22. LAND, SOILS AND GEOLOGY

22.1 Introduction

22.1.1 Background and Objectives

Hydro-Environmental Services (HES) was engaged by MKO to carry out an assessment of the potential likely significant effects of the Sceirde Rocks Offshore Wind Farm on the Land, Soils and Geology aspects of the receiving environment.

The Project is described in full in Chapter 5 of this EIAR.

This chapter provides a baseline assessment of the environmental setting of the onshore components of the Project (i.e. the Onshore Site), as described in Chapter 5, in terms of land, soils and geology and discusses the potential likely significant effects and cumulative effects that the construction, operation and maintenance, and decommissioning of the Onshore Site will have. Where required, appropriate mitigation measures to avoid any identified significant effects to land, soils and geology are recommended and the residual effects of the Onshore Site post-mitigation are assessed.

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: the 'Project', the 'Onshore Site', the 'Onshore Grid Connection', the 'Onshore Compensation Compound' and the 'Onshore Landfall Location'.

22.1.2 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 and Conor McGettigan.

Michael Gill P.Geo (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous land, soils and geology impact assessments of wind farms (and associated grid connections) and renewable projects in Ireland. In addition, he has substantial experience on projects with large earthworks and also with quarrying projects. For example, Michael has worked on the EIARs for Coole WF, Oweninny WF, Cloncreen WF, and Yellow River WF, and over 100 other wind farm related projects across the country.

Conor McGettigan (BSc, MSc) is an Environmental Scientist with over 4 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 wind farm development and associated grid connections and electrical infrastructure.

22.1.3 Relevant Legislation

The EIAR is 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 as amended by Directive 2014/52/EU (the 'EIA Directive'). The requirements of the following legislation are complied with:

- Planning and Development Act, 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;
- S.I. No. 296 of2018 European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018; and,
- The Heritage Act 1995 and 2018.

22.1.4 Relevant Guidance

The Land, Soils and Geology chapter of this EIAR was prepared in compliance with 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 An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018); and,
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017).

22.2 Assessment Methodology

22.2.1 Desk Study

A desk study of the Onshore Site was completed in the Summer of 2023 to collect all relevant geological data for the Onshore Site and the surrounding area. The desk study was completed to supplement site walkover surveys and site investigations. The desk study information has been checked and updated, where necessary, in April 2024.

The desk study included consultation with the following data sources:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland – Geological Databases (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 17 (Geology of the Shannon Estuary);
- Geological Survey of Ireland (GSI, 2005);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets;
- Teagasc Soil Map of Ireland (www.gsi.ie); and,
- Aerial Photography, 1:5000 and 6 inch base mapping.

22.2.2 Baseline Monitoring and Site Investigations

Site walkover surveys of the Onshore Site were undertaken by Michael Gill and Conor McGettigan of HES (refer to Section 22.1.2 above for qualifications and experience) on 19th July and 15th August 2023. These site walkover surveys were supplemented by site investigations completed by MKO, Minerex Geophysics Ltd and Irish Drilling Limited (IDL) between November 2022 and July 2024. The combined geological and hydrogeological dataset collated by HES, MKO, Minerex Geophysics Ltd and IDL has been used in the preparation of this EIAR Chapter.

The objectives of the intrusive site investigations included mapping the distribution and depth of peat at the Onshore Site along with assessing the mineral subsoil / bedrock conditions beneath the peat at key locations (i.e. refer to Chapter 5 for a description of the components of the Onshore Site). This data was used to inform the final layout design.

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

- A total of 41 no. peat probes were carried out by MKO in November 2023 to determine the depth and geomorphology of the peat along sections of the OGC which cross peatlands;
- IDL completed a total of 390 no. peat probes and 132 no. in-situ shear vane tests along the OGC between February and April 2024. The results of these site investigations are included as Appendix 5-13;
- Minerex Geophysics Ltd completed a geophysical survey consisting of 2D-Resistivity and seismic refraction surveying along the OGC along the R20301 in Doonmore, Co. Clare on 18th and 19th June 2024. The investigation was completed in order to determine the depth and type of glacial deposits which underlie the peat and the depth to rock;
- IDL completed a total of 12 no. hand augers (peat probes) along the OGC on 18th and 19th June 2024 to investigate the depths of peat and nature of the subsoils;
- IDL completed site investigations at the Onshore Landfall Location (OLL) between 21st and 28th November 2022. These site investigations comprised of the excavation of 2 no. trial pits and the drilling of 2 no. boreholes to investigate the nature of the mineral soil and subsoils and the underlying bedrock at the OLL;
- IDL excavated 3 no. trial pits at the Onshore Compensation Compound (OCC) on 3rd July 2024;
- Laboratory testing was completed on representative samples recovered from the boreholes and trial pits;
- HES also completed a visual assessment of exposed soils, subsoil and bedrock and topographic changes at the Onshore Site;
- Logging of subsoil exposures across the site where mineral soils and peat profiles are exposed; and,
- Mineral subsoils and peat were logged according to BS: 5930 and Von Post Scale respectively.

The Minerex Geophysics Ltd 'Peatland Geophysical Report' (July 2024) is included as Appendix 5-13. IDL's 'Sceirde Rocks Cable Route Phase 2: Site Investigation Factual Report' (July 2024) is included as Appendix 5-13. IDL's 'Sceirde Rocks Landfall: Factual Report' (February 2023) which details the site investigation works completed at the OLL is included as Appendix 5-12.

22.2.3 Scoping and Consultation

The scope for this assessment has been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties as summarised in Section 2.7 of Chapter 2 of the EIAR.

A consultation response relating to the land, soils and geological environment was received from Geological Survey Ireland (GSI) and the Irish Peatland Conservation Council (IPCC). This response encouraged the use of the online geological databases available at www.gsi.ie. These geological databases have been used in the characterisation of the baseline receiving environment in Section 22.3. The Irish Peatland Conservation Council (IPCC) also provided a scoping response. The key points from these scoping responses which relate to the onshore land, soils and geological environment are summarised in Table 22-1 below.

Table 22-1: Summary of Scoping Responses

Consultee	Description	Addressed in Section
GSI	The GSI recommend the use of their online databases.	All available and relevant GSI databases have been used in the preparation of this chapter.
	Geological Heritage – the GSI note the following County Geological Heritage Sites in the vicinity on the Onshore Site: › Spanish Point › Roevehagh M18 Road Cuts › Rahasane Turlough › Caherateemore M17 Road Cut	Geological Heritage Sites in the vicinity of the Onshore Site are detailed in Section 22.3.8
IPCC	IPCC advise that any construction in, or within close proximity to peatland habitat, should be familiar with the EPA funded Bogland Project which recommends best practice guidelines to ensure no damaging development occurs on, or affects peat soils.	All works associated with peat will be completed in accordance with best practice measures as detailed in Section 22.5.2.2.
	IPCC note that the site is in an area rich in recognised and designated conservation sites.	All designated sites in the vicinity of the Onshore Site are detailed in Section 22.3.9. The potential effects of the Onshore Site on the land, soils and geological characteristics of these designated sites are assessed in Section 22.5.2.6.

22.2.4 Impact Assessment Methodology

Using information from the desk study and data from the site investigations, an assessment of the importance of the soil and geological environment within the Onshore Site is assessed using the criteria set out in Table 22-2 (National Roads Authority, 2008).

Table 22-2 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	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit.

Importance	Criteria	Typical Example
	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.	Proven economically extractable mineral resource
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.

Following the characterisation of the importance of the baseline land, soils and geological environment and the identification of the potential receptors an assessment of the potential effects is completed. The assessment of effects is Stage 6 of 7 of the information which must be included in an EIAR (EPA, 2022). 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 effected), 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 environmental impact assessment report are those set out in the EPA (2022) glossary of effects as shown in Chapter 4 of this EIAR.

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 22-3.

Table 22-3: 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 SAC. › 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 SAC / 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 (by 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 SAC / 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.

22.2.5 Study Area

This chapter of the EIAR assesses the onshore elements of the Project (i.e. the Onshore Site), therefore the study area for the land, soils and geological environment is the area delineated by the Onshore EIAR Site Boundary. There is no potential for the Onshore Site to affect the land, soils and geological environment outside of the Onshore EIAR Site Boundary as all works will be located within this area. The EIAR Site Boundary is shown in Figure 1-1 in Chapter 1.

22.2.6 Consideration of Data Sources and Quality

No limitations or difficulties were encountered during the preparation of the Land, Soils and Geology Chapter of the EIAR.

22.3 Existing Environment

22.3.1 Onshore Site Description and Topography

The Onshore Site includes the Onshore Landfall Location (OLL), the Onshore Grid Connection (OGC) and the Onshore Compensation Compound (OCC). The locations of these elements of the Onshore Site are shown on Figure 5-9 of Chapter 5. The Onshore Site also includes 3 no. temporary construction compounds. These will be located at the OLL, the OCC and a third construction compound is proposed within Kilrush Golf Club in an existing car park.

22.3.1.1 Onshore Landfall Location

The OLL is located in the townland of Killard, approximately 1km northwest of White Strand and approximately 3.5km northwest of the village of Doonbeg in west County Clare. This is the location where the Offshore Export Cable (OEC) will be brought ashore to meet the Transition Joint Bay (TJB). The OLL stands at an elevation of approximately 10 metres above Ordnance Datum (mOD). The proposed TJB at the OLL is situated approximately 115m from the cliff edge. This area can be accessed from an unnamed local road which runs from northwest to southeast, approximately 220m southeast of the proposed temporary construction compound location. The site of the OLL is currently a greenfield site comprising of agricultural land.

22.3.1.2 Onshore Grid Connection

The OGC has a total length of 22.3km and is divided into 2 no. sections. The first section extends from the TJB at the OLL to the OCC in the townland of Ballymacrinan, and has a total length of 19.3km. The second section extends from the OCC to Moneypoint 220kV Substation and has a total length of 3km. The OGC comprises an underground cable connection which will travel along third-party lands and the local public road network. The local topography is relatively flat to gently undulating with elevations ranging from approximately 5mOD to 55mOD.

Upon exiting the TJB at the OLL, the OGC travels to the south along local roads and third-party lands before crossing the N67 in the townland of Doonmore. The route then continues to the southeast along the L2034 for 6.7km before travelling east, along local roads and 3rd party lands before crossing the R483. From here the cables will be routed through Kilrush Golf Club in the townlands of Ballykett and Parknamoney. After exiting Kilrush Golf Club, the OGC will then travel across the road into third-party lands, travelling south for 660m before entering onto the L6150 and continuing to the southeast as far as the 220kV OCC in the townland of Ballymacrinan.

