manage the total volume of peat and spoil requiring management for both the Proposed Wind Farm and the Proposed Grid Connection.

Rock for the Proposed Project will be sourced from the proposed on-site borrow pit with the remainder being sourced from offsite local quarries. The stone requirements for the Proposed Project are 77,200 m^3 (54,000 m^3 for the Proposed Wind Farm and 23,200 m^3 for the Proposed Grid Connection).

Table 8-11: Summary of Excavated Peat and Spoil Volumes (adapted from Table 6.1 of the PSMP)

Infrastructure Element	Proposed Dimensions	Peat Volume (m^3)	Spoil volume (m^3)
7 no. turbines and hardstands	25m diameter excavation footprint for foundation with 75x35m hardstand area	19,800	26,000
Access Tracks	5m running surface with 6m wide footprint	8,900	4,900
Temporary Construction Compound	Hardstanding area of 25x75m	450	450
Met Mast	Hardstanding area of 25x30	200	800
Borrow Pit	85x65m	1,500	13,000
Sub Total Proposed Wind Farm		30,850	44,650
Temporary Construction Compound (SS)	Hardstanding area of 40x60m	550	550
Substation	Hardstanding area of 105x125m	2,600	14,400
Access Tracks	3m wide running surface with 4m wide footprint	300	300
Sub Total Proposed Grid Connection		3,450	15,250
Total		34,300	59,900
		94,200	

Table 8-12: Summary of Peat and Spoil Management Areas (adapted from Table 6.1 of the PSPM)

Location	Volume (m^3)	Comment
Borrow Pit	27,000	Reinstatement of borrow pit
Peat and Spoil Management Areas	59,400	Max 1.25m height for peat and 1.5m height for spoil
Landscaping	15,500	Estimated that 2,000 m^3 of peat will be required for landscaping and ballast backfill at each of the 7 no. turbine locations and the reinstatement of the temporary construction areas
Total		101,500

8.6 Likely Significant Effects and Associated Mitigation Measures

8.6.1 Do Nothing Scenario

An alternative land-use option to the development of a renewable energy project at the Site would be to leave the Site as it is, with no changes made to existing land-use practices. In this Do-Nothing Scenario, the existing land use practices comprising of agricultural activities, turbary peat cutting and forestry would continue at the Site. Forestry will be felled as forestry compartments reach maturity. Re-planting of these areas with coniferous plantation is likely to occur. Land drainage carried out in areas of the Site will continue to function and may be extended in some areas.

If the Proposed Project were not to proceed, the opportunity to capture part of Mayo's valuable renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, development contributions, rates and investment in the local area would also be lost. On the basis of the positive environmental effects arising from the Proposed Project, the do–nothing scenario was not the chosen option. The existing agricultural activities (grassland management) will continue in conjunction with the Proposed Project use of the Site.

Furthermore, the opportunity to create the proposed habitat enhancement areas would be lost. Please see Appendix 6-4 Biodiversity Management and Enhancement Plan (BMEP) for details.

8.6.2 Construction Phase - Likely Significant Effects and Mitigation Measures

The likely effects of the Proposed Project and mitigation measures that will be put in place to eliminate or reduce them are shown below. The assessment considers the Proposed Project as a whole i.e. both the Proposed Wind Farm and the Proposed Grid Connection. Where this is required to be assessed separately, this is noted in the text. An assessment of the potential effects in relation to the accommodation works required along the TDR is also presented in Section 8.6.2.9.

8.6.2.1 Potential Effects on Land (Land-Take)

The Proposed Project includes the construction of 7 no. turbines, associated hardstand areas, 2 no. temporary construction compounds, a 110kV substation, met mast, peat and spoil management areas, a borrow pit, new access tracks and upgrades to the existing L15053 local road network. The permanent footprint of the Proposed Project infrastructure is approximately 5.5ha.

These works will result in a change in the land environment within these areas. For example, the proposed works will result in the loss of ~0.7ha of coniferous forestry due to the proposed infrastructure. A permanent loss of 2.5ha of scrub and mosaics of scrub as well as the permanent loss of 1.256km of linear vegetation will also result at the Site as a result of the Proposed Project. Cutover bog (3.7ha) will also be lost due to the construction of the Proposed Project.

The Proposed Project construction works will result in local topographic changes with the removal of overburden at the Site.

No significant changes will occur to the land environment due to the removal of 3 no. double wooden polesets under the existing Cloon-Castlebar OHL to facilitate the underground grid connection. The works will be very localised and of a very small scale, with a negligible footprint in comparison to the Site area, and will not give rise to any significant disturbance.

There will be no effects on the lands adjoining the Site.

Pathways: Excavation and infrastructure construction.

Receptors: Land (i.e. the land upon which the development will occur).

