

7. LAND SOILS AND GEOLOGY

7.1 Introduction

7.1.1 Background and Objectives

Hydro-Environmental Services (HES) was engaged by MKO Ireland (MKO) to provide a description and assessment of the residual direct and indirect effects of the peat extraction and ancillary activities at Ballydermot within the Allen Bog Group (at Ticknevin, Glashabaun North, Glashabaun South, Codd 1, Codd 2, Ballydermot North, Ballydermot South, Blackriver, Lullymore, Lullybeg, Barnaran, Killina, Derrybrennan and Lodge bogs), located in Counties Kildare and Offaly, (hereafter referred to as the 'Application Site') on the soil and geological environment from July 1988 to the present day. This chapter will also assess the potential effects of the proposed rehabilitation plan for the Application Site following the cessation of peat extraction in June 2020.

As stated in Chapter 4: Project Description of the rEIA (remedial Environmental Impact Assessment Report), July 1988 is the baseline environment as this is the year in which the EIA Directive (Directive 85/337/EEC) was required to be transposed into Irish Law. There is no legal requirement to complete a rEIA on any of the activities occurring at the Application Site prior to the required transposition of the EIA Directive. Nevertheless, for completion, we provide a brief overview of the activities occurring at the Application Site from 1935 and the onset of site preparation works up to July 1988. The baseline land, soils and geological environment in the year 1988 is then described in detail along with a description of peat extraction and ancillary activities from 1988 to the cessation of peat extraction in June 2020, the management of the Application Site since June 2020, and the activities intended to be carried out at the Application Site into the future.

This chapter presents:

- An assessment of effects of the peat extraction and ancillary activities on the land, soils and geological environment;
- The baseline sensitivity of the receiving land, soils and geological environment has been assessed based on the baseline site conditions occurring in 1988;
- The effects on the receiving land, soils and geological environment have been assessed over 3 no. Phases of the life cycle of the Project. These phases include the 'Peat Extraction Phase' (July 1988 – June 2020), the 'Current Phase' (June 2020 – present day) and the 'Remedial Phase' as described in Section 4.2.1 of Chapter 4;
- The monitoring and control measures that were implemented during the Peat Extraction Phase from July 1988 to June 2020;
- The monitoring and control measures during the Current Phase (June 2020 to present day)
- The proposed mitigation measures associated with the proposed Draft BnM Cutaway Bog Decommissioning and Rehabilitation Plan (Appendix 4-2) (Remedial Phase); and,
- The residual effects along with the cumulative effects from the proposed Ballydermot Wind Farm development and other relevant projects in the vicinity of the Application Site.

7.1.2 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 includes 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 on peatlands.

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

Nitesh Dalal (B.Tech, PG Dip., MSc) is an Environmental Scientist with over 7 years' experience in environmental consultancy and environmental management in India and over 1-year environmental consultancy experience in Ireland. 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).

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 developments on peatlands. Conor prepared the land, soils and geology chapter of the rEIAR completed for the substitute consent applications for the peat extraction activities at the Ballivor Bog Group, Lemanaghan Bog and Littleton Bog.

Adam Keegan PGeo (B.Sc., M.Sc.) is a hydrogeologist with 9 years environmental consultancy experience in Ireland. Adam has been involved in Environmental Impact Assessment Reports (EIARs) for numerous projects including wind farms, grid connections, quarries and small housing developments. Adam holds an MSc in Hydrogeology and Water Resource Management. Adam has worked on several wind farm EIAR projects, including Croagh WF, Lyrenacarriga WF (SID), Cleanrath WF, Carrownagowan WF (SID), and Fossy WF.

Michael Gill (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 geological, hydrological and hydrogeological impact assessments of wind farms and renewable projects in Ireland. For example, Michael has worked on the EIARs for Oweninny WF, Cloncreen WF, and Yellow River WF, and over 120 other wind farm related projects across the country. Michael has also worked on rEIARs for Cleanrath WF, 41 no. Bord na Móna bogs, the Ballivor Bog Group, and also for a number of quarry sites.

7.1.3 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 2.5 of Chapter 2: Background of the rEIAR. Consultation responses relating to the land, soils and geological environment were received from the Environmental Protection Agency and Geological Survey of Ireland. A summary of the response is below. Further details are outlined in Section 2.5.2 of this rEIAR.

Environmental Protection Agency

A scoping request was issued to the Environmental Protection Agency (EPA) on the 21st of February 2022. A response was received on the 16th of March 2022. The EPA response (EPA Ref: 2509)

contained copies of the scoping responses provided by Inland Fisheries (IFI) and Geological Survey Ireland (GSI) (a division of the Department of Environment, Climate and Communications, (DECC)). Please note, these bodies were scoped with individually, as part of the scoping exercise in February 2022. IFI and GSI both responded directly to MKO's scoping request, therefore the responses provided by the EPA are the same as those received directly from those bodies. Kildare County Council (KCC) did not respond directly to MKO in 2022.

The EPA response stated; *'having regard to the specific characteristics of the project and likely impact on the environment, the Agency is of the opinion that the scope and level of detail to be included in the remedial environmental impact assessment report should as a minimum:*

- (i) *address the matters raised in the responses received from the bodies detailed above;*
- (ii) *have regard to the rehabilitation plan(s) required under Condition 10 of Licence Reg No. P0503 for any relevant bog areas;*
- (iii) *consideration should be given to inclusion of any relevant bog areas in an enhanced rehabilitation scheme, e.g., under the Peatlands Climate Action Scheme (PCAS).*
- (iv) *have regard to relevant water quality monitoring data. Any gaps in water quality data for receiving waters should be filled by a sampling programme over an appropriately representative period of time.'*

A summary of the response is provided in Chapter 2 Section 2.5.2 of this rEIAR, and a copy of the response is provided in Appendix 2-1.

Owing to the passage of time between the initial scoping request in February 2022 and the preparation of this rEIAR, a subsequent scoping request was issued to the EPA on 15th of January 2026. A response was received on 11th of March 2026 which referred back to the response issued on 16th of March 2022 (EPA Ref: 2509), stating that *'the Agency has no further observations'*.

Geological Survey of Ireland

A scoping request was issued to the GSI on the 21st of February 2022. A response was received on the 22nd of February 2022. The response detailed what datasets should be used for the assessment and provided links to datasets for same. A summary of the response is provided in Chapter 2 Section 2.5.2 of this rEIAR, and a copy of the response is provided in Appendix 2-1.

Owing to the passage of time between the initial scoping request in February 2022 and the preparation of this rEIAR, a subsequent scoping request was issued to the GSI on the 15th of January 2026. A submission by DCEE on behalf of the GSI was received on the 26th of January 2026 recommending the use of their various publicly available datasets when conducting the EIAR, SEA, planning and scoping processes for developments, plans and policies. The response states; *'the publicly available data referenced/presented here, should in no way be construed as Geological Survey Ireland support for or objection to the proposed development or plan'*. No detailed information in relation to land, soils and geology was provided within the received response.

7.1.4 Relevant Legislation

The rEIAR 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 (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, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- S.I. No. 296/2018 European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018;
- S.I. No. 4/1995: The Heritage Act 1995, as amended; and,
- European Communities (Environmental Impact Assessment) Regulations 1989 to 2006.

7.1.5 Relevant Guidance

The land, soils and geology chapter of this rEIA was prepared having regard, where relevant, to 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).
- An Coimisiún Pleanála (2025), Guidance for Substitute Consent and Section 37L Applications (ACP 2025).

7.2 Methodology

7.2.1 Desk Study

A desk study of the Application Site and the surrounding area was completed in early 2021 to collect all relevant geological data. The initial desk study was completed in advance of site walkover surveys and site investigations. The desk study was checked and updated, where necessary, and also reviewed and updated in March and April 2026. The desk study included consultation with the following data sources:

- Integrated Pollution Control Licence (IPC) Allen Bog Group (Ref: P0503-01) Environmental Protection Agency, Appendix 4-1;
- Annual Environmental Reports 2000-2025 (Appendix 4-3¹);
- IPC Licence P0503-01 Application (Available at EPA Headquarters on request);
- BnM Cutaway Bog Decommissioning and Rehabilitation Plans (2026), Appendix 4-2;

¹ Annual Environmental Reports (2018-2024) can be found at the following link:
<https://leap.epa.ie/licence-profile/P0500/compliance>

- Ballydermot Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Barnaran Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Blackriver Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Codd Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Derrybrennan Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Glashabaun Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Killinagh Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Lullybeg Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Lullymore Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026);
- Ticknevin Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan (2026); and,
- Lodge Bog Cutaway Bog Decommissioning and Rehabilitation Plan (2022).
- Inspection of production records at Ballydermot Works;
- Aerial Maps from 1973, 1988, 1995, 2004 and 2020, Appendix 4-4;
- BnM Annual Reports (1946 to 2025) which contain information relevant to the Application Site such as peat depth databases and drainage;
- BnM Lidar data;
- Corine Land Cover and Land Cover Change Maps (<https://land.copernicus.eu/en>);
- Environmental Protection Agency soils and subsoils mapping (www.epa.ie);
- Geological Survey of Ireland – Geological databases (www.gsi.ie); and,
- Bedrock Geology 1:100,000 Scale Map Series. Geological Survey of Ireland (GSI, 2003).

7.2.2 Monitoring and Site Investigation Data

HES completed site inspections and walkover surveys at the Application Site as part of this rEIAR and to inform the proposed Ballydermot Wind Farm planning application. These site investigations comprised of peat probing, geological mapping and detailed walkover surveys completed by HES on 6th, 15th and 22nd October 2020, 5th, 10th, 12th and 18th November 2020, 1st April 2021, 11th December 2025 and 15th May 2026. These site investigations and surveys were completed by Michael Gill, Adam Keegan, Conor McGettigan and Nitesh Dalal (please refer to Section 7.1.2 for qualifications and experience).

In addition to the site investigations completed by HES, several additional site investigations have been completed at the Application Site to further inform this rEIAR and the proposed Ballydermot Wind Farm application. These site investigations included peat probing completed by MKO and Fehily Timoney and Company (FTC), trial pit excavations by FTC, trial pit excavations and borehole drilling by Irish Drilling Limited (IDL). The logs associated with these site investigations are provided in the Geotechnical and Peat Stability Assessment Report prepared for Ballydermot Wind Farm (FTC, 2026). This report will be appended to the Land, Soils and Geology chapter of the EIAR prepared for the Ballydermot Wind Farm application. The site investigation data referenced and described in that report has been used, where relevant, to inform this rEIAR chapter.