Upon exiting the OCC, the OGC cable continues to the south for 750m on the local road network before it joins the N67. From here, it travels 1.7km east in the verge of the N67 in the vicinity of Moneypoint 220kV Substation. Approximately 1.9km of the OGC is located in ESB lands which include some vegetated areas in the townland of Carrowdotia South. Local ground elevations along this section of the OGC range from approximately 5 to 25mOD. The vast majority of the OGC will be located in the existing public road corridor (14.8km from the TJB at the OLL to the OCC, and 0.7km from the OCC to Moneypoint 220kV Substation). The section between the OCC and Moneypoint 220kV Substation is located within the road verge along the N67. Meanwhile, 6.1km of the OGC is located in 3rd party lands.

An overview of both sections of the OGC (from the TJB at the OLL to the OCC, and from the OCC to Moneypoint 220kV Substation) the length of the sections within the public road, third-party lands, and the total length of each route is provided in Table 22-4 below.

Table 22-4 Onshore Grid Connection Sections

Cable Route Section	Public Roadway	Road Verge	Third-Party Lands	Total Length
Section A (Landfall to OCC)	14.8 km	—	4.5 km	19.3km
Section B (OCC to Moneypoint 220kV Substation)	0.7km	0.7km	1.6 km	3.0 km
Total				**22.3km**

22.3.1.3 Onshore Compensation Compound

The OCC is located within the townland of Ballymacrinan, approximately 3.5km to the southeast of the town of Kilrush. The site of the proposed OCC can be accessed via the L6150, situated to the east. The local ground elevations stand at ~20mOD. The Lower Shannon Estuary is located ~700m to the south. The site on which the OCC is located is currently a greenfield site in agricultural use.

22.3.2 Land and Land Use

According to Corine land cover mapping (2018) (www.epa.ie), the vast majority of the Onshore Site (including the OLL, much of the OGC and the OCC) is mapped in 'agricultural pastures'.

Due to the linear nature of the OGC several additional land classifications are mapped by Corine as follows:

- A local road which extends to the southeast from the N67 is mapped in areas of 'peat bogs' and 'agricultural land with significant areas of natural vegetation' in the townlands of Doonmore and Carrowmore South.
- The OGC then passes through a large area of 'agricultural land with significant areas of natural vegetation' along the L2034.
- 'Sports and leisure facilities' are mapped in the townland of Ballykett, corresponding to the location of Kilrush Golf Club.
- The southern section is mapped largely in 'agricultural pastures' with some 'mixed forests' mapped in the townlands of Feagarroge and Kilcarroll.
- In the vicinity of the OCC, the OGC is located in 'agricultural pastures'.
- Further south, the N67 is mapped within 'industrial land' in the townland of Carrowdotia North.
- To the east, the N67 and the off-road section are mapped in 'broad-leaved forests'.
- Meanwhile, the existing Moneypoint 220kV Substation is mapped as 'commercial and industrial units'.

HES completed site walkover surveys of the Onshore Site and verified the above land uses. It is noted that the OGC is largely located in the carriageway of the existing public road network, with some sections within the roadside verge and some sections in 3rd party lands.

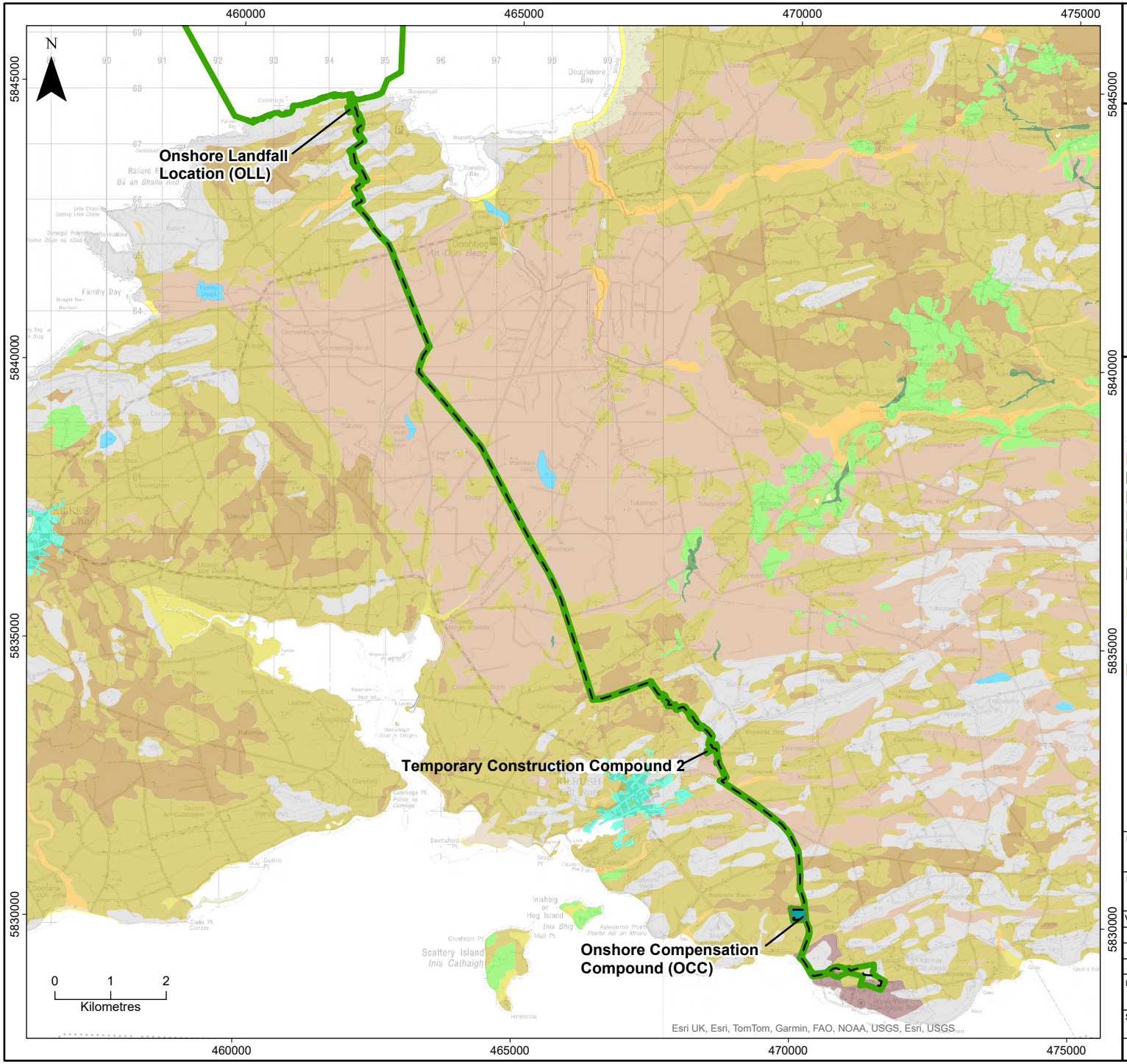
Based on site walkover surveys and the inspection of recent aerial imagery, the land along the off-road sections is described as follows:

- The off-road sections of the OGC in the townlands of Killard, Doonmore and Durrah are located on agricultural pastures whilst, the off-road section in the townlands of Ballykett and Parknamoney are located within the Kilrush Golf Club and along a small existing track.
- The off-road section located immediately to the north of Moneypoint 220kV Substation is located in forestry.
- It is also noted that approximately 700m of the OGC along the N67 is located in the roadside verge.

22.3.3 Soils and Subsoils

In summary, the published Teagasc soil mapping (www.gsi.ie) shows that the Onshore Site is overlain predominantly by acidic poorly drained mineral soils and peat. Furthermore, the published GSI subsoils map (www.gsi.ie) shows that the majority of the Onshore Site is underlain by till derived from Namurian sandstones and shales with some peat. The local GSI subsoils map for the local area is shown on Figure 22-1.

For ease of reporting, the subsequent paragraphs detail the mapped soils and subsoils at each of the individual components of the Onshore Site. The following paragraphs also present the results of any site investigations completed as part of the baseline assessment.



SCEIRDE ROCKS WINDFARM

Feirm Ghaoithe Charraigeacha Sceirde

LEGEND

- EIAR Site Boundary
- Onshore Grid Connection (OGC)
- OCC Location

Subsoils

- A, Alluvium
- AcEsk, Eskers comprised of gravels of acidic reaction
- BktPt, Blanket Peat
- Cut, Cut over raised peat
- Embankment
- GNSSs, Gravels derived from Namurian sandstones and shales
- Industrial
- L, Lacustrine sediments
- Mbs, Marine beach sands
- Mesc, Esturine silts and clays
- Rck, Bedrock outcrop or subcrop
- TNSSs, Till derived from Namurian sandstones and shales
- Urban
- Water
- Ws, Windblown sands
- Wsd, Windblown sands and dunes

PROJECT TITLE

Sceirde Rocks

MAP TITLE

Local Subsoils Map

VER	REMARKS	DATE	Drawn	Approved
1	First Issue	04/12/2024	GA	MG

DRAWING NO

Figure 22-1

SCALE	PAPER SIZE	DATUM	PROJECTION
1:100,000	A4	IRENET95	Transverse Mercator

22.3.3.1 Onshore Landfall Location

The published Teagasc soil mapping (www.gsi.ie) shows that the OLL, including the proposed location of the temporary construction compound and TJB, is predominantly overlain by mainly acidic poorly drained mineral soils, with some acidic shallow poorly drained mineral soils.

The GSI subsoils map (www.gsi.ie) shows that the OLL is predominantly underlain by till derived from Namurian sandstones and shales. The GSI also record the presence of some bedrock outcrop or subcrop in the northeast and south of the OLL.