Pre-Mitigation Potential Effect: Negative, slight, direct, permanent, likely effect on land (land-take) within the Site. In the absence of mitigation measures there is no potential for significant effects on land at the Site.

Mitigation Measures / Impact Assessment: The Proposed Project layout has been designed to, where possible, utilise the existing access track network within the Site, therefore reducing the area which will be altered from existing land cover to site access track.

The loss of ~0.7ha of coniferous forestry associated with felling to facilitate the Proposed Project and permanent loss of 2.5ha of scrub and scrub mosaics, permanent loss of 1.256km of linear vegetation and 3.7 ha of cutover bog associated with the permanent development footprint will not have a significant effect on land at the Site due to the small development footprint. The permanent development footprint represents a change in landcover of 3% of the total Site area (165ha). This loss of land is therefore minimal on a local scale, and negligible on a regional scale. The loss will be offset by the works proposed as part of the Proposed Biodiversity Management and Enhancement.

All felling operations will be completed in line with the Forest Service's published policy and will be subject of a Limited Felling Licence (LFL). The Forest Service policy requires replacement or replanting on a hectare for hectare basis for the footprint of the infrastructure developments. Therefore, while the loss of coniferous forestry (0.7ha) will be a permanent change to the land at these locations, all forestry lost will be replaced elsewhere within Ireland as per the Forest Service felling policy.

Given that the local topography is undulating, resulting from the quaternary deposits, any change in topography is likely to be minimal in the overall landscape.

Given the local undulating topography, any change in the topography is likely to be minimal in the overall landscape.

Post Mitigation Residual Effect: The residual effect will be a negative, direct, slight, permanent, likely effect on land and land use.

Significance of Effects: For the reasons outlined above (small development footprint), no significant effects on land and land use will occur.

8.6.2.2 Potential Effect from Peat and Subsoil Excavation

The peat, cohesive soils and granular soils and subsoils at the Site can be classified as being of low importance. The effect is the disturbance and relocation of 94,200 m^3 of material. The volume of material to be excavated is considered to be very small in comparison to the total volume of peat/soils/subsoils at the Site.

Excavation of peat and mineral soil/subsoil will be required for the installation of foundations for the access tracks, turbine hardstands and foundations, met mast, cable trenching, and on-site substation within the Site. Soils and subsoil will also require excavation at the designated peat and spoil management areas. The excavation of soils will also be required along the Proposed Grid Connection underground electrical cabling route and the access tracks proposed along the Proposed Grid Connection. The works associated with the removal of 3 no. double wooden polesets under the existing Cloon-Castlebar OHL to facilitate the underground grid connection will not give rise to any significant disturbance. Estimated volumes of peat and spoil to be relocated are summarised above in Table 8-11 above.

There will be no loss of peat or spoil from the Site, as it will be accommodated within the proposed 10 no. designated peat and spoil management areas. Spoil will also be used for landscaping at the proposed turbine

locations and in linear berms along access tracks where appropriate. In addition, peat will be used to reinstate the proposed borrow pit.

Pathway: Extraction/excavation.

Receptor: Peat and subsoil.

Pre-Mitigation Potential Effect: Negative, moderate, direct, likely, permanent effect on peat, soils and subsoil due to relocation within the Site. In the absence of mitigation measures, there will be no potential for significant effects on soils and subsoils at the Site (the peat at the Site is degraded and classified as being of low importance, the total volume of material to be excavated is small in comparison to the total volume which exists at the Site, there will be no loss of peat/soils/subsoils from the Site and material will be stored within the Site or used for landscaping or reinstatement of the proposed borrow pit).

Proposed Mitigation Measures by Design:

All work will be in accordance with the Peat and Spoil Management Plan detailed in Section 4.4.3 of Chapter 4 and Appendix 4-3. The site layout design has been iteratively developed using comprehensive site-specific site investigation dataset, which includes peat probes and trial pits.