The combined geological dataset collated by HES, MKO, FTC and IDL has been used in the preparation of this rEIAR Chapter.

In summary, site investigations to address the land, soils and geology chapter of the rEIAR include the following:

- Detailed walkover surveys of the Application Site completed by HES, MKO and FTC;
- A total of 974 no. peat probes have been completed at the Application Site by HES, MKO and FTC;
- The excavation of 9 no. trial pits by FTC in May 2021, and laboratory analysis of recovered subsoil samples;
- The excavation of 53 no. trial pits by IDL in November 2021 (46 no. within the Application Site and 7 no. in agricultural lands adjacent to the bogs), and laboratory analysis of recovered subsoil samples;
- The drilling of 3 no. boreholes in agricultural lands adjacent to the Application Site by IDL in June 2021 and July 2022;
- Logging of subsoil exposures across the Application 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.

Site specific data obtained by HES, FTC and MKO was supplemented with recent and historic site-specific data supplied by Bord na Móna Biomass Ltd (the Applicant). These data include habitat, soils/land, lidar and topographic maps for the Application Site. The maps are included in the Draft Cutaway Bog Decommissioning and Rehabilitation Plan attached as Appendix 4-2. The Applicant has also provided volumes of peat extracted for the Application Site that are utilised in the preparation of this rEIAR Chapter.

7.2.3 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 Application Site is assessed using the criteria set out in Table 7-1 (NRA, 2008).

Table 7-1: 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.
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.

Importance	Criteria	Typical Example
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.

The EPA Guideline criteria (EPA, 2022) for the assessment of likely significant effects require that likely effects are described with respect to their extent, magnitude, quality (i.e. negative, positive or neutral), significance, probability, duration, frequency, reversibility, and transfrontier nature (if applicable). The descriptors used in this environmental impact assessment report are those set out in the EPA (2022) Glossary of effects as shown in Chapter 1: Introduction of this rEiAR.

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 receiving environment, as listed in Table 7-2.

Table 7-2: Impact descriptors related to the receiving environment.

Impact Characteristics		Potential Geological and 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.

7.2.4 Study Area

The study area for the land, soils and geological environment is limited to within the Application Site boundary. There was no potential for the Peat Extraction Phase or the Current Phase of the Project to affect the land, soils and geological environment outside of the Application Site. Furthermore, there is no potential for the Remedial Phase of the Project to affect the land, soils and geological environment outside of the Application Site.

7.2.5 Limitations and Difficulties Encountered

A complete record of annual peat extraction volumes from the Application Site is not available.

Peat extraction commenced at the Application Site in 1935 (refer Table 7-4 for the date of commencement at each of the individual bogs) and ceased in June 2020. BnM have provided records of the annual peat extraction volumes for 60 years of this 86-year period. However, there are several periods of time for

which no peat extraction volumes are available. There are no detailed records for peat extraction volumes from 1935 to 1939, 1946 to 1950, 1955 to 1962, 1988 to 1993 and 1996 to 1997, therefore average data for the 5-year and 10-year periods was selected as a representative sample from which an average value has been calculated to represent peat extraction volumes in these years. Further details are provided in Chapter 4 of the rEIAR.

7.3 Establishing the Baseline Environment

7.3.1 Site Location and Description

The Application Site is located 2.2km southeast of Edenderry, 3.3km west of Allenwood, 2.4km north of Rathangan and 1.7km east of Clonbullogue Village. The Application Site comprises 14. no. bogs located on the Offaly-Kildare County border. The bogs include: Ticknevin, Glashabaun North, Glashabaun South, Codd 1, Codd 2, Ballydermot North, Ballydermot South, Blackriver, Lullymore, Lullybeg, Barnaran, Killina, Derrybrennan and Lodge. The Application Site has a total area of 5,448 hectares (ha). The Application Site forms part of the larger Allen Bog Group (~18,235ha). The lands within this Application Site represent ~30% of this Bog Group.

The Application Site is located in a low-lying landscape rural in character. The topography today ranges between 84 m above ordnance datum (AOD) at its highest point to approximately 68 m AOD at its lowest point. The Application Site measures approximately 10 km in length from north to south, and approximately 10.7 km from east to west, at its widest point. The Grid Reference co-ordinates for the approximate centre of the Application Site are E 266159, N 225145. The boundaries of the individual bogs are mainly defined by hedgerows, watercourses and laneways.

The Application Site is generally accessible via the local road network branching from the R402 to the north, the R403 to the east, the R401 to the west and the R414 to the south, with the latter cutting through the southeast of the site.

The townlands within which the Application Site are located are detailed in Table 1-1 in Chapter 1 of this rEIAR.

A description of each of the 14 no bogs which comprise the Application Site is provided in Section 1.7 of Chapter 1 of this rEIAR.

7.3.2 Topography

7.3.2.1 Original Topography

Prior to the commencement of drainage, which first occurred at the Application Site in 1935, the Application Site was covered by an active raised bog, with the surface being wet, acidic and deficient in plant nutrients, with open Sphagnum-dominated vegetation. Raised bogs are accumulations of deep acid peat where peat can range from 3-12m deep. The “raised bog” name is derived from the elevated dome which develops as the bog grows due to the accumulation of peat. The topography across the Application Site prior to the onset of peat extraction and ancillary activities is estimated to have been 75 - 88mOD. This is deduced from the presence of benchmarks noted on historical 25” OSI mapping (1897-1913 and) Cassini 6” (1940s) of the area.

The estimated topographic changes through time for each individual bog are shown in Table 7-3 below.

7.3.2.2 1988 Baseline Topography

Historically, the topographic profile of the Application Site was higher than that observed today with the topographic changes varying from across the site depending on the extraction history of the specific area of the Application Site (refer to Chapter 4). The Application Site would have experienced some topographic decrease associated with the initial drainage of the bog and the associated subsidence. Regan et al. (2019) observed continued subsidence of 4-6mm/year of a bog surface due to groundwater drainage, while Grzywna (2017) also recorded a subsidence rate of 6mm in a drained peatland. Further decreases in topography would have resulted from the subsequent peat extraction which commenced in 1935 (refer Table 7-4 for individual bogs). As detailed in Section 4.3.3 of Chapter 4, BnM records indicate that approximately 12,595,201 tonnes of peat were extracted from the Application Site for the period between 1935 to June 1988 inclusive. The estimated topography of the Application Site in July 1988 is based on an average depth of milled peat extraction of 0.135m per year over a 32-year period, which has been worked back from the 2020 topography. As most of the Application Site was subject to milled peat extraction, this approach is considered to be the most robust in determining the peat height in 1988. The topography of the Application Site is estimated to have been approximately 72-88 mOD by 1988.

7.3.2.3 Current Topography

The current topography of the Application Site is relatively flat with an elevation range of between approximately 68 and 84mOD. Topography at the Application Site has been modified through the peat extraction and ancillary activities including associated drainage works. Today the highest elevations are found at headlands and remnant peat banks which create a boundary berm, forming a basin effect within the former extraction areas of the bog. These remnant peat banks and headlands provide an approximation (albeit drained and subsided) of the original ground elevations which existed across the Application Site prior to the commencement of any peat extraction and ancillary activities. The topography at each of the bogs comprising the Application Site is presented in Table 7-3 below.

Table 7-3: Estimated Topographic Changes at the Application Site.

Bog Name	Pre-Extraction (1935) ²	1988 Topographic Range	Current Topographic Range (mOD)
Ballydermot North	76 - 86	72 - 86	68 – 82
Ballydermot South	79 - 82	73 - 80	69 – 76
Blackriver	75 - 81	72 - 81	68 – 77
Barnaran	81 - 84	75 - 84	71 – 80
Lullybeg	84 - 86	72 - 78	68 – 74
Lullymore	84 - 86	73 - 84	69 - 80
Lodge	81 - 85	78 - 85	74 – 81
Killina	78 - 88	78 - 88	70 - 84

² The Pre-Extraction (1935) elevations presented in this table have been derived from 25" OSI mapping (1897-1913) and Cassini 6" mapping. Note that the overall elevation range at the Application Site was between 75 and 88 mOD as discussed in Section 7.3.2.1.

Bog Name	Pre-Extraction (1935) ²	1988 Topographic Range	Current Topographic Range (mOD)
Derrybrennan	78 - 87	75 - 86	71 - 82
Glashabaun North	78 - 88	72 - 83	68 – 79
Glashabaun South	78 - 87	73 - 81	69 – 77
Ticknevin	78 - 81	77 - 81	73 – 77
Codd 1	76 - 79	72 - 79	68 – 75
Codd 2	76 - 80	72 - 80	68 – 76

7.3.3 Land (Land take)

7.3.3.1 Land - Historical Change Summary

The primary change to land at the Application Site associated with peat extraction and ancillary activities occurred during the initial drainage of the bog and the removal of vegetation in advance of peat extraction. Drainage ditches were inserted into the surface of the bog and drained the upper surface of the bog by lowering the local peat water table (full details on the drainage implemented at the Application Site are provided in Chapter 4). At this time, ancillary features were constructed including railway lines, machine passes, canteens, and mobile and fixed fuel tanks. After sections of the Application Site were drained, vegetation was removed from the bog surface, leaving only bare peat fields between the drains. During the Peat Extraction Phase only minimal soils/land change occurred and may have involved a change in the type of peat extraction i.e. sod peat, sod moss or milled peat extraction. During peat extraction, minor topographic changes have occurred annually due to the removal of peat from active peat extraction areas.

Land take and any land changes at the Application Site have been investigated using available aerial imagery dating from 1973 to present day. An aerial image from 1973 shows that a large area of approximately 4, 510 ha in the centre of the Application Site had been drained and was subject to peat extraction by this time. An area (approximately 688 ha) of the Application Site had been drained but was not subject to peat extraction. Meanwhile, the remainder of the Application Site (approximately 250 ha) had not been drained by 1973 and would still have been active raised bog. The primary and greatest land-use change associated with peat extraction and ancillary activities on the Application Site occurred during the initial drainage and vegetation removal of the bogs, which began in 1935, in advance of peat extraction. This impact would have predominantly occurred in advance of 1988 at the Application Site.