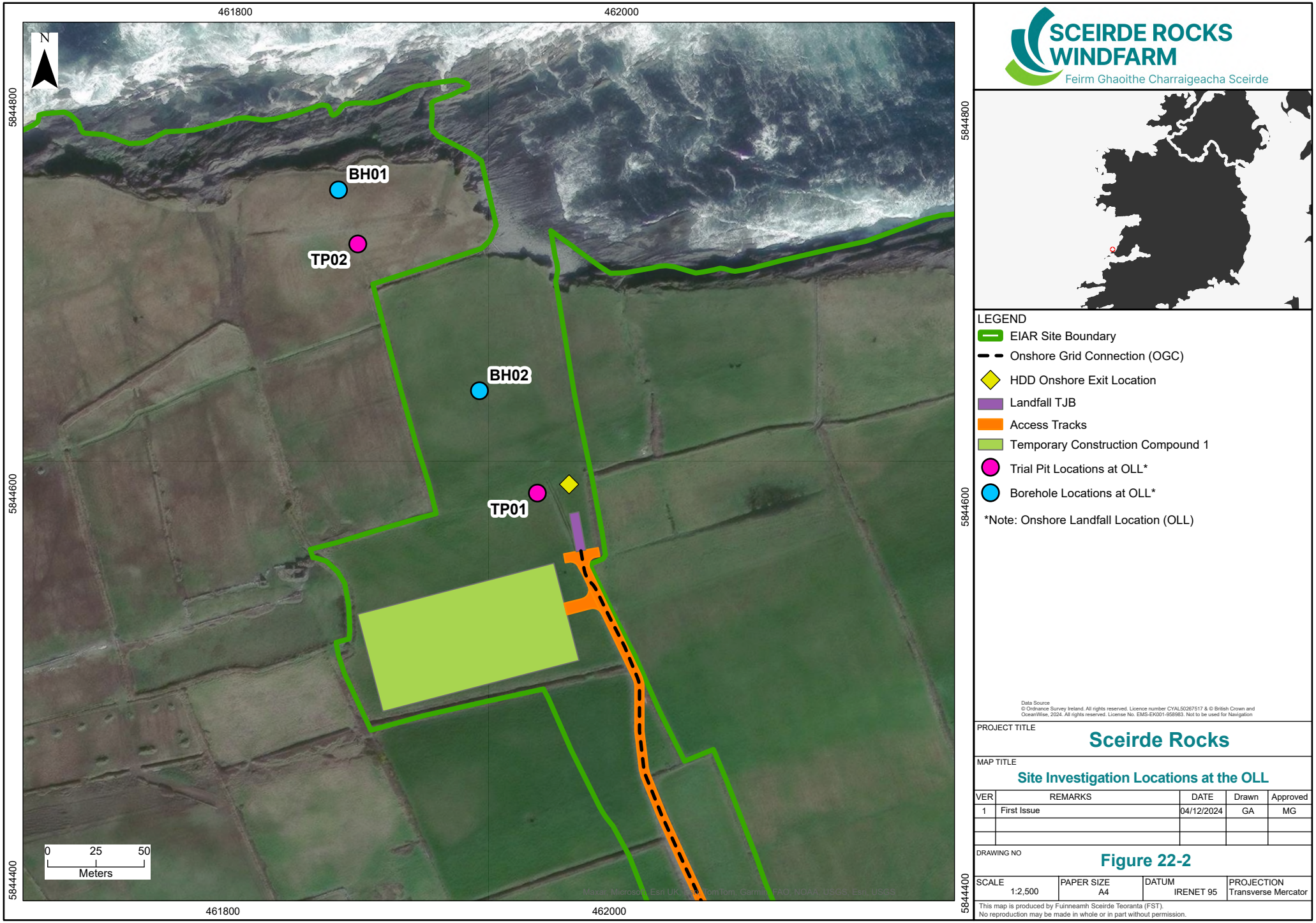
IDL completed site investigation at the OLL between 21st and 28th November 2022. These site investigations comprised of the excavation of 2 no. trial pits, the drilling of 2 no. boreholes and laboratory testing of recovered soil samples. The full logs and laboratory results are included in Appendix 5-13 and the locations of the site investigations are shown in Figure 22-2.

The results of the trial pits excavations are summarised as follows:

- The trial pits extended to depths of 0.9 at TP01 to 1.7mbgl (metres below ground level) at TP02.
- The OLL was found to be overlain by a dark brown gravelly SILT topsoil which was 0.2 to 0.3m in thickness.
- The topsoil is underlain by firm, grey, slightly sandy SILT with low cobble and boulder content.
- A firm, grey-orange slightly gravelly slightly sandy organic SILT with medium cobble content was recorded at a depth of 1.2mbgl in TP02.
- Both trial pits were terminated due to obstructions – recorded on the logs as rock.

The 2 no. boreholes confirmed the thickness of overburden at the OLL. BH01 encountered weathered rock at a depth of 1.7mbgl which was overlain by soft orangish brown SILT. Meanwhile, BH02 encountered weathered rock at a depth of 1.8mbgl which was overlain by 0.1m of GRAVEL which was in turn overlain by sandy SILT.

The site investigation data is consistent with the GSI mapped soils and subsoils at the OLL.


461800
462000
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Maxar, Microsoft, Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, USGS
SCEIRDE ROCKS WINDFARM
Feirm Ghaoithe Charraigeacha Sceirde
LEGEND
EIAR Site Boundary
Onshore Grid Connection (OGC)
HDD Onshore Exit Location
Landfall TJB
Access Tracks
Temporary Construction Compound 1
Trial Pit Locations at OLL*
Borehole Locations at OLL*
*Note: Onshore Landfall Location (OLL)
Data Source
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517 & © British Crown and OceanWise, 2024. All rights reserved. License No. EMS-EK001-958983. Not to be used for Navigation
PROJECT TITLE
Sceirde Rocks
MAP TITLE
Site Investigation Locations at the OLL
VER | REMARKS | DATE | Drawn | Approved
1 | First Issue | 04/12/2024 | GA | MG
DRAWING NO
Figure 22-2
SCALE 1:2,500 | PAPER SIZE A4 | DATUM IRENET 95 | PROJECTION Transverse Mercator
This map is produced by Fuinneamh Sceirde Teoranta (FST).
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22.3.3.2 Onshore Grid Connection

According to Teagasc soil mapping (www.gsi.ie), the northern section of the OGC, as far south as the N67, is overlain by acidic poorly drained mineral soils, with some shallow and some deep poorly drained mineral soils. Some mineral alluvium is also mapped along the boundary between the townlands of Killard and Doonmore, corresponding to the location of the EPA mapped Caherlean stream. To the south of the N67, a large section of the OGC, to the townland of Moanmore Upper, is overlain by cutover peat, with small pockets of acidic poorly drained mineral soils. The remainder of the OGC is also overlain by a mosaic of the above soil types with additional soil types including some areas of blanket peat and made ground (predominantly in the vicinity of the N67 and Moneypoint 220kV Substation).

The GSI subsoils map (www.gsi.ie) shows that the OGC is underlain largely by till derived from Namurian sandstones and shales and cut over raised peat. The most extensive deposits of peat are found to the south of the N67 in the townlands of Doonmore, Carrowmore South, Einagh, Monamore Upper and Moanmore North. Areas of bedrock outcrop are also mapped to the north of the N67 in the townlands of Killard and Doonmore and to the east and southeast of Kilrush town, in the townlands of Parknamoney, Dysert, Kilcarroll and Clooneylissaun. Other subsoils mapped along the OGC include mineral alluvium, which is mapped along the EPA mapped Caherlean Stream which marks the boundary between the townlands of Killard and Doonmore in the north. Alluvium is also mapped along the EPA mapped Wood stream between the townlands of Parknamoney and Kilcarroll. Meanwhile, industrial deposits are mapped along some areas of the N67 and in the vicinity of Moneypoint 220kV Substation.

Site investigations have been completed along the L20301 in Doonmore, Co. Clare as this section of the OGC runs through peatlands. The site investigations were designed to determine the peat depth and the depth and type of glacial deposits which underlie the peat. It is noted that this section of local road rests about 1-2m higher than the surrounding areas due to the road construction materials.

The initial site investigations in this area were completed by MKO on 9th November 2023. These investigations comprised of 41 no. peat probes to verify the peat thickness and morphology. These peat probe investigations revealed that, where present, peat ranged from 0.05 to 1.2m thick. A total of 31 no. probes (75% of all MKO peat probes) encountered peat depths of less than 0.5m. Only 9 no. MKO probes encountered peat depths of between 0.5 and 1m and only 1 probe encountered peat in excess of 1m deep.

2 no. phases of additional site investigations were completed in the areas where peat is present along the OGC. Phase 1 was completed by IDL between February and April 2024 and included the completion of 399 no. peat probes and in-situ shear vane testing at 132 no. probe locations. Peat depths ranged from 0.02 to 4.4mbgl. The full results of IDL's Phase 1 site investigations are presented in Appendix 5-13.

Phase 2 site investigations were completed on the 18th and 19th June 2024. These site investigations comprised of geophysical surveys and hand augers and the full results are presented in Appendix 5-13. IDL completed 12 no. hand augers adjacent to the L20301 which extended to a maximum depth of 4.9mbgl. PEAT was encountered at 10 no. auger locations and ranged in thickness from 1.1 to 4.3m. The peat was found to be typically underlain by soft blue CLAY. Possible gravelly clay was noted at a depth of 4.9m at HA08. No peat was recorded at HA11 or HA12 in the southeast of the area subject to these investigations.

A peat depth distribution plot of the combined MKO peat probes and the targeted IDL hand augers is included as Figure 22-3.

The hand augers completed by IDL were used to calibrate the results of the geophysical surveys undertaken by Minerex Geophysics Ltd. The geophysical surveys showed that peat is not present in the southeast of this study area (to chainage 310). Elsewhere, beneath the road materials and/or peat the

geophysical survey interprets the presence of firm sandy gravelly clay and silt with some clayey silty sand and gravel. Rock is interpreted to be shallowest (2.5-7.5mbgl) in the southeast of this area and in excess of 12m from chainage 420 onwards.

The location of the site investigations along the OGC are shown in Figure 22-4.