- Placement of turbines and associated infrastructure in areas with suitable ground conditions where appropriate (based on detailed site investigation data – the areas of deeper peat have been avoided by the Proposed Project infrastructure);
- The peat/soils and subsoils which will be removed during the construction of turbine hardstands will be localised to the turbine locations. The peat/soil/subsoil will be placed/spread locally alongside the excavations, stored within the 10 no. designated peat and spoil management areas or used to reinstate the borrow pit;
- Excavated peat/soils/subsoils shall be excavated and stored separately to topsoil; this will prevent mixing of materials and facilitate reuse afterwards;
- At the identified peat and spoil management areas, the vegetative topsoil layer will be removed to allow for spoil to be placed and upon reaching the recommended height, the vegetative topsoil layer will be reinstated;
- The peat placed within the peat and spoil management areas will be restricted to a maximum height of 1.25m (1.5m for spoil materials). Weak/liquified peat will be stored in the centre of the peat management areas with firmer/drier peat placed around the outside;
- The placement of excavated peat will be avoided without first establishing the adequacy of the ground to support the load. The placement of peat and spoil within the peat and spoil management areas will require the use of long reach excavators, low ground pressure machinery and possibly bog mats in particular for drainage works;
- It will be ensured that the surface of the placed peat will be shaped to allow efficient run-off of surface water. Shaping of the surface of the peat will be carried out as placement of peat within the peat and spoil management area progresses. This will reduce the likelihood of debris run-off and reduce the risk of instability of the placed peat;
- Finished/shaped side slopes in the placed peat will be not greater than 1 (v): 4 (h). This slope inclination will be reviewed during construction, as appropriate.
- Where available, the acrotelm will be placed on the finished surface with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the placed peat and spoil within the peat and spoil management areas;
- Movement monitoring instrumentation will be placed around the areas where peat has been placed. The locations where monitoring is required will be identified by the Project Geotechnical Engineer on site;
- Supervision by the Project Geotechnical Engineer will be carried out for the works; and,
- An interceptor drain will be installed upslope of the designated peat and spoil management areas to divert any surface water away from these areas. This will help ensure stability of the placed peat and reduce the likelihood of debris run-off. (interceptor drains will not be

required at all areas as the existing drainage network can function as interceptor drains – silt fences will be installed upgradient of the peat and spoil management areas in these locations).

Post Mitigation Residual Effect: With the implementation of the prescribed mitigation measures the residual effect will be negative, slight, direct, likely, permanent effect on soils and subsoils due to disturbance and relocation within the Site.

Significance of Effects: For the reasons outlined above, no significant effects on peat and subsoils will occur.

8.6.2.3 Potential Effects from the Contamination of Soils/Bedrock by Leakages and Spillages of Hydrocarbons

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk at the Site. The accumulation of small spills of fuels and lubricants during routine plant use can also be a significant pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in localised significant effects (i.e. contamination of soils, subsoils and pollution of the underlying aquifer) on the geological and water environment, depending on where a spill may occur, *i.e* Proposed Wind Farm and Proposed Grid Connection.

Pathway: Infiltration into subsoil and underlying bedrock pore space.

Receptor: Soils, Subsoil and bedrock.

Pre-Mitigation Potential Effect: Negative, significant, direct, short-term, unlikely effect on soils, subsoils and bedrock. In the absence of mitigation measures, there is potential for localised significant effects on soils, subsoils and bedrock at the Site.

Proposed Mitigation Measures:

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Where possible, off-site refuelling will occur at a controlled fuelling station;
- On-site re-fuelling will be undertaken using a double skinned bowser or a refuelling truck with spill kits kept onboard;
- Only designated trained operatives will be authorised to refuel plant on-site;
- Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system;
- All fuel storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area;
- Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- The on-site substation will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose;
- All waste tar material arising from works on hard top roads will be removed off-site and taken to licensed waste facility; and,
- An emergency response plan for the construction phase to deal with accidental spillages is contained within the Construction and Environmental Management Plan (which is contained in Appendix 4-5).

Post Mitigation Residual Effect: With the implementation of the prescribed mitigation measures the residual effect will be a negative, imperceptible, direct, short-term, unlikely effect on soils, subsoils and bedrock.

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation, no significant effects on soils, subsoils and bedrock will occur.

8.6.2.4 Potential Effects from the Erosion of Exposed Subsoils and Peat During Construction of Infrastructure

Erosion of soils/subsoils by the pathways listed below, can have the effect of reducing the overall volume of soils/subsoils at the Site, with the potential for some eroded subsoils to reach watercourses, leading to water quality issues such as high turbidity. Erosion of soils/subsoils may occur at any works area where excavation is ongoing, i.e. turbine foundations, access tracks and felling areas within the Site.

The main impacts associated with this aspect is to the water environment, and therefore this aspect is further assessed in detail in Chapter 9.

Pathway: Vehicle movement, surface water and wind action.

Receptor: Soils and subsoils.

Pre-Mitigation Potential Effect: Negative, slight, direct, short-term, likely effect on soils and subsoils by erosion and wind action. In the absence of mitigation measures, there will be no potential for significant effects on soils and subsoils at the Site (erosion would be confined to small, disturbed working areas, would occur over a short time period and the peat soils at the Site are considered to be of low importance).

Proposed Mitigation Measures:

- Soils/subsoils removed from the turbine locations and associated access tracks will be used for landscaping, placed/spread locally alongside the excavation or will be stored in the designated peat and spoil management areas.
- Temporary drainage systems will be put in place to limit runoff impacts during the construction phase as per the drainage drawings included as Appendix 4-4.
- In forestry areas, brash mats will be used to support vehicles on soft ground, reducing soil erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting.