Table 7-4 presents the key dates in relation to the peat extraction and ancillary activities at the Application Site.

Table 7-4: Peat Extraction Activity Timeline at the Application Site

Bog Unit	Bog Area (ha)	Commencement of Site Preparation Works (vegetation clearance and drainage insertion)	Extraction Commenced	Extraction Ceased
Ballydermot North	456	1946	1950	2020
Ballydermot South	425	1946	1950	2020
Blackriver	732	1947	1950	2020
Barnaran	486	1954	1959	2020
Lullybeg	267	1935	1935	2004
Lullymore	175	1935	1935	1992
Lodge	407	1947	1953	2020
Killina	257	1935	1935	2020
Derrybrennan	132	1959	1969	2015
Glashabaun North	515	1947	1951	2020
Glashabaun South	601	1947	1951	2020
Ticknevin	456	1973*	1981*	2019
Codd 1	247	1959	1973*	2020
Codd 2	290	1973	1981*	2019

*Estimated date indicated by available aerial imagery which are included in Appendix 4-4 of this rEIA.

Table 7-5 below summarises the change in land use across the Application Site based on the available aerial imagery. The baseline 1988 environment was comprised of a largely drained cutover bog area, with the majority of the Application Site already subject to peat extraction. The greatest change to occur at the Application Site during the Peat Extraction Phase was associated with the draining of the additional ~100ha of bog which was intact and undrained in 1988. However, this area represents a very small percentage (~1.8ha) of the Application Site.

Table 7-5: Land Change Over time at the Application Site Based on Available Aerial Imagery

Year	Area subject to Peat Extraction (ha)	Area Drained but not subject to Extraction (ha)	Undrained Area (ha)
1973	~4,510	~688	~250
1988 (rEIA Baseline)	~4,828	~423	~197
1995	~4,686	~565	~197

Year	Area subject to Peat Extraction (ha)	Area Drained but not subject to Extraction (ha)	Undrained Area (ha)
2004	~4,493	~757	~196
2020	~54	~5,295	~97

7.3.3.2 Land - Pre-Peat Extraction (1935)

It is assumed that prior to the onset of drainage and peat extraction and ancillary activities, which first occurred in 1935, the Application Site was covered by an active raised bog, with the surface being wet, acidic and deficient in plant nutrients, with open Sphagnum-dominated vegetation. Raised bogs are accumulations of deep acid peat where peat can range from 3-12m deep.

7.3.3.3 Land - 1988 Baseline

By 1988, the land use at the Application Site was well established as industrial peat extraction. The Application Site was drained with milled, sod moss and sod peat extraction were taking place across most of the Application Site in 1988. By 1988 total of ~5,251 ha (~96.38%) of the Application Site had been drained. Of this ~4,828 ha was subject to peat extraction (milled, sod and sod moss extraction), representing 88.6% of the Application Site. Only ~197 ha had been neither drained nor subject to peat extraction, representing 3.6% of the Application Site. The areas of the individual bogs comprising the Application Site which were subject to extraction are detailed in Table 7-6 below.

Railway infrastructure was also established throughout the Application Site by 1988. The main entrance points to the Application Site were at the Ballydermot Works entrance on the L-3001 road in the southwest of the Application Site, and from a local road (L-2506-3) which crosses the Grand Canal, passing the Lullymore Briquette Factory before cutting through Killina Bog in the northeast. Other access points include entrances off the L3001 Rathangan to Edenderry Road which cuts through the Application Site in a north to west direction and off the Allenwood to Rathangan Road (designated R414 in 1993) which cuts through the southeast of the Application Site. Ballydermot Works, which comprised welfare facilities, storage sheds, offices, maintenance buildings, staff carparks, HGVs storage area, a tiphead and a refuelling area is still in situ at present day.

Table 7-6: Baseline July 1988 Land Use

Bog Unit	Total Bog Area (ha)	Area subject to Peat Extraction	Area Drained but not subject to Extraction	Undrained Area
Ballydermot North	456	456	-	-
Ballydermot South	425	326.8	-	98.2
Blackriver	732	726.3	-	5.7-
Barnaran	486	486	-	-
Lullybeg	267	154	113	-
Lullymore	175	175	-	-
Lodge	407	383.1	-	23.9

Bog Unit	Total Bog Area (ha)	Area subject to Peat Extraction	Area Drained but not subject to Extraction	Undrained Area
Killina	257	168.5	88.5	-
Derrybrennan	132	132	-	-
Glashabaun North	515	499	-	16.2
Glashabaun South	601	419.5	192.5	-
Ticknevin	456	417.8		38.2
Codd 1	247	217	32.9	-
Codd 2	290	290	-	-
Total	5,448	4,828	423	197

7.3.3.4 Land – Current Condition

Corine land cover maps (2018) (www.epa.ie) show that the Application Site is predominantly comprised of ‘peat bogs’, located in a largely agricultural area. The Corine land cover at each of the bogs comprising the Application Site is detailed in Table 7-7. As detailed in Table 7-5 above, only ~97ha of undrained peatland remains at the Application Site, with the majority of the Application Site comprising of former peat extraction areas.

Landcover and land use at the Application Site have been verified during the site walkover surveys completed by HES. The landcover and uses surrounding the Application Site comprises a mixture of forestry, agricultural land, cutover and cutaway peatland, one-off rural housing and small village settlements. Cutaway peatlands are those areas where all commercially viable volumes of peat have been extracted. Cutover peatlands are those areas where peat extraction has occurred, and commercially viable peat volumes remain. Since the cessation of peat extraction and ancillary activities in June 2020, the Application Site has begun to revegetate naturally. The degree of revegetation depends on the length of the time since peat extraction ceased as peat extraction ceased at different times across the different bogs. Meanwhile, enhanced rehabilitation works have been completed at Lodge Bog.

Table 7-7: Summary of Corine Land Cover mapped at the Application Site

Bog Name	Corine Land Cover	Notes from Rehab Plans
Ballydermot North	Peat bogs with central area and small area in the southwest mapped as transitional woodland scrub.	Small section of coniferous forestry in the north. Ballydermot Works in the southeast. Second smaller works area in the centre.
Ballydermot South	Peat Bogs with small area in the south mapped as Non-irrigated arable land.	
Blackriver	Peat Bogs with small area in the north mapped as Land principally occupied by agriculture with significant areas of natural vegetation, small area in east mapped as Transitional woodland scrub and small area	Several relatively large sections of remnant raised bog along the western and northern margins, majority are degraded and have been cut privately for sod peat over the

Bog Name	Corine Land Cover	Notes from Rehab Plans
	in south mapped as pastures and mixed forests.	years, but retain some typical raised bog characteristics.
Barnaran	Peat Bogs with some area in the northwest and small areas in northeast and south mapped as Transitional woodland scrub.	Several remnant raised bog along the western and northern margins, majority are degraded and have been cut privately for sod peat over the years, but retain some typical raised bog characteristics.
Lullybeg	Transitional woodland scrub with some area in the southwest mapped as Peat bogs and some area in the northeast mapped as Mixed forests.	Lullybeg has been planted with conifer forestry by Coillte with some undeveloped and broad-leaved forestry.
Lullymore	Peat Bogs with some area in the north mapped as Transitional woodland scrub and Mixed forests.	Lullymore has been planted with conifer forestry with some undeveloped and broad-leaved forestry. Some area adjacent to the bog has been landscaped, re-wetted and allowed to naturally colonise.
Lodge	Peat Bogs with some area in the north and southwest mapped as Transitional woodland scrub and small area in south and southeast is mapped as Pastures.	Some small areas of turbary and former licenced plots occur within the site boundary.
Killina	Mixed forest with eastern portion as Transitional woodland scrub, some areas in northeast and southeast are mapped as Peat Bogs and some area in southwest is mapped as Pastures.	The main land-use is the forestry trial, which is still in progress. The remaining area is developing as cutaway bog with a mosaic of habitats.
Derrybrennan	Peat Bogs with some area in the southwest and southeast mapped as Transitional woodland scrub and some area in northeast is mapped as Pastures and Non-irrigated arable land.	Part of the site was planted with conifer forestry. Part of the site was developed as a forestry trial (deep ploughing of cutaway, mixed planting of conifers and broad-leaves). Small area comprises scrub and is included as a biodiversity feature (within the forestry development). Norway Spruce was planted in open parts of the site. The remaining area is developing as cutaway bog with a mosaic of habitats and has now specific land-use.
Glashabaun North	Peat Bogs with small area in the northwest mapped as Transitional woodland scrub, small area in north mapped as Coniferous forests and some area in southeast is mapped as mixed forests.	Majority of Glashabaun North bog comprises bare peat. Some production-related cutaway developing young pioneer cutaway habitats dominated by poor fen vegetation communities. Remnant strip of habitat along the edge of the production bog.
Glashabaun South	Transitional woodland scrub with some area in the northwest mapped as Peat bogs and some are in southeast mapped as mixed forests.	Significant portion of Glashabaun South has been out of production for some time and has developed more mature cutaway habitats. Part of this cutaway has also been developed for conifer forestry in the 1990's

Bog Name	Corine Land Cover	Notes from Rehab Plans
		by Coillte. Younger, production-related cutaway appears further north and peat production has been carried out along the northern side of the site. There is also some active sod peat production through Glashabaun South.
Ticknevin	Peat Bogs with small area in the north mapped as Pastures and small area in southwest mapped as Transitional Woodland scrub.	Some private sod-peat production around the margins of the high bog, both inside and outside the ownership of Bord na Móna. Turbary is ongoing on an area of drained raised bog to the west of the industrial production area.
Codd 1	Peat Bogs with small area in the north mapped as Land principally occupied by agriculture with significant areas of natural vegetation, small areas in northwest and west mapped as Pastures and small area in east mapped as Mixed forests.	Small area of conifer plantation (private plantation) has been planted at the north-east corner on old cutover bog. South of the plantation there is some active cutover bog where there is private sod-turf cutting.
Codd 2	Peat Bogs with small area in the west and southeast mapped as Land principally occupied by agriculture with significant areas of natural vegetation and small area in south mapped as Mixed forests.	