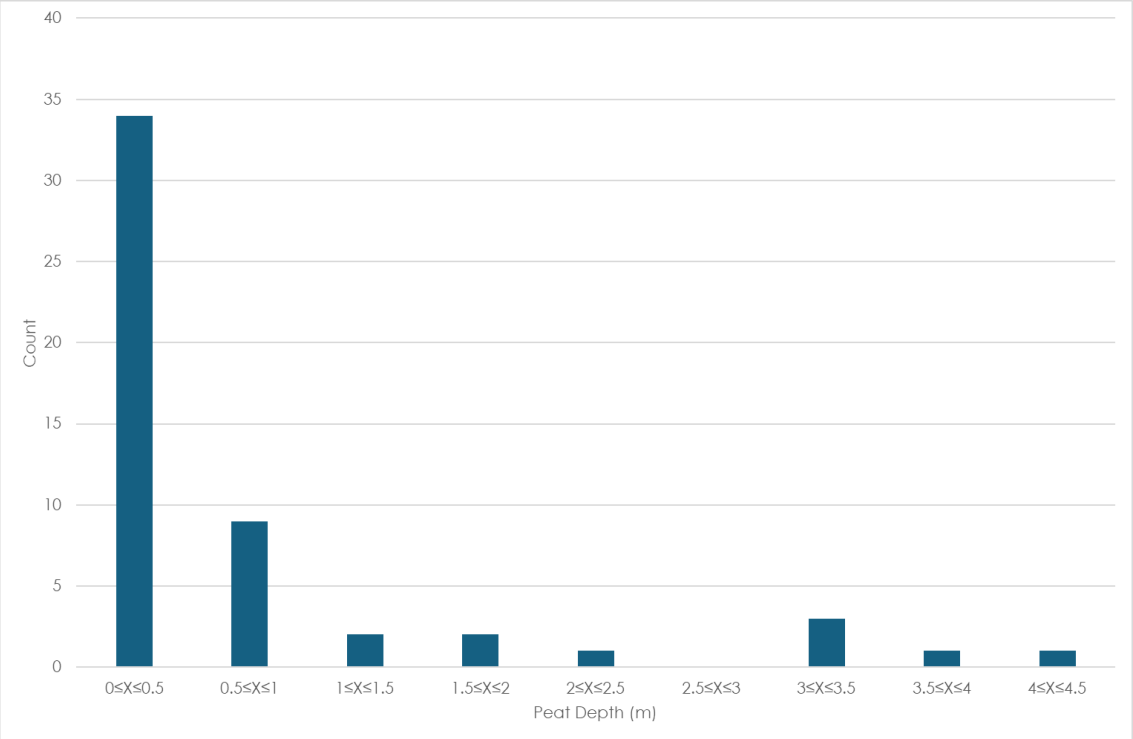
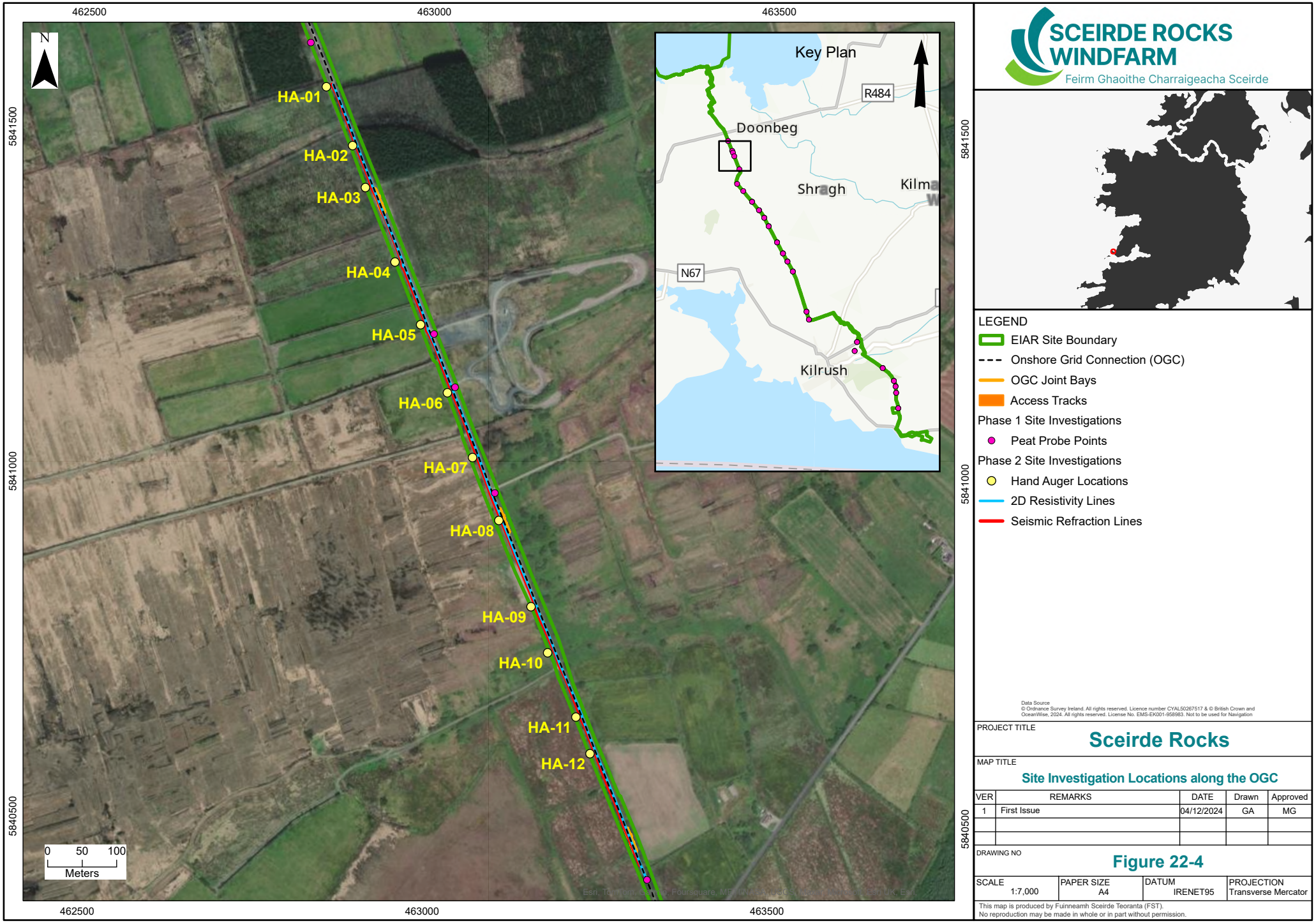


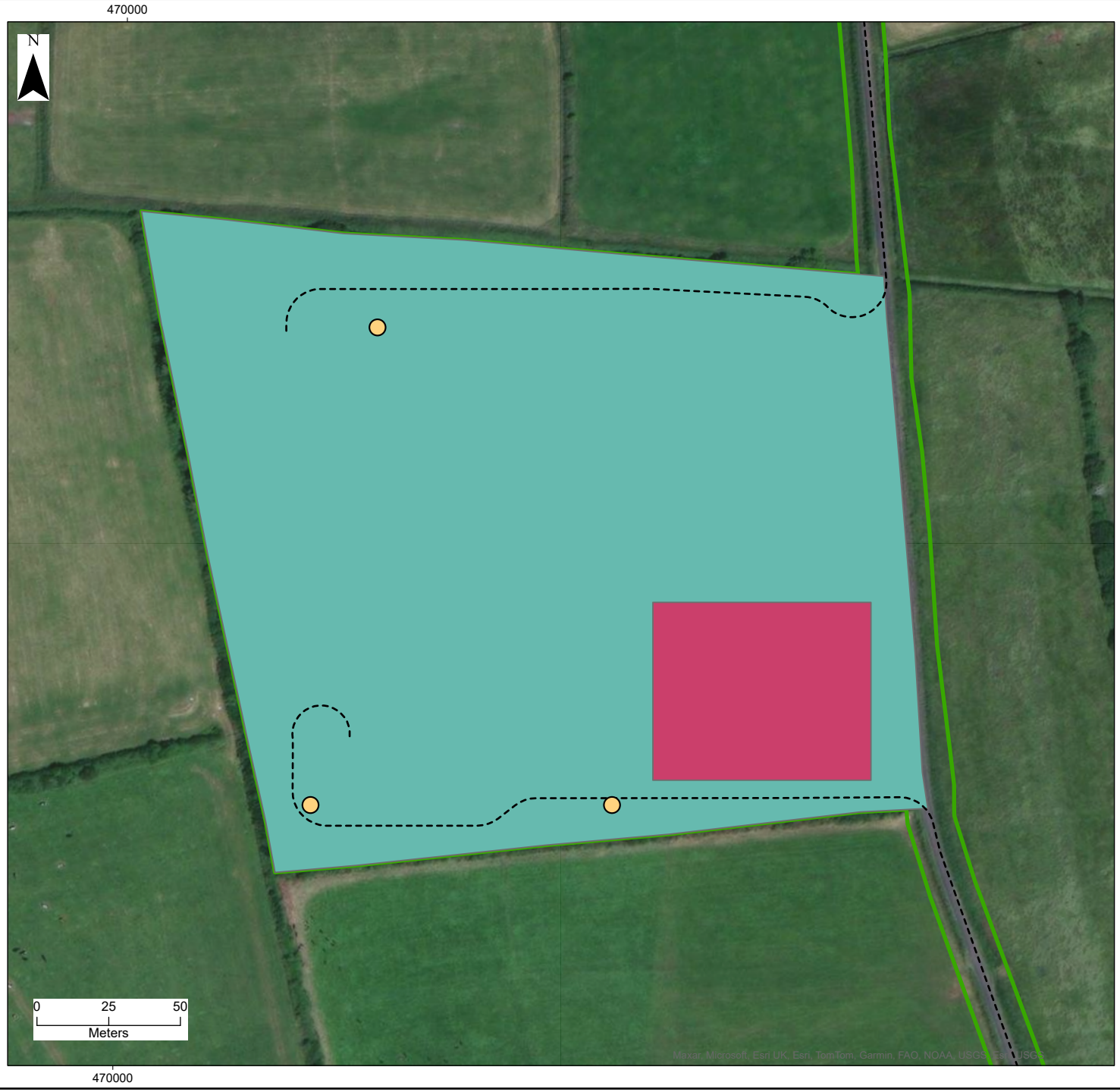
Figure 22-3: Peat Depth Distribution Plot (Onshore Grid Connection – combined MKO and IDL dataset)



22.3.3.3 Onshore Compensation Compound

According to Teagasc soil mapping (www.gsi.ie), the OCC is overlain by acidic poorly drained mineral soils in the south and blanket peat in the north. The GSI subsoils map (www.gsie) shows that the OCC is underlain by till derived from Namurian sandstones and shales in the south and blanket peat in the north.

The soils/subsoils present at the OCC have been confirmed by the excavation of 3 no. trial pits by IDL on 3rd July 2024. The trial pits extended to depths of 2.7 to 3mbgl. The ground conditions encountered during the site investigations were as expected and comprises of predominantly peat and/or silt overlying glacial tills. Peat was only encountered in 2 no. trial pits and extended to a maximum depth of 0.25m. The glacial tills were described as slightly sandy gravelly SILT/CLAY with cobbles and boulders. The locations of these site investigation points are shown in Figure 22-5.