Post Mitigation Residual Effect: With the implementation of the prescribed mitigation measures the residual effect will be a negative, slight, direct, short-term, likely effect on subsoils by erosion and wind action.

Significance of Effects: For the reasons outlined above, no significant effects on soils or subsoils will occur.

8.6.2.5 Potential Effects from the Excavation of Rock from the Borrow Pit

The Proposed Project will involve the removal of soils/subsoils and the extraction of rock from the borrow pit. The excavated rock from the borrow pit will be used in the construction of the infrastructure elements (turbine bases, access tracks, etc.) at the Site, with the remainder of rock required being sourced from local licensed quarries. The stone requirements for the Proposed Project are 77,200 m^3 (54,000 m^3 for the Proposed Wind Farm and 23,200 m^3 for the Proposed Grid Connection). Rock will be extracted by 2 no. methods, either rock breaking or blasting as described in Chapter 4, Section 4.9.2. It is estimated that 16,000 m^3 of material will be excavated from the borrow pit.

Pathway: Extraction.

Receptor: Bedrock.

Potential Pre-mitigation Effect: Negative, irreversible, direct, moderate, likely, permanent effect on bedrock. In the absence of mitigation measures, there will be no potential for significant effects on bedrock (the volume of rock to be excavated is small in comparison to the total volume of rock which exists beneath the Site, the bedrock at the Site is not designated and is considered to be of medium importance).

Mitigation Measures / Impact Assessment:

Bedrock extraction will result in a direct impact on the local geological environment.

The proposed bedrock extraction is considered to be an acceptable and unavoidable part of the Proposed Project. However, the effects will be localised within the proposed extraction area.

Therefore, no specific mitigation measures in relation to excavation of bedrock are required.

The rock to be quarried at the Site is not notable from a geological heritage point of view.

Post Mitigation Residual Effects: While the bedrock which will be removed is considered to be of Medium Importance, these bedrock formations are also present outside of the Site within the local area. The residual effect is considered to be negative, irreversible, slight, direct, likely, permanent effect on bedrock.

Significance of Effects: For the reasons outlined above, no significant effects on the local bedrock will occur.

8.6.2.6 Erosion of Exposed Peat, Soils and Subsoils During Tree Felling

Tree felling is a component of the Proposed Project works, with ~0.7ha of felling of coniferous forestry proposed. In addition, there will be a permanent loss of 2.5ha of scrub and mosaics of scrub and a permanent loss of 1.256 km of linear vegetation.

During felling operations there is a high likelihood of erosion due to the distance of soils and subsoils associated with vehicle and plant movements. This also has associated potential effects on the water environment; and therefore, this aspect is assessed in further detail in Chapter 9 Water.

Pathway: Vehicle movement, surface water and wind action.

Receptor: Soils, subsoils and weathered bedrock.

Pre-Mitigation Potential Effect: Negative, slight, direct, permanent, likely effect on soils, subsoils and weathered bedrock due to felling operations. In the absence of mitigation measures, there will be no potential for significant effects on soils, subsoils and weathered bedrock at the Site (this is due to the low importance/sensitivity of the peat/soils and subsoils and the localised nature of the felling operations which are restricted to small areas within the Site).

Proposed Mitigation Measures:

All proposed felling works will be completed in accordance with the best practice Forest Service regulation, policies and strategic guidance documents as well as Coillte and Department of Agriculture, Food and the Marine (DAFM) guidance documents to ensure that felling results in minimal potential negative effects on the local soil and subsoil environment.

In addition, the following mitigation measures will be implemented during felling operations:

- Before any works are completed silt fences will be installed to limit the movement of entrained sediment in surface water runoff;
- The harvester and the forwarder are designed specifically for the forest environment and are low ground pressure machines;
- All machinery will be operated by suitably qualified personnel;
- These machines will traverse the Site along specified routes (referred to as racks);
- Brash mats will be placed on the racks to support the vehicles on soft ground, reducing mineral soil disturbance and erosion and avoiding the formation of rutted areas, in which surface water ponding can occur;

- As felling progresses, the harvester will collect brash produced by the felling and place it in front of the machine before it advances forward along the rack;
- The condition of the racks will be continually monitored and fresh brash will be applied when the brash mat becomes heavily used and worn, ensuring that the mat remains effective throughout the operational phase; and,
- The location of racks will be chosen to avoid wet and potentially sensitive areas.

Post Mitigation Residual Effect: With the implementation of the prescribed mitigation measures the residual effect will be a negative, imperceptible, direct, permanent, unlikely effect on soils, subsoils and weathered bedrock.