7.3.4 Peat/Soils and Subsoils

7.3.4.1 Current Environment

7.3.4.1.1 Desk Study

The published Teagasc soils map (www.gsi.ie) for the local area shows that cutover/cutaway peat is mapped almost exclusively across the Application Site except for small area in the northeast of Derrybrennan Bog which is mapped as mainly basic poorly drained mineral soils (BminPD). Soils mapped in the surrounding lands comprise largely of mainly basic deep well drained mineral soil (BminDW), mainly basic poorly drained mineral soils (BminPD) and cutover/cutaway peat (Cut). Mineral alluvium (AlluvMIN) is mapped along the Figile River to the southwest and Slate River to the southeast of the Application Site.

The published GSI subsoils map (www.gsi.ie) shows that the Application Site is underlain predominantly by cut over raised peat (Cut) with small areas in the northeast of Derrybrennan Bog mapped to be underlain by till derived from limestones (TLs). The area surrounding the Application Site is mapped to be underlain by tills derived from limestones (TLs), cut over raised peat (Cut) and bedrock outcrop or subcrop (Rck). Meanwhile, some esker sands and gravels (BasEsk) and gravels derived from limestones (GLS) are also mapped to the northeast of the Application Site. Alluvium subsoils are mapped along the Figile River to the southwest and Slate River to the southeast of the Application Site.

A summary of the soils and subsoils in each bog are included in Table 7-8. A map of the local subsoil cover is attached as Figure 7-1.

Table 7-8: Summary of mapped soils and subsoils at the Application Site

Bog Name	Teagasc Mapped Soils	GSI Mapped Subsoils
Ballydermot North	Ballydermot North Bog is overlain by Cutover/cutaway peat (Cut)	The Ballydermot North Bog is underlain by Cut over raised peat (Cut)
Ballydermot South	Ballydermot South Bog is overlain by Cutover/cutaway peat (Cut)	The Ballydermot South Bog is underlain by Cut over raised peat (Cut)
Blackriver	Blackriver Bog is overlain by cutover/cutaway peat (Cut)	The majority of Blackriver Bog is underlain by cut over raised peat (Cut) with a very small area in northwest underlain by till derived from limestones (TLs)
Barnaran	Barnaran Bog is overlain by cutover/cutaway peat (Cut)	Barnaran Bog is underlain by cut over raised peat (Cut)
Lullybeg	Lullybeg Bog is overlain by Cutover/cutaway peat (Cut)	Lullybeg Bog is underlain by cut over raised peat (Cut)
Lullymore	Lullymore Bog is overlain by cutover/cutaway peat (Cut)	Lullymore Bog is underlain by cut over raised peat (Cut)
Lodge	Lodge Bog is overlain by cutover/cutaway peat (Cut)	Lodge Bog is underlain by cut over raised peat (Cut)
Killina	Killina Bog is overlain by cutover/cutaway peat (Cut)	The majority of Killina Bog is underlain by cut over raised peat (Cut) with a very small area in north underlain by till derived from limestones (TLs)
Derrybrennan	The majority of Derrybrennan Bog is overlain by cutover/cutaway peat (Cut) with some area in northeast overlain by mainly basic poorly drained mineral soils (BminPD)	The majority of Derrybrennan Bog is underlain by cut over raised peat (Cut) with some area in northeast underlain by till derived from limestones (TLs).
Glashabaun North	Glashabaun North Bog is overlain by cutover/cutaway peat (Cut)	Glashabaun North Bog is underlain by cut over raised peat (Cut)
Glashabaun South	Glashabaun South Bog is overlain by cutover/cutaway peat (Cut)	Glashabaun South Bog is underlain by cut over raised peat (Cut)
Ticknevin	Ticknevin Bog is overlain by cutover/cutaway peat (Cut)	Ticknevin Bog is underlain by cut over raised peat (Cut)
Codd 1	Codd 1 (Codd South) Bog is overlain by cutover/cutaway peat (Cut)	The majority of Codd 1 Bog is underlain by cut over raised peat (Cut) with a very small area in east underlain by till derived from limestones (TLs).

Bog Name	Teagasc Mapped Soils	GSI Mapped Subsoils
Codd 2	Codd 2 (Codd North) Bog is overlain by cutover/cutaway peat (Cut)	The majority of Codd 2 Bog is underlain by cut over raised peat (Cut) with a very small area in southeast underlain by till derived from limestones (TLs).

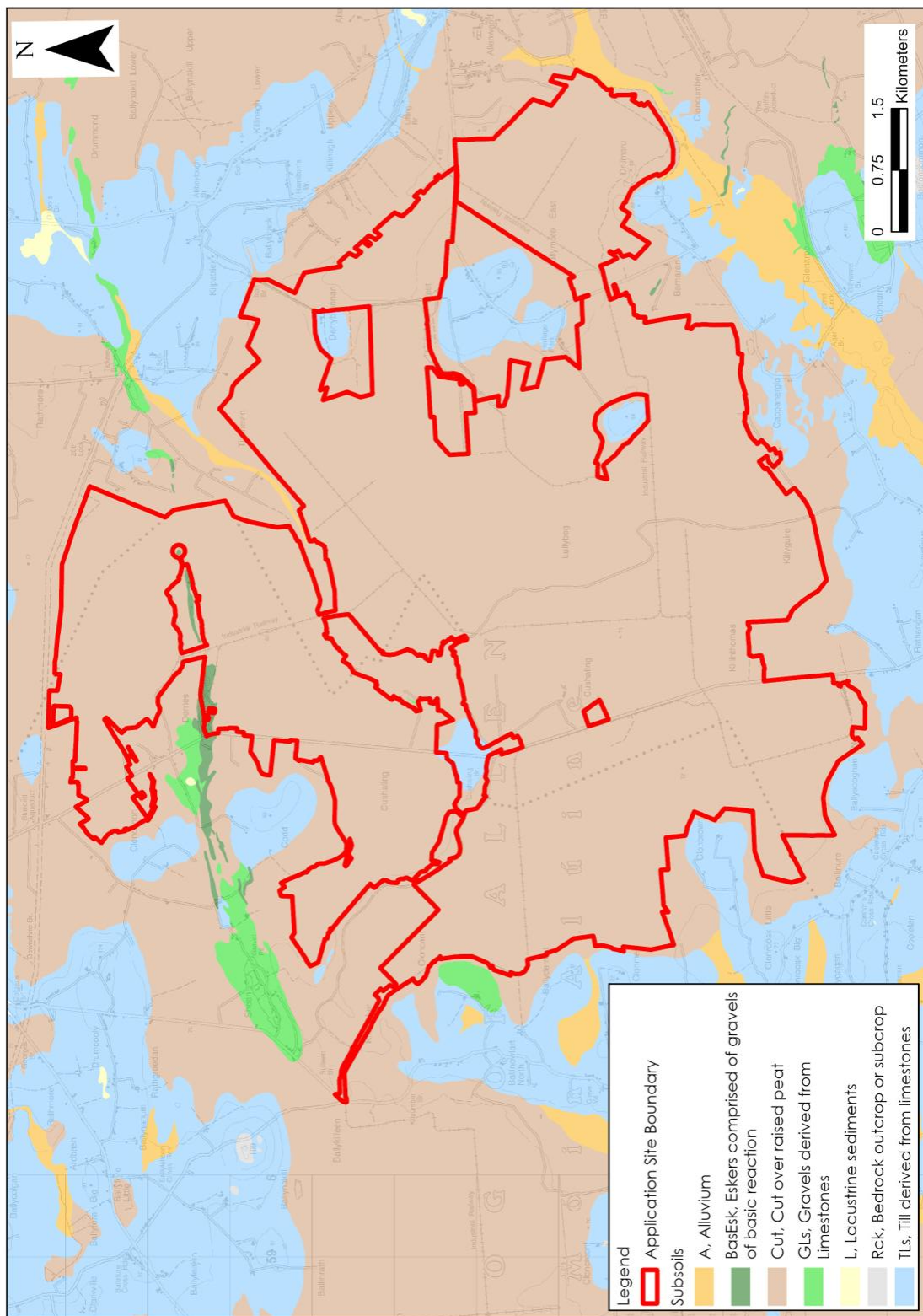


Figure 7-1: Local Subsoils Map

7.3.4.1.2 **Site Specific Data**

The soils and subsoils present at the Application Site have been verified during site walkover surveys and intrusive site investigations completed as part of site investigations for the Proposed Ballydermot Wind Farm application.

Draft Cutaway Bog Decommissioning and Rehabilitation Plans

According to the Draft Cutaway Bog Decommissioning and Rehabilitation plans (refer to Appendix 4-2), the peat type and depths for each bog is as follows:

Ballydermot North and South Bog: Much of Ballydermot Bog is now cutaway and the majority of the original raised bog has now been removed. In most of the bog the peat depth is less than 1m. Residual deeper peat remains in the Ballydermot South and small pockets on Ballydermot North with residual peat over 3-4 m in depth in some places.

Blackriver Bog: Much of Blackriver Bog is now cutaway, and the majority of the original raised bog has now been removed. Blackriver is considered to be a shallow peat cutover bog, and in general between 0.5m - 1.5m of residual fen or minerotrophic peat remains. There are also some areas with residual peat of deeper than 2 m, most notably within the southern portion of the site.

Barnaran Bog: Much of Barnaran Bog is now cutaway, and the majority of the original raised bog has now been removed. Barnaran is considered to be a shallow peat cutover bog, and in general between 0.5m - 1.5m of residual fen or minerotrophic peat remains. There are also some areas with residual peat of deeper than 2 m, most notably within the north-eastern, south-eastern and south-western areas of the site.

Lullybeg Bog: Much of Lullybeg Bog is now cutaway and the majority of the original raised bog has now been removed. In general, between 0.5-1.5 of residual peat remains across the majority of the site. There is some deeper peat towards the southern margin with pockets of 2-3 m of peat present.