SCEIRDE ROCKS WINDFARM

Feirm Ghaoithe Charraigeacha Sceirde

LEGEND

- EIAR Site Boundary
- Onshore Grid Connection (OGC)
- OCC* Location
- Temporary Construction Compound 3
- Trial Pits Locations at the OCC*

*Note: Onshore Compensation Compound (OCC)

PROJECT TITLE

Sceirde Rocks

MAP TITLE

Site Investigation Locations at the OCC

VER	REMARKS	DATE	Drawn	Approved
1	First Issue	04/12/2024	GA	MG

DRAWING NO

Figure 22-5

SCALE	PAPER SIZE	DATUM	PROJECTION
1:2,000	A4	IRENET95	Transverse Mercator

22.3.4 Bedrock Geology

Based on the GSI bedrock mapping (www.gsi.ie), the OLL and the majority of the OGC are underlain by the Gull Island Formation which is comprised of grey siltstone and sandstone. Meanwhile, the southern section of the OGC and the OCC are mapped to be underlain by the Central Clare Group. This bedrock geological formation is comprised of 5 no. cyclothems consisting of a basal mudstone which is overlain by laminated to massive grey siltstones, which are in turn overlain by thick, laminated and cross bedded sandstones.

The GSI maps the presence of bedrock outcrop immediately to the north of the OLL, along the coastline. There are no significant or extensive areas of bedrock outcrop mapped by the GSI along the OGC. The GSI maps some small exposures of the Gull Island Formation along the OGC in the townland of Doonmore in the north and further south along the N68 in the townland of Parknamoney. Some isolated areas of bedrock outcrop of the Central Clare Group are mapped along the OGC in the townlands of Kilcarroll and Clooneylissaun. Meanwhile, there are no mapped bedrock outcrops in the vicinity of the OCC or along the OGC from the OCC to Moneypoint 220kV Substation.

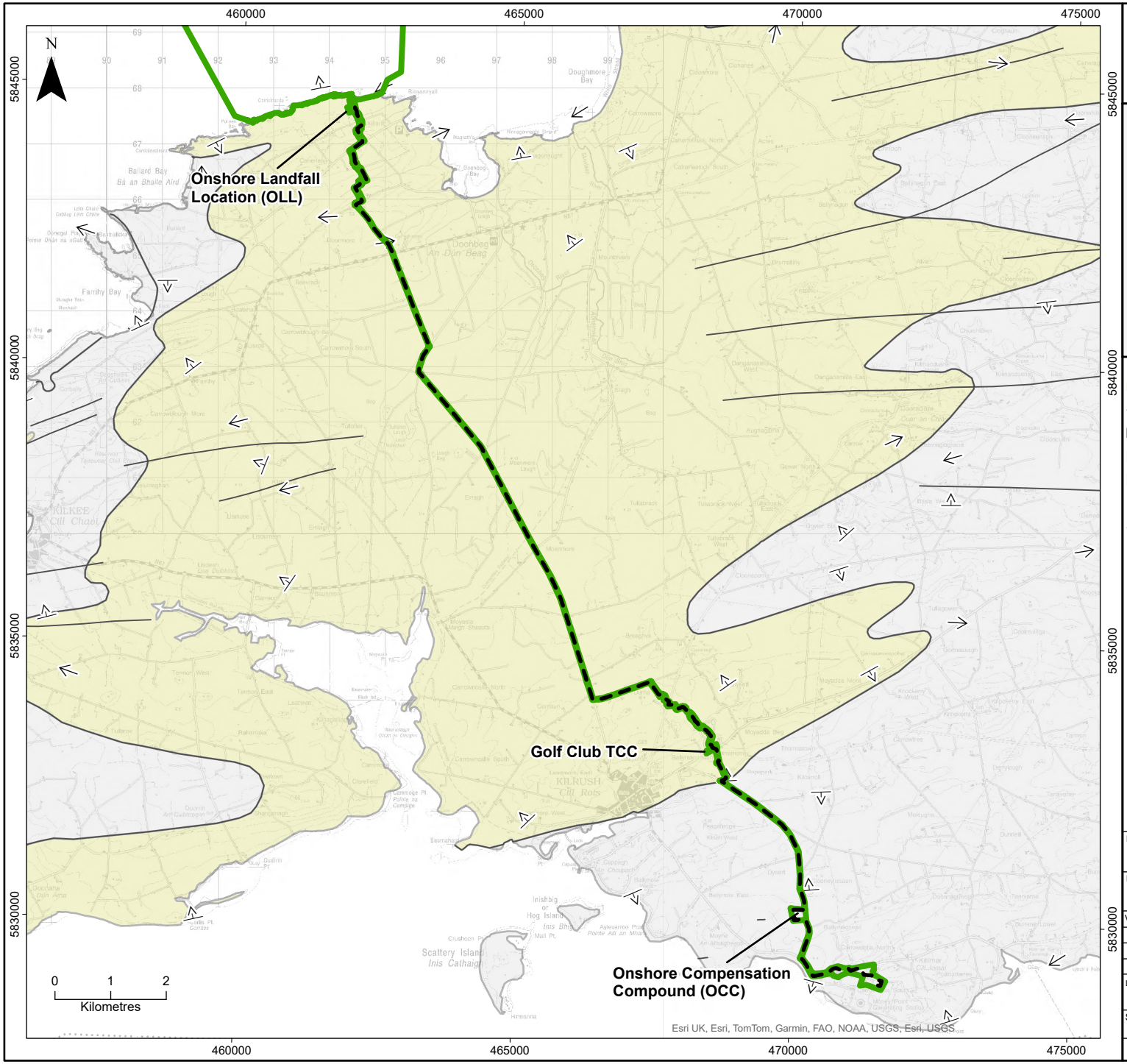
The GSI records the presence of a coal seam approximately 500m to the west of the OCC.

There are no bedrock geology faults mapped in the local area of the Onshore Site.

2 no. boreholes (BH-01 and BH-02) were drilled at the OLL between 21st and 28th November 2023. BH-01 and BH-02 extended to depths of 31mbgl and 23.3mbgl respectively. Both BHs encountered strong, locally weak and medium strong, laminated grey fine and medium grained SILSTONE interbedded with grey fine-grained sandstone. The bedrock encountered during the site investigations at the OLL correspond to the GSI's description of the mapped Gull Island Formation.

No bedrock was encountered during the site investigations along the OGC or at the OCC.

A bedrock geology map is shown as Figure 22-6.



SCEIRDE ROCKS WINDFARM

Feirm Ghaoithe Charraigeacha Sceirde

LEGEND

- EIAR Site Boundary
- Onshore Grid Connection (OGC)

Bedrock Geology

- Gull Island Formation
- Central Clare Group
- Geological Linework

Structural Symbols

- Dip of bedding or main foliation, old GSI data
- Strike and dip of bedding, right way up

PROJECT TITLE

Sceirde Rocks

MAP TITLE

Local Bedrock Geology Map

VER	REMARKS	DATE	Drawn	Approved
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DRAWING NO

Figure 22-6

SCALE	PAPER SIZE	DATUM	PROJECTION
1:100,000	A4	IRENET95	Transverse Mercator

22.3.5 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 or in the immediate vicinity of the Onshore Site. The closest mapped active quarry is Derrynalecka Quarry which is hosted in the Central Clare Group. This quarry is located approximately 11km northwest of Moneypoint 220kV Substation.

Furthermore, the GSI do not record the presence of any historic quarries or pits within or in the vicinity of the Onshore Site. The closest mapped historic quarry/pits are located to the south of Creegh village, located approximately 8km east of the OGC.

During the walkover surveys, 2 no. quarries which have not been mapped by the GSI were identified in the vicinity of the Onshore Site. A quarry is located immediately to the east of the OGC in the townland of Doonmore and is approximately 2.3km southeast of the OLL. A second is located to the east of the N67 in the townland of Carrowdotia North.

The GSI record several mineral localities within the vicinity of the Onshore Site.

- Coal has been recorded in the townland of Killard, immediately to the north of the OLL;
- Coal has also been recorded in the townland of Ballymacrinan, approximately 500m west of the OCC; and,
- Slate has been mapped approximately 1km to the southeast of Moneypoint 220kV Substation.

The GSI online Aggregate Potential Mapping Database (www.gsi.ie) was consulted for the Onshore Site, and for ease of reporting this information is detailed below for the OLL, OGC and OCC.

22.3.5.1 Onshore Landfall Location

The crushed rock aggregate potential for the OLL is 'Moderate'. Meanwhile, this area is not mapped in an area of gravel reserves.

22.3.5.2 Onshore Grid Connection

The crushed rock aggregate potential for the OGC ranges from 'Very Low' to 'High'. The areas mapped as having 'High' potential are located to the east and south of Kilrush Town. The total length of the OGC which is located in an area with 'High' potential is 5.5km. However, the vast majority of the OGC will be located in the existing public road corridor.

The majority of the OGC is not mapped in an area with the potential for gravel reserves. An area of 'Low' potential is mapped in the townland of Killard in the vicinity of the EPA mapped Caherlean stream. The OGC crosses an area of 'High' potential in the townland of Ballykett.

22.3.5.3 Onshore Compensation Compound

The OCC is mapped as having 'High' crushed rock aggregate potential. The OCC is not mapped in an area for gravel reserves.

22.3.6 Geohazards

The GSI does not record the presence of any historic landslides within the Onshore Site or in the surrounding lands (www.gsi.ie). The closest mapped historic landslide is located approximately 17km southeast of the OGC at Ballynahill, Co. Limerick.

The GSI Landslide Susceptibility Map (www.gsi.ie) classifies the probability of a landslide occurring. The landslide susceptibility at the Onshore Site is mapped has being predominantly 'Low' with some very localised areas of 'Moderately Low' to 'Moderately High' mapped along the OGC.

22.3.7 Soil Contamination

There are no known areas of soil contamination within the Onshore Site. During the site walkovers and site investigations, no areas of contamination concern were identified within the Onshore Site. No historic borrow pits which may have contaminated tailings were identified.

According to the EPA online mapping (www.epa.ie), there are no licensed waste facilities or dump sites located within or in the vicinity of the Onshore Site. The closest EPA mapped dump site, relates to a dumping at sea permit (S0020-02) held by Keating Maritime Limited and is located on the Kilrush Marina Approach Channel. This mapped dump site is approximately 2.5km to the southwest of the OGC at its closest point. An EPA mapped waste facility, Lisdeen Recycling Centre and Transfer Station (W0170), is located approximately 6.7km southwest of the OGC at its closest point, and approximately 2km southeast of Kilkee.

In terms of IPC licensing, Saint-Gobain Performance Plastics Ireland (P0096-02) and Versiv Composites Ireland (P0096) have existing IPC licences in Kilrush town, approximately 1km from the OGC. Further to the south, the OGC, along the N67, is mapped within the IPC Boundary associated with the ESB's Moneypoint Power Station (P0605-02).

The IPC licence at Moneypoint Power Station related to the following activities:

- Combustion of fuels in installations with a total rates thermal output of 50MW or more; and,
- Landfills receiving more than 10 tonnes of waste per day.

The construction will not interact with these IPC licensed activities. The OGC does not encroach upon the landfill areas.