Significance of Effects: For the reasons outlined above, and with the implementation of the proposed mitigation measures, no significant effects on soils, subsoils or bedrock will occur.

8.6.2.7 Potential Effects on Geological Heritage Sites

The works proposed as part of the Proposed Project are remote from any geological heritage site (refer to Section 8.3.7).

There are no geological heritage sites mapped in the vicinity of the Site.

Potential effects on other designated sites including Special Areas of Conservation (SACs) and Special Protected Areas (SPAs) are assessed in Chapter 9.

Pathway: There is no pathway for effects between the Geological Heritage Sites and the Site.

Receptor: Geological Heritage Sites.

Pre-Mitigation Potential Effect: There is no potential for effects.

Residual Effects: There will be no residual effects on geological heritage sites as a result of the Proposed Project.

Significance of effects: No effects

8.6.2.8 Potential Effects from Peat Instability

Peat instability and failure are risks at the Site during the construction phase and are assessed herein.

A Geotechnical & Peat Stability Assessment was carried out for the main infrastructure elements at the Site. This approach takes into account guidelines for geotechnical/peat stability risk assessments as given in PLHRAG (2017) and MacCulloch (2005).

Peat instability or failure refers to a significant mass movement of a body of peat that would have an adverse impact on the Proposed Project and the surrounding environment. The potential significant effects of peat failure at the Site may result in:

- Death or injury to site personnel;
- Damage to machinery;
- Damage or loss of infrastructure;
- Drainage disruption by blockage of drainage pathway by relocated peat and spoil;
- Site works damaged or unstable;
- Contamination of watercourses, water supplies by particulates; and,
- Degradation of the peat environment.

However, the findings of the GPSA (FT, 2026), which involved analysis of 262 no. locations, showed that all Proposed Project infrastructure elements are located in areas of negligible risk as discussed in Section 8.3.10 above.

Notwithstanding the above, the management of peat stability and appropriate construction practices will be inherent in the construction phase of the Proposed Project to ensure peat failures do not occur on site.

Pathway: Vehicle movement and excavations.

Receptor: Peat and subsoils.

Pre-Mitigation Potential Effect: The findings of the GPSA (FT, 2026) showed that the Site has an acceptable margin of safety, is suitable for the Proposed Project and is considered to be at negligible to low risk of peat failure, allowing for a negative, slight, direct, permanent, unlikely effect on peat and subsoils. In the absence of mitigation measures, there will be no potential for significant effects on peat and subsoils at the Site.

Proposed Mitigation Measures:

Firstly, the key mitigation with regard peat stability risk at the Site was the carrying out of a robust, multidisciplinary site investigation and Geotechnical & Peat Stability Assessment. The extent and depth of ground investigation and peat stability analysis by FT has been undertaken following the principles in the Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (PLHRAG, 2nd Edition, Scottish Government, 2017).

The findings of the peat assessment, which involved analysis of 262 no. locations, showed that the Proposed Project development areas have an acceptable margin of safety and that the Site is suitable for the Proposed Project.

The GPSA (FT, 2026) provides a number of mitigation/control measures to reduce the potential risk of peat failure at each infrastructure location. Sections of access tracks to the nearest infrastructure element will be subject to the same mitigation/control measures that apply to the nearest infrastructure element. The required mitigation/control measures are shown below:

The following control measures incorporated into the construction phase will ensure the management of the risks for this site:

- Appointment of experienced and competent contractors;
- The Site will be supervised by experienced and qualified personnel;
- Allocate sufficient time for the Proposed Project construction programme (be aware that decreasing the construction time has the potential to increase the risk of initiating a localised peat movement);
- Prevent undercutting of slopes and unsupported excavations;
- A robust drainage system will be implemented as per the drainage drawings includes as Appendix 4-4;
- There will be no placement of loads/overburden on marginal ground;
- Implementation of safety buffers around deep peat areas as detailed in the GPSA (FT, 2026), with a construction buffer zone being proposed in the south east section of the Site (See Drawing P23-270-0600-0002 in Appendix 8-1). Please refer to Appendix 8-1 for details on the safety buffers.
- Ensure construction method statements are developed and agreed before commencement of construction and are followed by the contractor; and,
- Revise and amend the Construction Risk Register as construction progresses to ensure that risks are managed and controlled for the duration of the construction phase of the Proposed Project.

Post Mitigation Residual Effect Assessment: With the implementation of the control measures outlined above the residual effect will be a negative, imperceptible, direct, permanent, unlikely effect on peat and subsoils.

Significance of Effects: No significant effects on peat, soils and subsoils will occur due to peat instability.