Lullymore Bog: Much of Lullymore Bog is now cutaway and the majority of the original raised bog has now been removed. In general, between 0-1 m of residual peat remains across the majority of the site.

Lodge Bog: Coring carried out by RPS in 2021 across Lodge Bog provided further insight into the deposits underlying the bog. The dataset revealed the lowest lying areas of the bog to be underlain by Limestone till (below c. 72.5mOD) and lacustrine clay (below c. 74mOD), while there are a number of ridges of more elevated material (rising to >77mOD). Mixed gravel till is exposed in some places at the ends of fields that are developing as cutaway and within the deep drainage ditches under peat across the bog. Peat depths are varied across the site. A large portion of the east of the bog contains peat depths in excess of 2.6ms. Much of the central portion of the site contains shallow peat, largely between 0-1 metre, with deeper peat at the bog boundary/near headlands.

Killina Bog: Much of Killina Bog is now cutaway and the majority of the original raised bog has now been removed. In general, between 0.5-1.5 of residual peat remains. There is some exposed sub-soil at the northern end (limestone till).

Derrybrennan Bog: Derrybrennan Bog is now cutaway and the majority of the original raised bog has now been removed. Much of the bog comprises shallow residual peat of less than 1 m with some deeper pockets of peat interspersed. Peat is deeper to the east of the site. Deep peat areas may have the potential to develop embryonic Sphagnum-rich peat-forming communities if optimum hydrological conditions can be developed.

Glashabaun North and South Bog: There seems to be somewhat deeper peat left on Glashabaun South compared to other production bogs. This peat has still been harvested to the fen layers. However, there are very little gravel mounds or sub-soil exposed on the site. A sandy, marl-like sub-soil is found along the Figile River, where there are profiles exposed. This is likely to be alluvial in development. The deeper pockets of peat over 2m may have the potential to develop embryonic Sphagnum-rich peat-forming communities if optimum hydrological conditions can be developed.

Ticknevin Bog: Much of Ticknevin Bog is now cutaway and the majority of the original raised bog now been removed. Ticknevin is considered to have relatively deep residual peat, and the majority of the bog is estimated to have between 2m - 5m of peat remaining. Peat depths are generally shallower within the western area of the bog and along its northern boundary.

Codd 1 and Codd 2 Bogs: Much of Codd Bog is now cutaway and the majority of the original raised bog has now been removed. In general, between 0.5-1.5m of residual peat remains. Remnants of deeper peat remain in the north-west spur and eastern section of Codd 2 with peat over 5m in depth in some places. This may have the potential to develop embryonic Sphagnum-rich peat-forming communities if optimum hydrological conditions can be developed.

Peat Probing

The presence of subsoil peat on-site has been confirmed by peat probing investigations conducted by HES, FTC and MKO. The combined dataset included a total of 974 no. peat probe investigation points. Note that a very small number of proposed SI locations could not be probed due to waterlogged conditions or the presence of railbeds. These points are not included in Figure 7-2 or Table 7-9. The peat depth data from the completed 966 no. probes is discussed below.

Peat depth intervals recorded across the Application Site are shown on the bar chart presented as Figure 7-2. Overall peat depths ranged from 0 to >6m with an average of 1.61m ($n=948$, $\sigma = 1.03m$). 59% of peat depth probes recorded peat depths of 0.5m to 2.0m, and 21% of peat depth probes recorded peat depths of 2.0m to 3.0m. Approximately 90% of peat depth probes recorded peat depths of less than 3.0m. A number of localised readings were recorded where peat depths were >3.5. The subsoils encountered during the peat probing typically comprised of clay, sandy or gravelly mineral soils. Peat depth information obtained from the peat probe investigation for the individual bogs comprising the Application Site is summarised in Table 7-9.

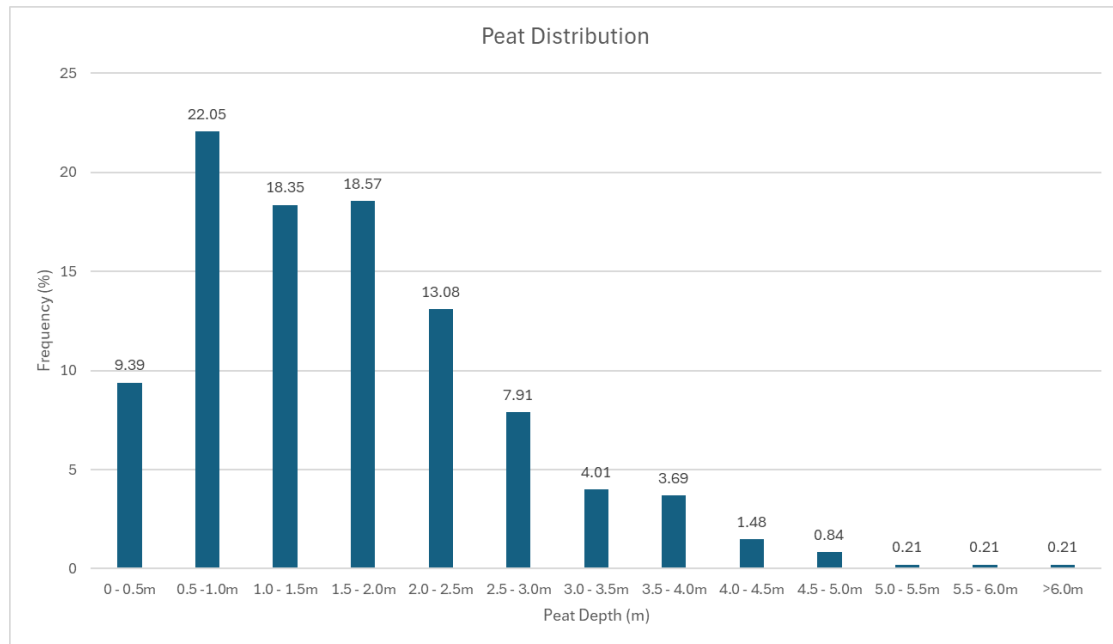


Figure 7-2: Residual Peat Depths at the Application Site (HES, FT and MKO peat probes)

Table 7-9: Summary of peat depths across the Application Site (based on MKO, HES and FT Probing).

Bog Name	No. Peat Probes	Range (m)	Average (m)
Ballydermot North	96	0 – 3	1.25
Ballydermot South	115	0 – 4.7	0.85
Blackriver	199	0 – 4.6	1.41
Barnaran	91	0 – 4.2	1.36
Lullybeg	57	0.2 – 2.6	1.09
Lullymore	10	0 – 2.1	0.86
Lodge	20	0 – 2.3	1.29
Killina	-	-	-
Derrybrennan	41	0 – 3.7	1.66
Glashabaun North	101	0.1 – 6	1.38
Glashabaun South	73	0.1 – 5.8	1.49
Ticknevin	55	0 – 6	3.24
Codd 1	66	0 – 3.8	1.5
Codd 2	42	0.4 – 4.1	2.25

Trial Pits and Boreholes

Ground investigations were completed at the Application Site (53 no. trial pits), and the surrounding lands (3 no. rotary core boreholes) by IDL. An additional 9 no. trial pits were excavated at the Application Site by FTC.

The ground conditions encountered during these site investigations, which were completed to inform the design of the Proposed Ballydermot Wind Farm, are summarised as follows:

- The trial pits excavated at the Application Site extended to depths of 0.5 to 4.7mbgl;
- The Application Site is overlain by light brown to dark brown amorphous to fibrous PEAT;
- The peat thicknesses recorded during these site investigations ranged from 0.2 to 4m;
- The peat at the Application Site is underlain by lacustrine clay, described as light grey to brown, soft to stiff gravelly SILT/CLAY with some cobbles and boulders;
- The site investigations completed in the agricultural lands to the west of Codd 1 Bog, and outside of the Application Site, encountered fluvioglacial sand and gravel, typically described as grey silty sandy GRAVEL with fine to coarse SAND with cobbles and boulders.

The logs associated with these site investigations are attached to the Geotechnical and Peat Stability Assessment Report prepared for Ballydermot Wind Farm (FTC, 2026). A map of the TP and BH locations is included as Figure 7-3.