22.3.8 Geological Heritage Sites

There are no recorded geological heritage sites within the Onshore Site (www.gsi.ie).

The closest geological heritage site is Foohagh Point (Site Code: CEO21). This County Geological Site (CGS) is recommended for designation as a Geological National Heritage Area (NHA) and is located approximately 8.5km to the southwest of the OGC at its closest point. The importance of the CGS is due to the presence of a spectacular growth fault which can been seen in the cliff face at Foohagh Point.

There are no other geological heritage sites within 10km of the Onshore Site.

The geological heritage sites listed by the GSI in their scoping response include Spanish Point, Roevehagh M18 Road Cuts, Rahasane Turlough and Caherateemore M17 Road Cut. All of these designated sites are distant from the Onshore Site.

A map of geological heritage sites is shown as Figure 22-7 below.

22.3.9 Designated Sites and Protected Areas

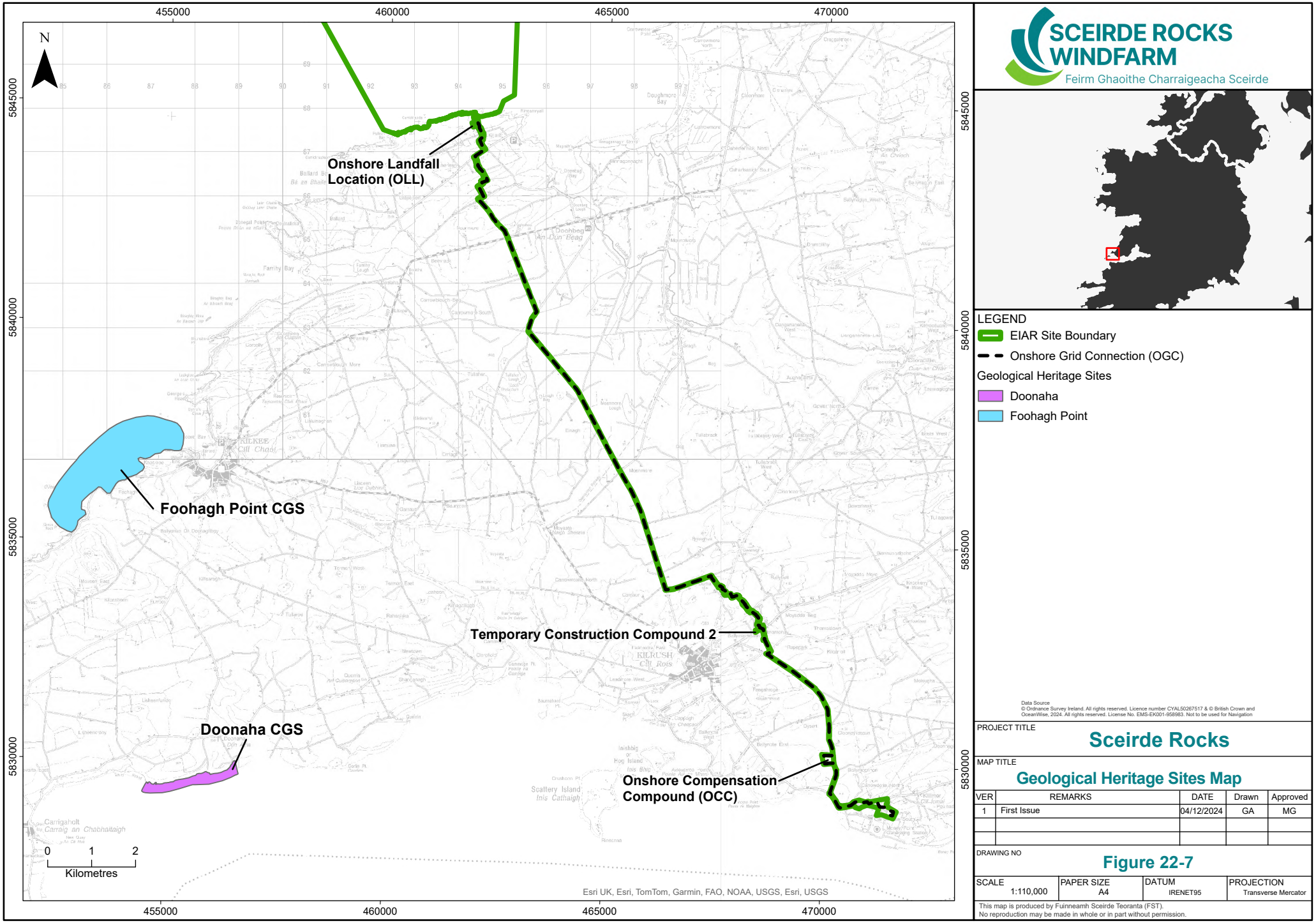
Within the Republic of Ireland, designated sites include Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs) and candidate Special Protection Areas (cSPAs).

The Onshore Site is not mapped within any designated site or protected area.

However, several designated sites are mapped in close proximity to the Onshore Site.

- Approximately 1.3km of the OGC in the townland of Carrowmore South is located adjacent to Tullaher Lough and Bog SAC (Site Code: 002343) and NHA (Site Code: 000070). This designated site is located immediately to the west of the local road within which the OGC is proposed to be laid.
- Approximately 400m of the OGC, adjacent to the N67, is located immediately to the east of the River Shannon and River Fergus Estuaries SPA (Site Code: 004077) and the Lower River Shannon AC (Site Code: 002165).

The Onshore Site does not encroach upon these designated sites, therefore there is no potential for the Project to affect the land, soils and geological environment associated with these designated sites. The potential for effects on these, and other downstream designated sites, is associated with the hydrological (surface water) and hydrogeological (groundwater) environment. The potential effects are assessed in Chapter 23: Water.



SCEIRDE ROCKS WINDFARM

Feirm Ghaoithe Charraigeacha Sceirde

LEGEND

- EIAR Site Boundary
- Onshore Grid Connection (OGC)

Geological Heritage Sites

- Doonaha
- Foohagh Point

PROJECT TITLE

Sceirde Rocks

MAP TITLE

Geological Heritage Sites Map

VER	REMARKS	DATE	Drawn	Approved
1	First Issue	04/12/2024	GA	MG

DRAWING NO

Figure 22-7

SCALE	PAPER SIZE	DATUM	PROJECTION
1:110,000	A4	IRENET95	Transverse Mercator

22.3.10 Receptor Sensitivity and Importance

Based on the criteria set out in Table 22-2 above, the peat, soils and subsoils at the Onshore Site can be classed as being of 'Low' importance as these deposits are not designated in this area (i.e. they do not form part of a designated site). The bedrock geology underlying the Onshore Site can be classed as being of 'Medium' importance where the bedrock could be used on a sub-economic scale.

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

All geological heritage sites have been screened out of the impact assessment due to their distant location from the Onshore Site. There is no potential for effects to occur on these geological heritage sites.

Tulloher Bog SAC will be included in the impact assessment due to its location immediately adjacent to the OGC. All other designated sites have also been screened out of the land, soils and geological assessment as the components of the Onshore Site do not encroach upon and are distant from these designated sites. There is no potential for effects on land, soils and geological environment on these designated sites.

22.4 Characteristics of the Onshore Site

The Project, including the Onshore Site, is described in full in Chapter 5 of this EIAR.

The Onshore Site includes the OLL, the OCC and the OGC.

Due to the nature of the works at the Onshore Site, the volumes of material generated and requiring storage will be small. Furthermore, the volumes of material required for the construction will be minimal.

22.4.1 Onshore Landfall Location

Works at the OLL will involve the removal of soils and subsoils for the construction of the 2 no. temporary construction areas, one measuring approximately 4,265m^2 and the other approximately 2,271m^2. The larger construction compound area will be used for the OLL construction activities whilst the smaller construction compound is required for the construction of the TJB. In addition, a temporary winch base pad will be required to the south of the TJB. For the construction of these areas, it is required to remove soil/subsoil to create level ground on a suitable bearing material. These works areas, including the TJB (which will be buried approximately 2m below ground), will be reinstated following construction.

Permanent access tracks will be required to provide access during all phases of the Onshore Site. At the OLL, an existing access track off the local road L-6150 will provide access for approximately 690m, after which a new permanent access track will be required.

22.4.2 Onshore Grid Connection

The excavation of the trench for the OGC will also require the excavation of subsoils.

Open-cut trenching for cables laid in ducts will be the primary installation method, with Horizontal Directional Drilling (HDD) being utilised in certain instances where obstacles are encountered, including sensitive features such as water courses, major roads, sensitive environmental areas (deep peat deposits), etc. The trench will be typically 1.1m wide by approximately 1.2m deep. All material

excavated from the trench will be removed off-site by a licensed haulier and transported to a licenced facility for disposal. Following completion of the excavation, a concrete bedding layer is placed at the bottom of the trench and once the ducts are in place the trench will be backfilled with appropriate engineered backfill or imported stone material. The surface will be reinstated as agreed with Clare County Council.

Where the OGC enters private land, a 3 metre wide access track will be constructed over or alongside the cable route, except where the OGC follows the route of existing tracks, so as to cater for access required for potential future maintenance.

The Onshore Site also includes the provision of temporary construction compounds along the OGC.

22.4.3 Onshore Compensation Compound

The construction of the OCC will require the removal of soils and subsoils. Generally, for construction of any structure or platform foundation, such as a substation or construction compound, it is required to remove all soft material to a depth where a suitable bearing material is encountered. Any excavated material will be used for landscaping. Any hardstand areas will be constructed using a suitable specified engineered stone fill. Any material required for the construction will be reused from the excavations where possible or imported from nearby quarries and sand and gravel pits.

22.5 Likely Significant Effects and Associated Mitigation Measures

22.5.1 Do Nothing Scenario

If the Onshore Site was not developed, the existing land use practices of low intensity agriculture at the OLL and at the OCC would continue. Furthermore, transport along the public road corridor would continue along the majority of the OGC. In the Do Nothing Scenario, there would be no disturbance or excavation of soils and subsoils. The impact of this on the land, soils and geological environment is considered neutral in the context of the EIAR.

If the Project were not to proceed, the opportunity to capture the available renewable energy resource and connect it to Ireland's electricity grid 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 and investment and to diversify the local economy would also be lost.

22.5.2 Construction Phase - Likely Significant Effects and Mitigation Measures

The likely effects of the Onshore Site and mitigation measures that will be put in place during the construction phase to eliminate or reduce any likely significant effects are outlined below.