8.6.2.9 Potential Effects from TDR Works

Accommodation works will be required at various locations on the road network between the port of arrival in Galway and the Site. Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large turbine components and associated vehicles seeking to access wind farm sites. The proposed transport route for the Proposed Project, is shown in Chapter 4, Figure 4-33. These areas and the proposed works are detailed in Chapter 4, Section 4.6.2.

No significant works are required along the TDR. To facilitate the transportation of turbine components off the L-55512 and onto the L-1519, minor accommodating works are required which involves the temporary stoning up of the verges. A similar degree of works will be required on the L-1505 where temporary widening of the eastern portion of the road and vegetation clearance will be required to provide the necessary clearance of the turbine delivery vehicle. All works are minor, temporary and have limited potential for effects.

Pathway: No significant works proposed.

Receptor: Soils and subsoils.

Pre-Mitigation Potential Effect: No potential for significant effects (due to the minor, localised and temporary nature of the works).

Post Mitigation Residual Effect: There will be no residual effects on soils and subsoils as a result of works along the proposed TDR.

Significance of effects: No effects.

8.6.2.10 Potential Effects from the Proposed Biodiversity Management and Enhancement Plan

BMEP works are proposed to offset the loss of habitats within the Site and to further enhance the biodiversity of the Site. The proposed works include planting and enhancement of 2.5 km of hedgerow/ treeline planting and 3.5ha of native woodland. It is also proposed to provide for the enhancement of an area of 1.16 ha of degraded Annex I Molinia meadow habitat and to safeguard maintain and monitor existing marsh fritillary breeding habitat.

Some of these proposals will disturb local peat, soils and subsoils deposits and increase the likelihood of erosion of peat, soils and subsoils. However, due to the largely non-invasive nature of the works the potential for effects on the soils and geological environment are limited. The works will have a positive effect on the land environment.

Pathway: Vehicle movement, restoration works, surface water and wind action.

Receptor: Land, peat/soils and subsoils.

Pre-Mitigation Potential Effect: Negative, direct, slight, likely effect on peat, soils and subsoils due to disturbance associated with proposed restoration works. Positive, slight, direct, permanent effect on the land at the Site. In the absence of mitigation measures, there will be no potential for significant effects on land, peat, soils and subsoils at the Site (due to minimal ground disturbance, the small-scale, localised and short-term nature of the works and the long-term stabilising benefits in terms of soil erosion control).

Proposed Mitigation Measures:

All proposed habitat management and enhancement works will be in accordance with the best practice Forest Service regulation, policies and strategic guidance documents as well as Coillte, DAFM and NatureScot guidance documents to ensure minimal potential negative effects on the local peat, soil and subsoil environment.

Given the nature of the restoration measures the following mitigation measures are proposed:

- Before any works are completed silt fences will be installed to limit the movement of entrained sediment in surface water runoff;
- All machinery operators will be experienced;
- The Site will be walked before machinery goes into areas proposed for habitat management;
- Bog mats will be used where the excavator is required to travel over wet ground; and,
- A low ground pressure excavator with wide tracks (1.9m or greater) will be used to reduce compaction of the peat and subsoils.

Post-Mitigation Residual Effect: With the implementation of mitigation measures outlined above the residual effect will be a negative, direct, imperceptible, likely effect on peat, subsoils and weathered bedrock. There will be a slight, positive, permanent effect on land within the Site.

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation measures, no significant effects on peat and subsoils.

8.6.3 Operational Phase - Likely Significant Effects and Mitigation Measures

There are very few potential direct effects envisaged during the operational phase of the Proposed Project. The potential effects may include:

- Some construction vehicles or plant may be necessary for maintenance at the Site which could result in minor accidental leaks or spills of fuel/oil;
- The transformer in the substation and transformers in each turbine are oil cooled. There is potential for spills / leaks of oils from this equipment resulting in contamination of soils and groundwater; and,
- In relation to indirect effects a small amount of granular material may be required to maintain access tracks during operation which will place intermittent minor demand on local quarries.

8.6.3.1 Potential Effects from Access Track Maintenance

In relation to indirect effects, a small amount of granular material will be required to maintain access tracks during operation which will place intermittent minor demand on local quarries.

Pathway: Reworking of access track surfaces.

Receptor: Peat, subsoil and bedrock.

Potential Pre-Mitigation Effect: Negative, indirect, imperceptible, short term, likely effect on peat, subsoil and bedrock. In the absence of mitigation measures, there will be no potential for significant effects on peat, soils, subsoils and bedrock at the Site (due to minimal disturbance and the localised nature of maintenance works).

Proposed Mitigation Measures:

- Use of aggregate from authorised quarries for use in road and hardstand maintenance.

Post-Mitigation Residual Effect: The residual effect will be a negative, imperceptible, indirect, short-term, unlikely effect on bedrock.

Significance of Effects: For the reasons outlined above, no significant effects on land, soils or geology will occur.