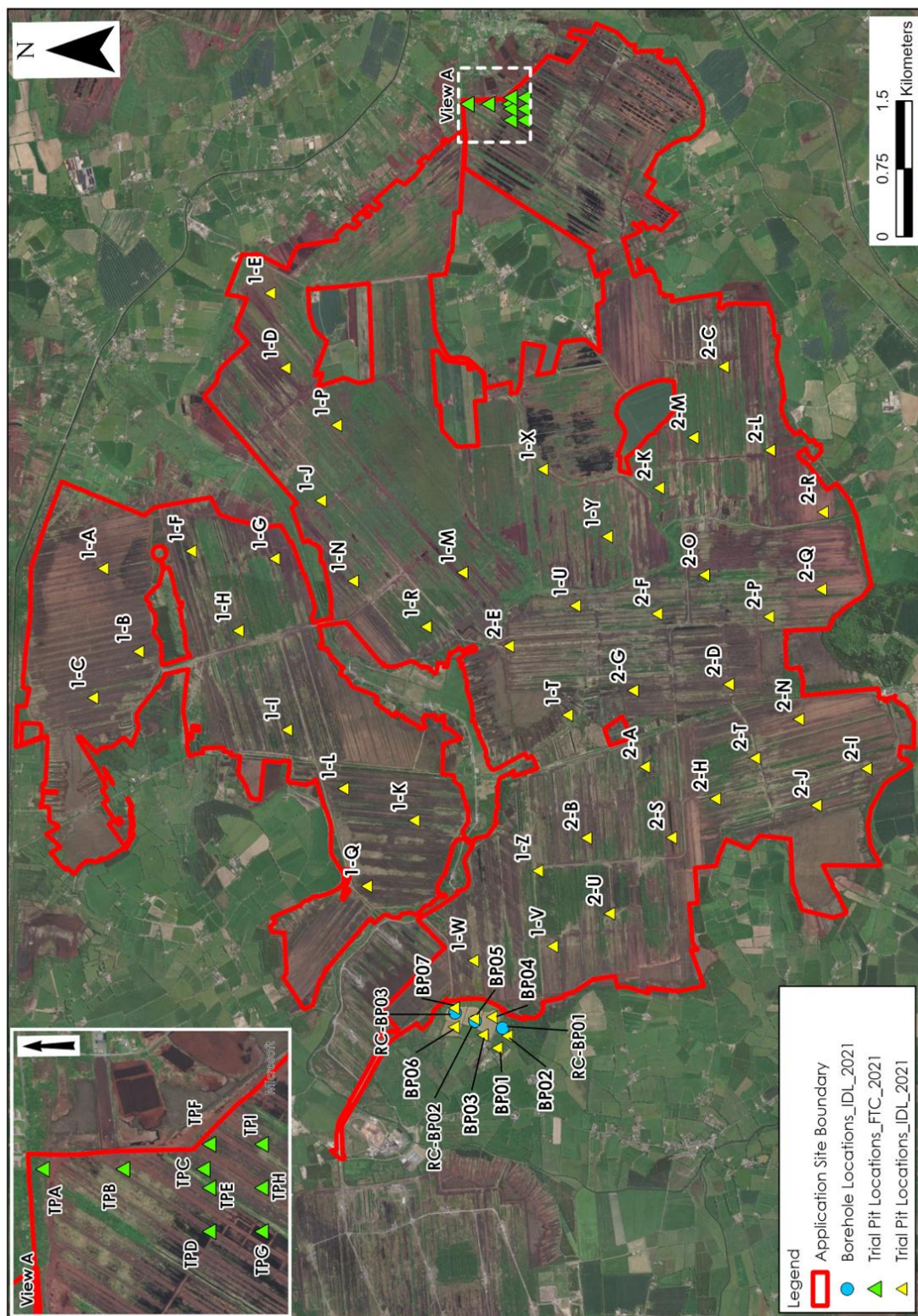


Figure 7-3: Site Investigation Locations (Trial Pits and Boreholes)

7.3.4.2 Peat Extraction

Peat extraction commenced at the Application Site in 1935 (refer Table 7-4 for the date that peat extraction commenced in each of the individual bogs comprising the Application Site). Sod peat was extracted at the Application Site from 1950 to 2000. Milled peat was extracted at the Application Site from 1935 to 2020. Sod moss extraction commenced at the Application Site in 1976 and ceased in 2020. Bin sod was extracted at the Application Site in 2000 and ceased in 2020. BnM peat extraction records were consulted in order to quantify the volume of peat which has been removed from the Application Site. Note that records of the volume of peat extracted from the Application Site are not available for every year. For the years where there was no extraction volumes recorded, the average extraction volumes from other years were used to estimate the volume of peat extracted. This is detailed in the subsequent sections and in Chapter 4 of this rEiAR.

7.3.4.2.1 Peat Extraction 1935 - June 1988

Peat extraction commenced at the Application Site in 1935. An estimate of the volumes produced during that period was determined based on the number of bogs in production, the estimated area in production and an average of production tonnages over the 1935 to June 1988 period. Peat extraction volumes are not available for milled peat from 1935 to 1939 and 1946 to 1951 therefore an estimate based on the average peat extraction volumes at the Application Site in the 5-year period following each range was used in the absence of accurate data. Peat extraction volumes are not available for sod peat from 1955 to 1962 and milled peat from 1960 to 1962 therefore an estimate based on the average peat extraction volumes at the Application Site in the 10-year period between 1963 and 1973 was used in the absence of accurate data. The volumes of peat removed from the Application Site varied from year to year with a general and gradual increase with time as more of the Application Site was developed and became available for peat extraction and ancillary activities. Fluctuations in peat extraction volumes are generally attributable to weather conditions in any given year, with wetter weather resulting in lower volumes of peat extraction due to poorer ground conditions for operating machinery, and poorer peat drying conditions; conversely, dryer weather usually resulted in higher volumes of peat extraction due to better ground and drying conditions.

It is estimated that approximately 106,472 tonnes of milled peat was produced annually at the Application Site between 1935 and July 1988, the milled peat produced was transported by rail to the Lullymore Briquette factory to be used in briquettes from 1936 and to Ballydermot Works from 1986.

It is estimated that approximately 167,483 tonnes of sod peat were extracted annually from the Application Site between 1950 and 1988, which would have been predominantly delivered to Portarlinton Power Station via trucks from its opening in 1950 to its closure in 1988 and Allenwood Power Station via rail from its opening in 1952 to its closure in 1994. Smaller volumes of sod peat were transported by trucks for public sale.

From 1976 to 1988, 40,000 tonnes of sod moss was transported by road from the Application Site to Kilberry Factory annually. From Kilberry Factory the sod moss was distributed to the horticulture industry overseas via Dublin Port.

BnM production records indicate that approx. 12,595,201 tonnes (sod, milled and sod moss combined) were extracted from the Application Site for the period 1935 and July 1988 inclusive. Figure 7-4 and Table 7-10 below outlines the peat extraction tonnages over the 1935 to June 1988 period.

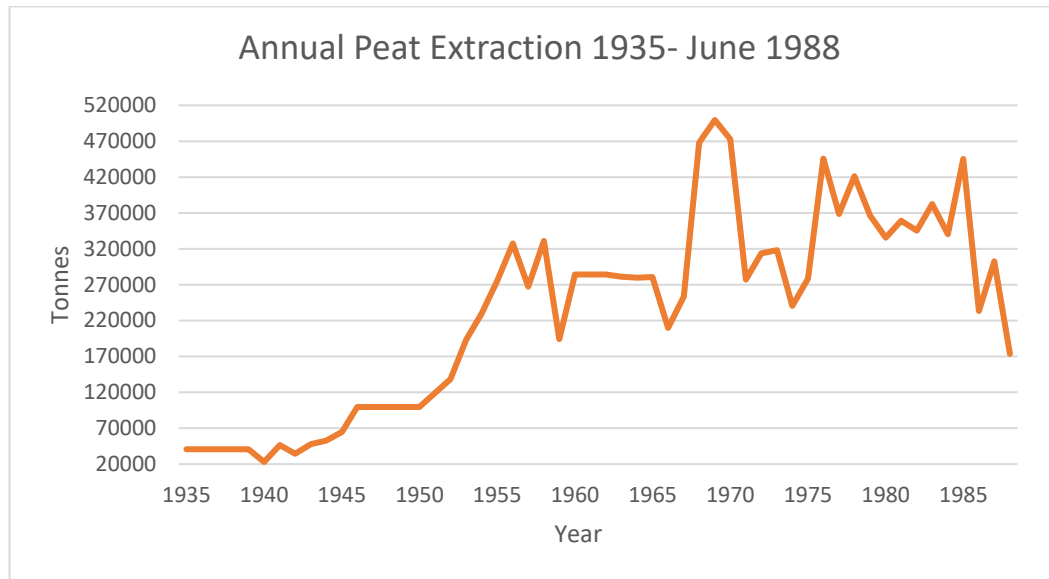


Figure 7-4: Annual Peat Extraction volumes (Tonnes) 1935 to June 1988.

Table 7-10 Annual Peat extraction (Tonnes) 1935 to June 1988.

Year	Annual Extraction (Tonnes)	Year	Annual Extraction (Tonnes)
1935	40,870*	1963	281,258
1936	40,870*	1964	279,872
1937	40,870*	1965	280,651
1938	40,870*	1966	209,760
1939	40,870*	1967	253,642
1940	23,000	1968	468,164
1941	46,400	1969	499,502
1942	34,560	1970	472,779
1943	47,850	1971	277,299
1944	52,540	1972	313,522
1945	65,000	1973	318,180
1946	99,780*	1974	240,373
1947	99,780*	1975	278,284
1948	99,780*	1976	445,857
1949	99,780*	1977	368,401
1950	99,780*	1978	421,258
1951	119,180	1979	366,387
1952	138,547	1980	335,342
1953	193,287	1981	359,321
1954	230,360	1982	345,305

Year	Annual Extraction (Tonnes)	Year	Annual Extraction (Tonnes)
1955	275,333**	1983	382,254
1956	327,670**	1984	340,560
1957	267,377**	1985	445,156
1958	331,032**	1986	233,455
1959	194,020**	1987	302,414
1960	284,335**	January – June 1988	173,794
1961	284,335**	Total volume Extracted (Tonnes)	12,595,201
1962	284,335**		

*Based on average peat extraction volumes at the Application Site in the 5-year period following this range of absent accurate data.

**Based on average peat extraction volumes at the Application Site in the 10-year period between 1963 and 1973 in the absence of accurate data.

The 1988 January to June peat extraction volume has been extrapolated by halving (i.e. due to the 6-month period) the total tonnes of peat extracted for 1988. The latter half of the year 1988 (i.e. July to December) is identified in Table 7-11 below.

7.3.4.2.2 Peat Extraction Phase: July 1988 – June 2020

The volumes of peat extracted at the Application Site varied from year to year and were influenced by weather conditions. The annual extraction quantities for the period from July 1988 to June 2020 are set out in Figure 7-5 and Table 7-11. There are no detailed records for peat extraction volumes from 1988 to 1993 and 1996 to 1997, therefore data for the 10-year periods from 1994 to 2004 and 1998 to 2008 was selected as a representative sample from which an average value has been calculated to represent peat extraction volumes in the 1988 to 1993 and 1996 to 1997 periods. As detailed in Section 7.3.4.2.1 above, the 1988 July – December peat extraction volume has been estimated by halving (i.e. due to the 6-month period) the total tonnes of peat extracted for the year 1988.

Between July 1988 and June 2020, an average of 349,194 tonnes of peat were extracted each year, with a total of approximately 11,174,206 tonnes extracted between July 1988 and the cessation of peat extraction in June 2020. There was a closing stock of horticultural peat (sod moss and bin sod combined) recorded for the 2020 season of 2,321 tonnes at the point of the cessation of peat extraction. The milled peat supplied Lullymore Briquette Factory until its closure in 1992 and then supplied Edenderry Power Station from 2000. The sod peat supplied Allenwood Power Station until its closure in 1994. The bin sod and sod moss from the Application site was transported by road to Kilberry Factory, Ballivor Works, Cúil na Móna Works, Westland Horticulture and Dublin Port where it was shipped to the UK and Holland to supply the horticulture industry. Horticultural peat was also sold to other third party customers by road.