22.5.2.1 Potential Effects on Land (Land-Take)

The Onshore Site includes the construction of a TJB pit at the OLL, a 220kV Onshore Compensation Compound and associated temporary construction compounds and construction areas. These components of the Project are located in agricultural pastures and have the potential to result in the loss of agricultural land.

However, the TJB work area and the 3 no. construction compounds are temporary, and will be reinstated following construction. Therefore, there will be no permanent loss of agricultural land associated with these components of the Project. The OCC in the townland of Ballymacrinan has a total development footprint of 4.98 hectares (ha). The construction of this infrastructure will result in the loss of agricultural pastures.

No significant effects on land will occur along most of the OGC as the majority of these works will occur within the carriageway of the existing public road network and existing tracks in private lands. The works will result in the excavation of a narrow trench to accommodate the cabling. This trench will be reinstated once the cabling is emplaced with a comparable ground surface.

Approximately 3.6km of off-road sections are proposed along the OGC. Where the OGC enters private lands, a 4m wide access track will be constructed over or alongside the cable route, except where the OGC follows the route of existing tracks. A change in land will occur where these new tracks are constructed.

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

Pathways: Excavation and infrastructure construction.

Receptors: Land (i.e. the land upon which the Project will be constructed).

Pre-Mitigation Potential Effect: Negative, slight, direct, permanent, likely effect on land (land-take) at the OLL and OCC which is Not Significant.

Negative, imperceptible, direct, permanent, likely effect on land (land-take) along the OGC which is Not Significant.

Mitigation Measures / Impact Assessment:

The Onshore Site, in particular with regards to the OGC, has been designed to, where possible, utilise the existing network of public roads and access tracks. This has reduced the area of land which has the potential to be impacted by the Project. The proposed length of the off-road sections of the OGC is very small in comparison to the total length of the OGC (22.3km). Across the vast majority of the OGC the ground will be reinstated once the cables are in place. The only permanent effect on land associated with the OGC will be the new access tracks which are proposed in 3rd party lands where no existing access track is present along the cable route. Due to the nature of the works associated with the OGC, No Significant Effects on land will occur.

There will be no permanent loss of agricultural land, associated with the construction of the TJB and construction compounds at the OLL. These areas will be temporary and will be reinstated following completion of the construction works, Access to the TJB during the operation and maintenance phase will be via the existing access tracks, where possible, to the south of the OLL. Therefore, there will be no significant effect on the local land environment.

There will be a permanent loss of agricultural land at the OCC. However, the OCC is located in an agricultural area in west Co. Clare and given the small footprint of the OCC, there is no potential for significant effects on the land environment on a local or regional scale.

Furthermore, given the scale of the proposed construction works and the local flat to gently undulating topography, any change in the local topography will be minimal in the overall landscape.

Post Mitigation Residual Effect: The Project will result in the loss of agricultural lands which will be replaced by the OCC and new access tracks along the OGC where it passes through 3rd party lands. This will result in a permanent change to land at these locations. However, due to the relatively small permanent footprint of the Project infrastructure on a site scale and even more so on a local scale, the

residual effect is considered to be negative, direct, slight, permanent, likely effect on land (land-take), and Not Significant.

Significance of Effects: For the reasons outlined above (small development footprint), No Significant effects on land (land-take) will occur.

22.5.2.2 Potential Effects from Peat, Soil, Subsoil and Bedrock Excavation

Excavation of peat, soils, subsoils and bedrock will be required for the Project works during the construction phase including:

- Construction of the TJB at the OLL will require the excavation of 286m^3 of peat, soil, and subsoil and 200m^3 of bedrock;
- Construction of the compound area at the OLL will require the excavation of ~3,276m^3 of spoil;
- Construction of the OCC will require the excavation of approximately 25,216m^3 of spoil; and,
- Construction of the OGC– excavated material (estimated to be ~31,218m^3) will be removed off-site and will be disposed of in a nearby licensed waste facility and/or managed on site.

These construction phase activities will result in the permanent removal and relocation of in-situ peat and subsoil at some excavation locations.

However, there will be no loss of spoil at the OCC and the OLL, as it will be relocated within the Onshore Site. It is proposed to manage any excess overburden generated through construction activities within the Onshore Site and will be used for landscaping around the OCC and at the OLL in a designated excess spoil areas, further referenced as spoil management areas. The excavated spoil material at the OLL will be used in the post-construction reinstatement whereby the soil will be used to reinstate the construction compound location.

Excavation of subsoils will also be required along the OGC. As material is removed from the trench, it is to be removed off-site by a licenced haulier and brought to a licenced facility for disposal. It is estimated that approximately 18,954m^3, 888m^3 and 8,189m^3 of material will be excavated during the construction of the trench in the public roadway, road verge and in third-party lands respectively. An additional 3,186m^3 will be excavated for the TJBs along the OCG.

Pathway: Extraction/excavation.

Receptor: Peat, soil and subsoil within the Onshore Site.

Pre-Mitigation Potential Effect: Negative, slight, direct, likely, permanent effect on soil and subsoil due to relocation at the OLL and OCC, which is Not Significant.

Negative, slight, direct, permanent, likely effect on peat, soils and subsoils along the OGC which is Not Significant.

Negative, slight, direct, likely, permanent effect on bedrock due to excavation at the OLL which is Not Significant.

Proposed Mitigation Measures by Design:

- The soil and subsoil which will be removed during the construction phase will be localised to the Project infrastructure location (i.e. OCC, temporary construction compounds and access tracks);

- The Project has been designed to avoid sensitive habitats;
- A minimal volume of material will be excavated and removed to allow for infrastructure works to take place in comparison to the total volume of these materials present on the site and in the surrounding lands;
- Any excavated material associated with the OCC will be used for landscaping;
- Any excavated material associated with the temporary construction compounds will be stored locally and will be used in the restoration of these areas once construction works are complete;
- Excavated soils/subsoils shall be excavated and stored separately to topsoil; this will prevent mixing of materials and facilitate reuse afterwards;
- All materials which require storage will be stockpiled at low angles (< 5-10°) to ensure their stability and secured using silt fencing where necessary. This will help to mitigate erosion and unnecessary additions of suspended solids to the drainage system;
- Spoil will be deposited, in layers of 0.50m and will not exceed a total thickness of 2m; and,
- Spoil will only be deposited on slopes of less than 5 degrees to the horizontal and greater than 10m from the top of a cutting.

The following additional mitigation measures will be implemented along the OGC:

- Soils and subsoils excavated along the underground cabling route will be removed off-site by a licenced haulier and brought to a licenced facility for disposal;
- Appropriate engineered backfill material or imported stone material, in line with the Guidelines for Managing operations in Public Roads, will be used to backfill the trench;
- Backfilling the trench will be done in layers to ensure proper compaction of the backfill material;
- All trenching and reinstatement works are to be completed in line with Eirgrid specifications; and,
- Where site investigations have encountered the presence of deep peat along the OGC, Horizontal Directional Drilling (HDD) will be used for the construction of the OGC. Through the utilization of HDD, the OGC will be installed at depth of approximately 8mbgl which is 4m below the peat. This construction methodology will remove the requirement for the excavation of large volume of peat and will reduce the potential for effects on adjacent peatlands.

Post Mitigation Residual Effect: The granular subsoils and peat at the Onshore Site can be classified as of "Low" importance and the bedrock is considered to be of "Medium" importance.

The negative effect is the disturbance and relocation of spoil materials. The excavated volumes will be very small relative to the local deposits. Furthermore, the mitigation measures incorporated into the Project as described above, combined with the 'Low' importance of the soil and subsoil deposits means that the residual effect will be - Negative, slight, direct, likely, permanent effect on soils and subsoils due to disturbance and relocation at the OLL and the OCC, which is Not Significant.

The negative effect is the excavation of 200m^3 of bedrock at the TJB location. Due to the small volumes of rock to be excavated and the 'Medium' importance of the local bedrock at the OLL, the residual effect will be a – Negative, slight, direct, likely, permanent effect on bedrock, which is Not Significant.

The soil/subsoil and peat deposits along the OGC are classified as being of 'Low' importance. Following the excavation and construction of the OGC, the excavated areas will be predominantly reinstated with a comparable ground cover. Where the OGC crosses 3rd party lands and in the absence of an existing access track a new access track will be constructed over the cable route to cater for access and required maintenance by Eirgrid. The residual effect is considered to be a negative, imperceptible, direct, likely, permanent effect, which is Not Significant.

Significance of Effects: For the reasons outlined above, No Significant Effects on peat, soils and subsoils will occur.

22.5.2.3 Potential Effects from Leakages and Spillages

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a pollution risk at the Onshore 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 significant effects (i.e. contamination of peat, subsoils and pollution of the underlying aquifer) on the geological and water environment. Additionally, waste tar, removed from the road hardstanding along the OGC has the potential to affect soils/subsoils.

Pathway: Infiltration through peat, soil, mineral subsoil and underlying bedrock pore space.

Receptor: Peat, soil, mineral subsoil and bedrock.

Pre-Mitigation Potential Effect: Negative, direct, slight, short term, unlikely effect on peat, soil, subsoils and bedrock, which is Not Significant.

Proposed Mitigation Measures:

- Maintenance of construction vehicles or plant will take place off-site;
- On-site re-fuelling will be undertaken using a double skinned bowser with spill kits on the ready for any minor accidental leakages or spillages;
- Fuels stored on Site will be minimised but will be in bunded locations at the temporary construction compounds;
- The electrical control building at the OCC will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- All waste tar and chip material arising from the chipping and resurfacing of the roads during construction of the underground electrical cabling route will be removed off-site and taken to an appropriately licenced facility;
- The plant used during construction will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be contained within the Onshore Construction Environmental Management Plan (Onshore CEMP) Appendix 5-16 of this EIAR. Spill kits will be available to deal with accidental spillage in and outside of re-fuelling areas.

Post Mitigation Residual Effect: The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect will be negative, imperceptible, direct, short-term, unlikely effect on peat, soils, subsoils and bedrock, which is Not Significant.

Significance of Effects: For the reasons outlined above, No Significant Effects on peat, soils, mineral subsoils or bedrock will occur.

22.5.2.4 Potential Effects from the Erosion of Exposed Soils and Subsoils During Construction Works

There is a possibility of erosion of exposed peat and spoil during its excavation and during landscaping works. The main impacts associated with this aspect is to the water environment (entrainment of suspended solids in runoff), and therefore this aspect is further assessed in detail in Chapter 23: Water.

Pathway: Vehicle movement, surface water and wind action.

Receptor: Peat, soils, subsoil and weathered bedrock within the Onshore Site.

Pre-Mitigation Potential Effect: Negative, direct, slight, likely effect on peat, soils, subsoils and bedrock by erosion and wind action which is Not Significant.