8.6.3.2 Site Vehicle/Plant Use

Plant and site vehicles used in site maintenance will be run on fuels and use hydraulic oils. Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to land, soils and associated ecosystems. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, and is persistent in the environment.

Pathway: Infiltration into peat, subsoil and bedrock pore space.

Receptor: Peat, subsoil and bedrock.

Potential Pre-Mitigation Effect: Negative, direct, slight, short term, unlikely effect on peat, subsoil and bedrock. In the absence of mitigation measures, there will be no potential for significant effects on peat, subsoils and bedrock at the Site (due to the small volumes of hydrocarbons and the low to medium importance/sensitivity of the receiving environment).

Proposed Mitigation Measures:

- Vehicles used during the operational phase will be refuelled off site before entering the site;
- No fuels will be stored on-site during the operational phase; and
- Spill kits will be available in all site vehicles to deal with an accidental spillage and breakdowns; and,
- An emergency plan for the operational phase to deal with accidental spillages and breakdowns will be contained in the CEMP (Appendix 4-5).

Post-Mitigation Residual Effect: With the implementation of the prescribed mitigation measures the residual effect will be a negative, imperceptible, direct, short-term, unlikely effect on peat, subsoils, and bedrock.

Significance of Effects: For the reasons outlined above, no likely significant effects on land, soils, subsoils or bedrock will occur.

8.6.3.3 Potential Effects from the Use of Oils in Transformers

The transformer in the proposed substation and transformers in each proposed turbine, are oil cooled. There is potential for spills / leaks of oils from this equipment resulting in contamination of soils and groundwater. Hydrocarbon has a high toxicity to humans, and all flora and fauna, and is persistent in the environment.

Pathway: Infiltration into peat, subsoil and bedrock pore space.

Receptor: Peat, subsoil and bedrock.

Potential Pre-Mitigation Effect: Negative, direct, slight, short term, unlikely effect on peat, subsoil and bedrock. In the absence of mitigation measures, there will be no potential for significant effects on peat, subsoils and bedrock at the Site (due to the small volumes of hydrocarbons and the low to medium importance/sensitivity of the receiving environment).

Proposed Mitigation Measures:

- All transformers and substation areas will be bunded to 110% of the volume of oil used in each transformer/substation;

- An emergency plan for the operational phase to deal with accidental spillages will be contained in the CEMP included as Appendix 4-5.

Post-Mitigation Residual Effect: With the implementation of the prescribed mitigation measures the residual effect will be a negative, imperceptible, direct, short-term, unlikely effect on peat, subsoils, and bedrock.

Significance of Effects: For the reasons outlined above, no likely significant effects on land, soils, subsoils or bedrock will occur.

8.6.4 Decommissioning Phase - Likely Significant Effects and Mitigation Measures

The proposed wind turbines as part of the Proposed Project are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Wind Farm may be decommissioned fully.

Upon decommissioning of the Proposed Wind Farm, the wind turbines and the meteorological mast would be disassembled in reverse order to how they were erected. All above ground turbine and mast components would be separated and removed off-site for recycling. Turbine and mast foundations would remain underground and would be covered with earth and allowed to revegetate. Leaving the foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant temporary environment disturbances such as noise, dust and/or vibration. Site access tracks will be used during the operational phase by farm machinery and therefore will be retained post decommissioning to facilitate these activities.

The underground electrical cabling connecting the turbines to the proposed 110kV substation will be removed from the cable ducts. The cabling will be pulled from the cable ducts using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at the original cable jointing pits which will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance. The cable materials will be transferred to a suitable recycling or recovery facility.

The Proposed Grid Connection underground electrical cabling and proposed 110kV substation will remain in place as it will be part of the Electricity Grid under the ownership and control of ESB Networks and Eirgrid.

A Decommissioning Plan has been prepared (Appendix 4-6). The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will agree with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Wind Farm has been fully assessed in the EIAR.

As noted in the Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the Proposed Wind Farm, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

> *"best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm".*

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant (i.e., mitigation outlined at Sections 8.6.2). Some of the effects will be avoided by leaving elements of the Proposed Project in place where appropriate, *i.e.* the 110kV substation and underground cabling. Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

No significant effects on the soils and geology environment are envisaged during the decommissioning stage of the Proposed Project.

8.6.5 Risk of Major Accidents and Disasters

Due to the nature of the Proposed Project, *i.e.* soft peat deposits, there is a risk of peat movement occurring. However, due to the generally flat nature of the Site, the risk is low.

A comprehensive GPSA (FT,2026) has been undertaken for all key infrastructure locations, and it concludes that with the implementation of the proposed control (mitigation) measures the residual effect of a landslide occurring is determined to be imperceptible. Refer to Appendix 8-1 for the detailed GPSA (FT, 2026) and Chapter 16: Major Accidents and Natural Disasters for a full assessment on risks relating to the Proposed Project.