During the Peat Extraction Phase, BnM implemented a stockpiling system whereby the aim was to have three years' supply stockpiled at any time to ensure there was a supply available to the power stations in years of poor peat harvest due to weather conditions. Although peat extraction ceased in June 2020, the removal of stockpiled peat continued beyond this date and was completed in October 2021. The peat extraction volumes therefore do not directly relate to deliveries of peat to the power station over that extraction year.

From the recorded volumes in Table 7-11, the most productive extraction year was 2013 with 583,428 tonnes extracted this season. The least productive extraction year was 2019 with 71,352 tonnes. The year of 2020 doesn't represent a full year as peat extraction ceased after 3 weeks in June 2020.

The peat milling process involves the top 10-15mm of the peat extraction production field surface being removed during any given harvests. In a typical year, a total of 12 no. harvests (weather dependent) would be completed, which would equate to 12–18cm of peat being removed each year. When this is applied to the 32-year period from 1988-2020, it can be estimated that ~3.8 – 5.8m of peat was removed from any production field which was utilised throughout this period. However, it is unlikely that certain fields were utilised throughout this period and therefore the depth of peat removed across the Application Site is likely to be less than the 3.8 – 5.8m range.

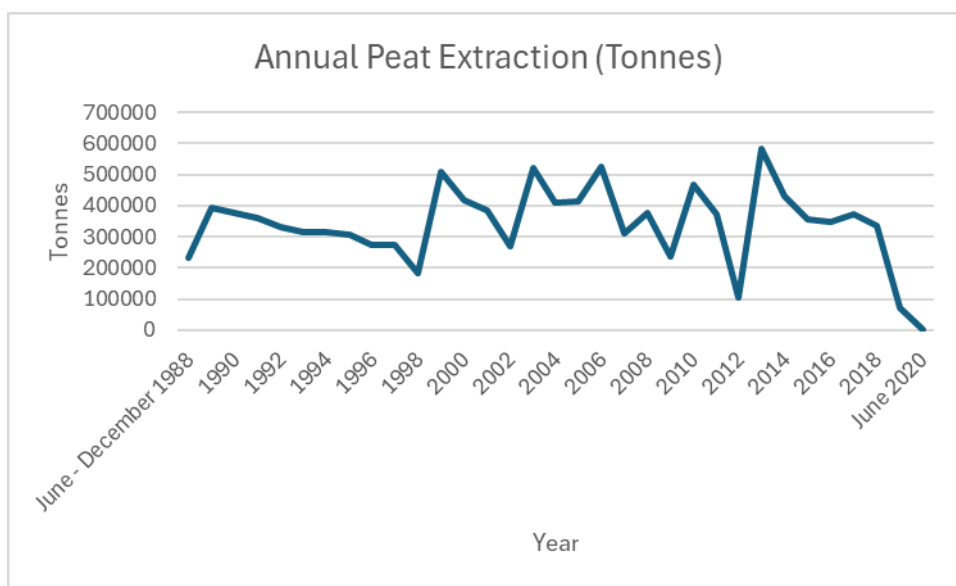


Figure 7-5: Annual Peat Extraction volumes July 1988 – June 2020.

Table 7-11 Annual Peat extraction quantities for the period 1988 to 2020

Year	Annual Extraction (Tonnes)
July – December 1988*	234,160**
1989	391,697**
1990	377,498**
1991	360,497**
1992	331,097**
1993	314,597**
1994	316,235
1995	304,810
1996	275,297***
1997	272,497***
1998	180,800
1999	507,659

Year	Annual Extraction (Tonnes)
2000	416,772
2001	383,787
2002	267,481
2003	521,327
2004	411,387
2005	413,319
2006	527,185
2007	309,268
2008	375,433
2009	236,762
2010	466,231
2011	374,627
2012	105,369
2013	583,428
2014	431,814
2015	356,030
2016	346,540
2017	370,754
2018	336,175
2019	71,352
January – June 2020	2,321****
Total	11,174,206

*1988 Baseline peat extraction figures are for months July – December 1988 when Baseline period began as per Section 4.1 of Chapter 4

**Based on average peat extraction volumes at the Application Site in the 10-year period between 1994 and 2004 in the absence of accurate data.

***Based on average peat extraction volumes at the Application Site in the 10-year period between 1998 and 2008 in the absence of accurate data.

****Peat extraction at the Application Site came to an end midway through this year leading to a lower annual extraction volume compared to previous years.

7.3.5 Bedrock Geology

7.3.5.1 Desk Study

A total of 5 no. bedrock geological formations are mapped to underlie the Application Site (www.gsi.ie). These include the Ballyadams Formation (crinoidal wackestone/packstone limestone), the Lucan Formation (dark limestone and shale ('calp')), Allenwood Formation (thick-bedded limestone, locally peloidal), the Waulsortian Limestones (massive, unbedded lime-mudstone) and the Boston Hill Formation (nodular and muddy limestone and shale). Table 7-12 summarises the mapped bedrock geology under each of the 14 no. bogs comprising the Application Site. A bedrock geology map is included as Figure 7-6.

Table 7-12 :Bedrock Geological Formations across the Application Site.

Bog	Mapped Bedrock Geological Formations	Mapped Faults
Ballydermot North	Predominantly Lucan Fm with a small area in the SE underlain by the Ballyadams Fm.	None
Ballydermot South	Predominantly Ballyadams Fm with small area in NW and W underlain by the Lucan Fm.	None
Blackriver	Predominantly Ballyadams Fm with some areas in NW underlain by the Lucan Fm, some area in SW underlain by the Allenwood Fm.	2 faults (NW – SE in northern section and NE – SW in southern section)
Barnaran	Predominantly Waulsortian Limestones with majority of western section underlain by the Allenwood Fm with a small area in W underlain by the Ballyadams Fm.	3 faults (NW – SE in centre, NE – SW in southwestern and N – S in the northwestern section)
Lullybeg	Predominantly Ballyadams Fm with a very small area in the E underlain by Allenwood Fm.	1 fault (N – S in east of the bog)
Lullymore	Predominantly Allenwood Fm with some area in E underlain by Waulsortian Limestones and some area in the W underlain by Ballyadams Fm.	1 fault (N – S in west of the bog)
Lodge	Ares in NW and SE underlain by the Boston Hill Fm while the central section is underlain by the Waulsortian Limestones.	1 fault (W – E in the south of the bog).
Killina	Area in E ais underlain by the Boston Hill Fm, the central section is underlain by the Waulsortian Limestones and the majority of the area in W is underlain by the Allenwood Fm with a very small area in W underlain by the Ballyadams Fm.	1 fault (N – S in the west of the bog)
Derrybrennan	Majority of area in E is underlain by the Allenwood Fm with some area in the NE underlain by the Waulsortian Limestones while the western section is underlain by the Ballyadams Fm.	1 fault (N – S in the centre of the bog)
Glashabaun North	Predominantly Lucan Fm with some area in E underlain by the Ballyadams Fm.	1 fault (NW – SE in south of the bog)
Glashabaun South	Predominantly Ballyadams Fm with some area in W underlain by the Lucan Fm and some area in E underlain by the Allenwood Fm.	1 fault (N – S in the east of the bog)
Ticknevin	Predominantly Lucan Fm with a very small area in the SE underlain by the Ballyadams Fm.	None
Codd 1	Lucan Fm	None
Codd 2	Lucan Fm	1 fault (NW – SE in the east of the bog)

7.3.5.2 Site Specific Data

No bedrock was encountered in any of the trial pits excavated at the Application Site by IDL or FTC. The trial pits extended to depths of 0.5 to 4.7m and did not encounter any weathered or competent bedrock.

The boreholes completed by IDL on the agricultural lands to the west of Codd 1 Bog encountered competent limestone bedrock at depths of 1.4 to 7.1m. The upper 2m of bedrock was described as being weathered in 2 of the 3 no. boreholes. The bedrock was described as comprising strong, massive, dark blackish grey, fine grained calc limestone. This is consistent with the GSI's description of the Lucan Formation which is mapped to underlie this area.

The logs associated with these site investigations are attached to the Geotechnical and Peat Stability Assessment Report prepared for Ballydermot Wind Farm (FTC, 2026).