Proposed Mitigation Measures:

- Material removed from the infrastructure footprint will be used for landscaping or for reinstatement of the temporary construction compound and associated temporary access track;
- The upper vegetative layer (where still present) of excavated material will be stored with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the storage areas;
- Re-seeding and spreading/planting will also be carried out in the spoil management areas;
- All excavation works will be temporary, stockpiles will be covered and silt fencing will be used downgradient of excavations or stockpiles; and,
- Temporary drainage systems will limit runoff impacts during the construction phase.

With regards to the OGC:

- Soil/subsoil removed from the underground electrical cabling route trench will be transported off-site by a licenced haulier and brought to a licenced facility for disposal; and,
- The underground electrical cabling route will be constructed in a stepwise manner along its length. This will minimise the time any particular section of the underground electrical cabling route trench is open before being reinstated.

Post Mitigation Residual Effects: Peat, soils and subsoils can be eroded by vehicle movements, wind action and by water movement. Following implementation of these measures the residual effect will be - Negative, slight, direct, likely effect on soil and subsoils, and possibly bedrock, which is Not Significant.

Significance of Effects: For the reasons outlined above, No Significant impact on peat, soils, subsoils or bedrock will occur.

22.5.2.5 Potential Effects from the Erosion of Exposed Soils/Subsoils During Hedgerow and Tree Removal

The OGC is routed through vegetated areas that will require some minor hedgerow and tree removal to facilitate construction works.

During hedgerow and tree removal operations there is a moderate likelihood of erosion of spoil due to 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 23: Water.

Pathway: Vehicle movement, surface water and wind action.

Receptor: Peat, subsoil and weathered bedrock.

Pre-Mitigation Potential Effect: Negative, slight, direct, permanent, likely effect on peat, subsoil and weathered bedrock due to hedgerow and tree removal operations at the OGC, which is Not Significant.

Proposed Mitigation Measures:

All proposed hedgerow and tree removal works will be completed in accordance with the best practice to ensure that hedgerow and tree removal results in minimal potential negative effects on the local peat, soil and subsoil environment.

In addition, the following mitigation measures will be implemented during hedgerow/tree removal operations:

- Before any works are completed silt fences will be installed to limit the movement of entrained sediment in surface water runoff;
- All machinery will be operated by suitably qualified personnel; and,
- Hand cutting/removal will be completed in some areas.

Post Mitigation Residual Effect: The proposed hedgerow and tree removal works will likely result in minor local disturbance of peat and subsoil. However, given the minimal footprint of the proposed hedgerow and tree removal areas combined with the mitigation measures outlined above, the residual effect is - negative, imperceptible, direct, permanent, unlikely effect on peat, subsoils and weathered bedrock, which is Not Significant.

Significance of Effects: For the reasons outlined above, and with the implementation of the proposed mitigation measures, No Significant Effects on peat, soils/subsoils or bedrock will occur.

22.5.2.6 Potential Effect on Designated Sites

Tullaher Lough and Bog SAC/NHA is located immediately to the west of approximately 1.8km of the OGC.

The OGC does not encroach upon the boundary of the SAC/pNHA. No construction works or excavations will take place within the SAC/NHA. Therefore, there will be no direct effects on the land, soils and geological environment of the SAC/pNHA.

Potential direct/indirect effects may relate to potential impacts on groundwater levels, the accidental leakage or spillage of hydrocarbons associated with works along the OCG. The main pathway is associated with the Water Environment (Chapter 23).

Pathway: Infiltration through peat, soil and mineral subsoil.

Receptor: Tullaher Lough and Bog SAC/NHA.

Pre-Mitigation Potential Effect: Negative, direct, slight, short term, unlikely effect on Tullaher Lough and Bog SAC, which is Not Significant.

Mitigation Measures / Impact Assessment: As the Project does not encroach upon the SAC/NHA there can be no direct effect on the land, soils and geological characteristics of this designated site.

The mitigation measures for hydrocarbons to prevent the contamination of soils and peat will be implemented as detailed in Section 22.5.2.3.

Post Mitigation Residual Effect: There will be no residual effect on the Tullaher Lough and Bog SAC/NHA.

Significance of Effects: For the reasons outlined above, there will be No Significant effects on Tullaher Lough and Bog SAC/NHA.

22.5.3 Operation and Maintenance Phase - Likely Impacts and Mitigation Measures

Very few potential impacts are envisaged during the operation and maintenance phase of the Project. These may include:

- Some construction vehicles or plant may be necessary for maintenance of the TJB or the OCC which could result in minor accidental leaks or spills of fuel/oil;
- The transformer in the OCC will be oil cooled. There is potential for spills / leaks of oils from this equipment resulting in contamination of soils and groundwater; and,
- The requirement for emergency repair works along the OGC is highly unlikely.

22.5.3.1 Potential Effects due to Vehicle/Plant Use

Plant and vehicles used in site maintenance will be run on hydrocarbon fuels and use hydraulic oils. Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a 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: Soil, subsoil and bedrock pore space.

Receptor: Soil, subsoil and bedrock.

Potential Pre-Mitigation Effect: Negative, direct, slight, short term, unlikely effect on peat, subsoil and bedrock, which is Not Significant.

Proposed Mitigation Measures:

- Vehicles used during the operation and maintenance phase will be refuelled off site before entering the site;
- No fuels will be stored on-site during the operation and maintenance 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 operation and maintenance phase to deal with accidental spillages and breakdowns will be contained in the Onshore Construction and Environmental Management Plan (Onshore CEMP) included as Appendix 5-16.

Post-Mitigation Residual Effect: The use of hydrocarbons in plant and vehicles is a standard risk associated with all operational wind farm sites and their associated grid infrastructure. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - negative, imperceptible, direct, short-term, unlikely effect on soils, subsoils, and bedrock, which is Not Significant.

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

22.5.3.2 Potential Effects Due to the Use of Oils in Transformers

The transformer in the OCC will be oil cooled. There is potential for spills / leaks of oils from this equipment resulting in contamination of soils and groundwater.

Pathway: Soil, subsoil and bedrock pore space.

Receptor: Soil, subsoil and bedrock.

Potential Pre-Mitigation Effect: Negative, direct, slight, short term, unlikely effect on peat, subsoil and bedrock, which is Not Significant.

Proposed Mitigation Measures:

- All transformers and OCC areas where oils are contained will be bunded to 110% of the volume of oil used in each transformer/OCC;
- All runoff collected in the underground gravity system at the transformer will pass through a full retention petrol interceptor. An operation and maintenance system for the oil interceptor will be provided by the manufacturer and will be included in the safety file for the Onshore Site; and,
- An emergency plan for the operation and maintenance phase to deal with accidental spillages will be contained in the Onshore CEMP included as Appendix 5-16.

Post-Mitigation Residual Effect: The use of hydrocarbons in transformers and substations is a standard risk associated with all operational wind farm sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - negative, imperceptible, direct, short-term, unlikely effect on soils, subsoils, and bedrock, which is Not Significant.

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

22.5.4 Decommissioning Phase – Likely Significant Effects and Mitigation Measures

The potential effects associated with decommissioning will be similar to those associated with construction but of significantly reduced magnitude.

The Rehabilitation Schedule is presented in Appendix 5-18. Some of the effects relating to the Onshore elements will be avoided by leaving elements of the Project in place where appropriate, for example:

- The above ground components of the OCC building and compound will be removed fully from site. For the underground components, such as the foundations and non-electrical infrastructure, the Best Environmentally Practicable Option (BEPO) least disruptive option would be is for these to remain in situ;
- The planted area adjacent to the OCC, as presented in the Landscape Management Plan in Appendix 27-1, will remain in situ. The remainder of the OCC site will be reinstated to its original form with a grassed surface;
- For the OGC, the ducts and joint bay infrastructure will remain in situ and can be used for future cable installation if required. The joint bays will be opened up and the cables will be cut. Once cut, the cables are pulled through the ducting and removed. The joint bays are then backfilled and reinstated to the relevant road standards, or to original condition for those located on private lands; and,
- Onshore access tracks within private lands will remain in situ and can be provided for alternative future use by the landowners.

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant (refer to Sections 22.5.2.2, 22.5.2.3, 22.5.2.4, 22.5.2.5, and 22.5.2.6).

No Significant effects on the land, soils and geological environment will occur during the decommissioning phase of the Onshore Site.

22.5.5 Risk of Major Accidents and Disasters

Due to the absence of peat across the majority of the Onshore Site and the relatively flat topography there is not considered to be a risk of a landslide. Where peat is present, it is typically shallow and even where deeper peat deposits were recorded the topography is relatively flat.

22.5.6 Human Health Effects

Potential health effects arise mainly through the potential for soil and ground contamination. The Onshore Site is not a recognized source of pollution (e.g. it's not a waste management site, or a chemical plant), and so the potential for effects during the operation and maintenance phase is very low.

Hydrocarbons will be used onsite during construction; however, the volumes will be small in the context of the scale of the Onshore Site 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 imperceptible.

22.5.7 Cumulative Effects

Due to the localised nature of the proposed construction works which will be kept within the Onshore EIAR Site Boundary, there is no potential for significant cumulative effects in-combination with other local developments on the land, soils and geology environment. The only way the Onshore Site can have in combination 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 23: Water.

The construction of the OGC will only require relatively localised excavation works within the site boundary and therefore will not contribute to any significant cumulative effects.

22.6 Post Construction Monitoring

None required.

22.7 Conclusion

The impact assessment presented in this EIAR chapter is summarised as follows:

- The impact assessment is underpinned by an extensive site-specific geological dataset which has been accrued for the Onshore Site.
- The comprehensive site investigations included a total of 458 no. site investigation points accompanied by geophysical surveys. These site investigations comprised of:
  - The excavation of 2 no. trial pits and the drilling of 2 no. BHs at the OLL;
  - The excavation of 2 no. trial pits at the OCC;
  - The completion of 440 no. peat probes and 132 no. shear vane tests along the OGC; and,
  - Completion of 12 no. hand augers and geophysical surveys along the OGC.

- The site investigations completed were peat is present along the OGC were multi-phased and comprehensive;
- The nature and thickness of the peat, soils and subsoils is now comprehensively understood across the Onshore Site;
- Where deeper excavations will take place at the OLL, the site investigations have confirmed the presence of competent siltstone and sandstone bedrock;
- The Land, Soils and Geology impact assessment for the Onshore elements of the Project concludes that with the implementation of the prescribed mitigation measures that there will be No Significant Effects on the land, soils and geological environment; and,
- The conclusions of the impact assessment are unambiguous and are underpinned by a significant geological dataset.