8.6.6 Assessment of Human Health Effects

Potential human health effects arise mainly through the potential for soil and ground contamination. A wind farm or grid connection route is not typically associated with a significant source of soil, surface water, or groundwater pollution and so the potential for effects during the operational phase are negligible.

Hydrocarbons will be used onsite during construction and decommissioning however the volumes will be small in the context of the scale of the Proposed Project and will be handled and stored in accordance with best practice mitigation measures. The potential residual effects associated with soil or ground contamination and subsequent health effects are negligible.

Peat failure has also the potential to affect human health, but this would likely require a catastrophic failure to occur. The residual risk of significant peat slide/failure occurring is determined to be negligible to low following the implementation of the proposed control (mitigation) measures.

8.6.7 Cumulative Effects

Due to the localised nature of the proposed construction works which will be kept within the Site, there is no potential for significant cumulative effects in-combination with other local developments on the land, soils and geology environment as all effects are direct within the Site. Other existing, proposed or permitted projects outside the Site do not have the potential to reduce or increase the magnitude of effects of the Proposed Project on Land, Soils and Geology.

The only potential cumulative effects are associated with those activities which are currently ongoing at the Site including turbary peat cutting and private forestry. However, the cumulative effects of the Proposed Project in combination with the turbary activities and the forestry operations on the land, soils and geological environment are not considered to be significant given the small footprint of the Proposed Project and following the implementation of the mitigation measures prescribed in this chapter.

The only way the Proposed Project can have cumulative effects with other off-site projects and plans is via the drainage and off-site surface water network, and this hydrological pathway is assessed in Chapter 9. The construction of the Proposed Grid Connection works will only require relatively localised excavation works within the Site and therefore will not contribute to any significant cumulative effects.

8.6.8 Post Construction Monitoring

None required.

8.7 EIA Classification Summary

Please see Table 8-13 for a summary of all identified effects for the Proposed Project relating to land, soils and geology.

Table 8-13 EIA Classification summary

Topic	Pre-Mitigation Effect	Mitigation Section Reference	Residual Effect	Significance
Construction Phase				
Land and Land-Take	Negative, slight, direct, permanent, likely	Section 8.6.2.1	Negative, slight, direct, permanent, likely	Not Significant
Peat and Subsoil Excavation	Negative, moderate, direct, likely, permanent	Section 8.6.2.2	Negative, slight, direct, likely, permanent,	Not Significant
Contamination of Soils/Bedrock by Leakages and Spillages of Hydrocarbons	Negative, significant, direct, short-term, unlikely	Section 8.6.2.3	Negative, imperceptible, direct, short-term, unlikely	Not Significant
Erosion of Exposed Subsoils and Peat During Construction of Infrastructure	Negative, slight, direct, short-term, likely	Section 8.6.2.4	Negative, slight, direct, short-term, likely	Not Significant
Excavation of Rock from the Borrow Pit	Negative, irreversible, direct, moderate, likely, permanent	Section 8.6.2.5	Negative, irreversible, direct, slight, likely, permanent	Not Significant
Erosion of Exposed Peat, Soils and Subsoils During Tree Felling	Negative, slight, direct, permanent, likely	Section 8.6.2.6	Negative, imperceptible, direct, permanent, unlikely	Not Significant
Geological Heritage Sites	No effect	N/A	No effect	Not Significant
Peat Instability	Negative, slight, direct, permanent, unlikely	Section 8.6.2.8	Negative, imperceptible, direct, permanent, unlikely	Not Significant
Turbine Delivery Route	No effect	N/A	No effect	Not Significant

Proposed Biodiversity Management and Enhancement Plan	Subsoils: Negative, direct, slight, likely Land: Positive, slight, direct, permanent	Section 8.6.2.10	Subsoils: Negative, direct, imperceptible, likely Land: Slight, positive, permanent	Not Significant
Operational Phase				
Access Track Maintenance	Negative, indirect, imperceptible, short term, likely	Section 8.6.3.1	Negative, imperceptible, indirect, short-term, unlikely	Not Significant
Site Vehicle / Plant Use	Negative, direct, slight, short term, unlikely effect	Section 8.6.3.2	Negative, direct imperceptible, short-term, unlikely	Not Significant
Use of Oil in Transformers	Negative, direct, slight, short term, unlikely	Section 8.6.3.3	Negative, imperceptible, direct, short-term, unlikely	Not Significant
Decommissioning Phase				
Land Soils and Geology	The potential effects associated with decommissioning of the Proposed Project will be similar to those associated with construction but of reduced magnitude.	N/A	N/A	Not Significant