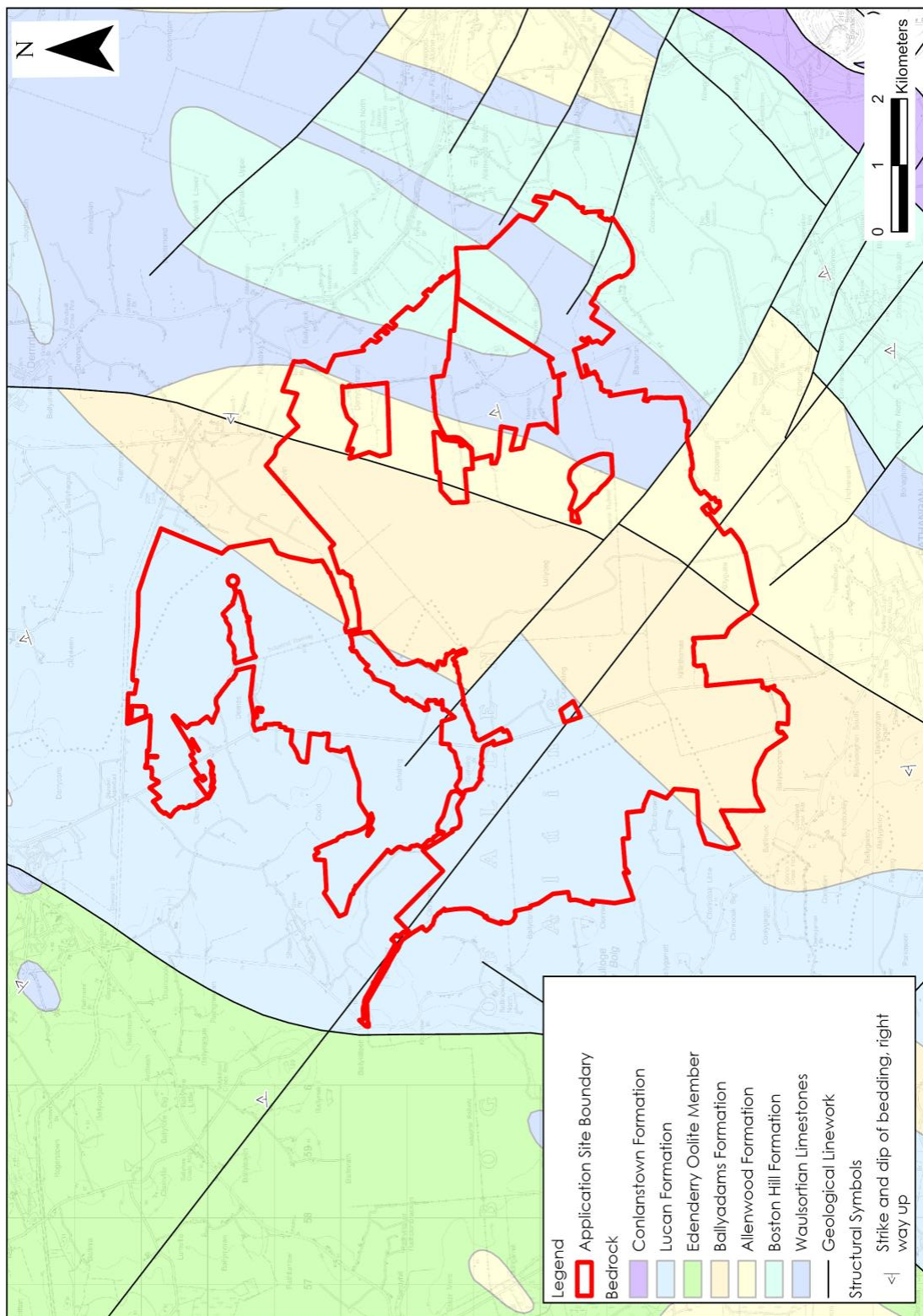


Figure 7-6: Bedrock Geology Map

7.3.6 Soil Contamination

According to the EPA online mapping (www.epa.ie), there are no licenced waste facilities or dump sites within the Application Site. There are several licenced waste facilities in the surrounding lands:

- The closest EPA mapped waste locality is an EPA licensed Composting/Anaerobic Digestion waste facility (Licence No.: W0124) located approximately 900m northeast of the Application Site (Derrybrennan Bog). This licence is associated with Carbury Compost Limited.
- A landfill (Licence No.: W0049) is also mapped approximately 2.7km west of the Application Site (Codd South Bog). This licence is associated with the Clonbullogue Ash Repository operated by BnM in Cloncreen Bog.
- A waste facility (Licence No: W0201-04) is also mapped ~4km to the east of the Application Site. This is associated with BnM's Drehid landfill located in Timahoe Bog.

The EPA map several Industrial Emissions Licenced (IEL) facilities and Integrated Pollution Control sites (IPC sites) in the vicinity of the Application Site. The IEL/IPC licenced sites located in the close vicinity of the Application site are JMW Farms (IRL) Limited (IEL Licence No: P0702) located immediately to the south of Barnaran Bog, Edenderry Power Limited (P0482) located ~600m west of the Application Site (Codd South Bog) and Clonbullogue Ash Repository (IEL Licence No: P0049) located ~3m west of the Application Site (Codd South Bog). IEL licences are also associated with the Drehid Mechanical Biological Treatment Facility (W0283) and the Drehid Waste management Facility (W0201) located in Timahoe Bog to the northeast of the Application Site.

It is also noted that the activities carried out by BnM at the Application Site are licensed by the EPA under IPC Licence P0503-01.

The GSI do not map the presence of any historic quarries or pits within the Application Site which may have contaminated tailings. The GSI record several quarries dating from the early to mid-20th century in the lands surrounding the Application Site. Site surveys have revealed the presence of historic gravel pits within the Application Site between Glashabaun North and Ticknevin bogs. These pits occur within the mapped extent of The Long Derries, Edenderry SAC (Site Code: 00925) and are associated with mineral soils/subsoils adjacent to the cutover bogs.

During the site walkover surveys completed as part of the site investigations for the proposed Ballydermot Wind Farm, no areas of particular contamination concern were identified within the Application Site. Some minor fly-tipping was noted along the edge of access tracks.

7.3.7 Economic Geology

The GSI Online Minerals Database accessed via the Public Data Viewer (www.gsi.ie) shows a small number of historic quarries and pits in the lands surrounding the Application Site. These historic extraction sites largely date from the early to mid-20th century. However, none of these historic extraction sites are located within the Application Site.

The GSI (www.gsi.ie) record no mineral localities within the Application Site. The nearest mineral locality is mapped within the townland of Bostoncommon, ~2.9km southeast of the Application Site (Barnaran Bog) where zinc deposits have been recorded. This mineral occurrence is further described by the GSI as follows: “*This prospect is known as Boston Hill-Allenwood. Exploration has revealed zinc-lead deposits of 1 million tonnes and grading 15% combined*”.

The GSI do not map the presence of any active bedrock quarries or sand and gravel pits within the Application Site or in the surrounding lands. The closest GSI mapped (www.gsi.ie) active bedrock quarry is Roadstone Allen, located ~3.5km southeast of the Application Site (Lodge Bog) in the townland of Pluckerstown. The closest mapped active sand and gravel pit is Castlejordan Pit, located ~8km northwest of the Application Site (Ticknevin Bog) in the townland of Clongall.

Callan Sand and Gravel, which is not mapped on the GSI database, is also located ~2km to the south of the Application Site. Arkil Pit is also located to the south of Callan Sand and Gravel.

The Site Synopsis Report for the Long Derries, Edenderry SAC (Site Code: 000925) states that there are a number of used and unused gravel pits within the SAC. This SAC is located between Glashabaun North and Ticknevin bogs.

The GSI online Aggregate Potential Mapping Database (www.gsi.ie) shows that the crushed rock aggregate potential of the Application Site ranges from ‘Very Low’ to ‘Very High’. The vast majority of the west and northwest of the Application Site is mapped as having ‘Low’ potential for a bedrock quarry. Meanwhile, the east and south of the Application Site is mapped as having ‘Moderate’ to ‘High’ potential. There are some areas in the centre of the Application Site which are mapped having ‘Very Low’ and ‘Very High’ crushed rock aggregate potential. The bedrock underlying the Application Site could be classified as ‘Medium’ importance (refer to

Table 7-1). The bedrock could be used on a “sub-economic” local scale for construction purposes. The bedrock has not been used in the past at the Application Site for this purpose, likely because of the covering of peat and glacial till overburden in the area.

Furthermore, the vast majority of the Application Site is not located within an area mapped for granular aggregate potential (i.e. potential for gravel reserves). Some small areas adjacent to the Application Site along the Figle and Slate rivers are mapped as having ‘Very Low’ to ‘Very High’ potential. The overlying peat deposits at the Application Site could be classified as ‘Low’ importance as the peat is not designated in this area and is degraded in most places as a result of industrial peat extraction and drainage. Refer to

Table 7-1 for definition of these criteria.

7.3.8 Geological Heritage Sites

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

The closest geological heritage site is Clonkeen Mushroom Rock (Site Code: OY007) is located ~2.6km southwest of the Application Site (Ballydermot North Bog). This County Geological Site (CGS) is a Mushroom Rock – isolated upstanding rock in a grass field. This is one of the spread of mushroom rocks that are particularly well represented in Offaly.

The Carbury Castle (Site Code: KE011) is located ~4.2km north of the Ticknevin Bog. This is designated as a CGS and may be recommended for Geological NHA. This CGS is a disused quarry at the north end of Carbury hill below the ruined castle. The quarry exposes good sections of Calp limestones; individual beds of limestone around 10-40cm thick in general with thin interbedded black shales.

The Hill of Allen CGS (Site Code: KE003) is located ~3.5km southeast of the Lodge Bog. This CGS is a large working quarry. The Hill of Allen has been heavily excavated on its northwest face. This excavation has exposed part of the Allen Andesite Formation, a massive andesitic lava, which in places within the quarry is porphyritic. Dunmurry Hill (Site Code: KE002) and the Chair of Kildare (Site Code: KE001) CGSs are located ~5km to the south of the Application Site.

A map of local geological heritage sites is attached as Figure 7-7. Table 7-13 details the geological heritage sites within 5km of the Application Site.

7.3.9 Designated Sites

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

A small area of the Application Site overlaps with The Long Derries, Edenderry SAC and pNHA (Site Code: 000925) partially overlaps with the Application Site (i.e. Glashabaun North). The Long Derries, Edenderry SAC/pNHA is located in the lands between the cutover bogs at Glashabaun North and Ticknevin bogs. The SAC/pNHA comprises a gravel (esker) ridge) which is designated for orchid-rich calcareous grasslands and supports several species of conservation interest (refer to Chapter 6: Biodiversity (including Ornithology)). The Long Derries was formerly used as a BnM gravel pit during the construction of the railway network at the Application Site. The railway infrastructure was well established at the Application Site by 1988 and the Peat Extraction Phase.

The Grand Canal pNHA (Site Code: 002104) is also mapped adjacent to the north of the Ticknevin Bog. The Application Site does not encroach upon the mapped extent of this pNHA.

There are no other designated sites in the vicinity of the Application Site. The main potential to impact other designated sites is via surface water pathways and the hydrological connectivity to other designated sites is assessed in Chapter 8: Hydrology and Hydrogeology of this rELAR.

Table 7-13: Geological Heritage Sites

Site Code	Site Name	IGH Theme	Description
KE003	Hill of Allen	IGH4	This is a large working quarry which has exposed part of the Allen Andesite Formation, a massive andesitic lava. Designated as a CGS.
KE001	Chair of Kildare	IGH2 & IGH4	Natural rock exposures scattered over and around a hilltop. Designated as a CGS, recommended for Geological NHA.
KE002	Dunmurry Hill	IGH2	Forested hillside. Graptolite follis in black mudstones. Designated as a CGS.
KE011	Carbury Castle	IGH8	A disused quarry exposes good section of Calp limestones. Designated as a CGS, recommended for Geological NHA.
OY007	Clonkeen Mushroom Rock	IGH1	An isolated upstanding rock. Designated as a CGS.

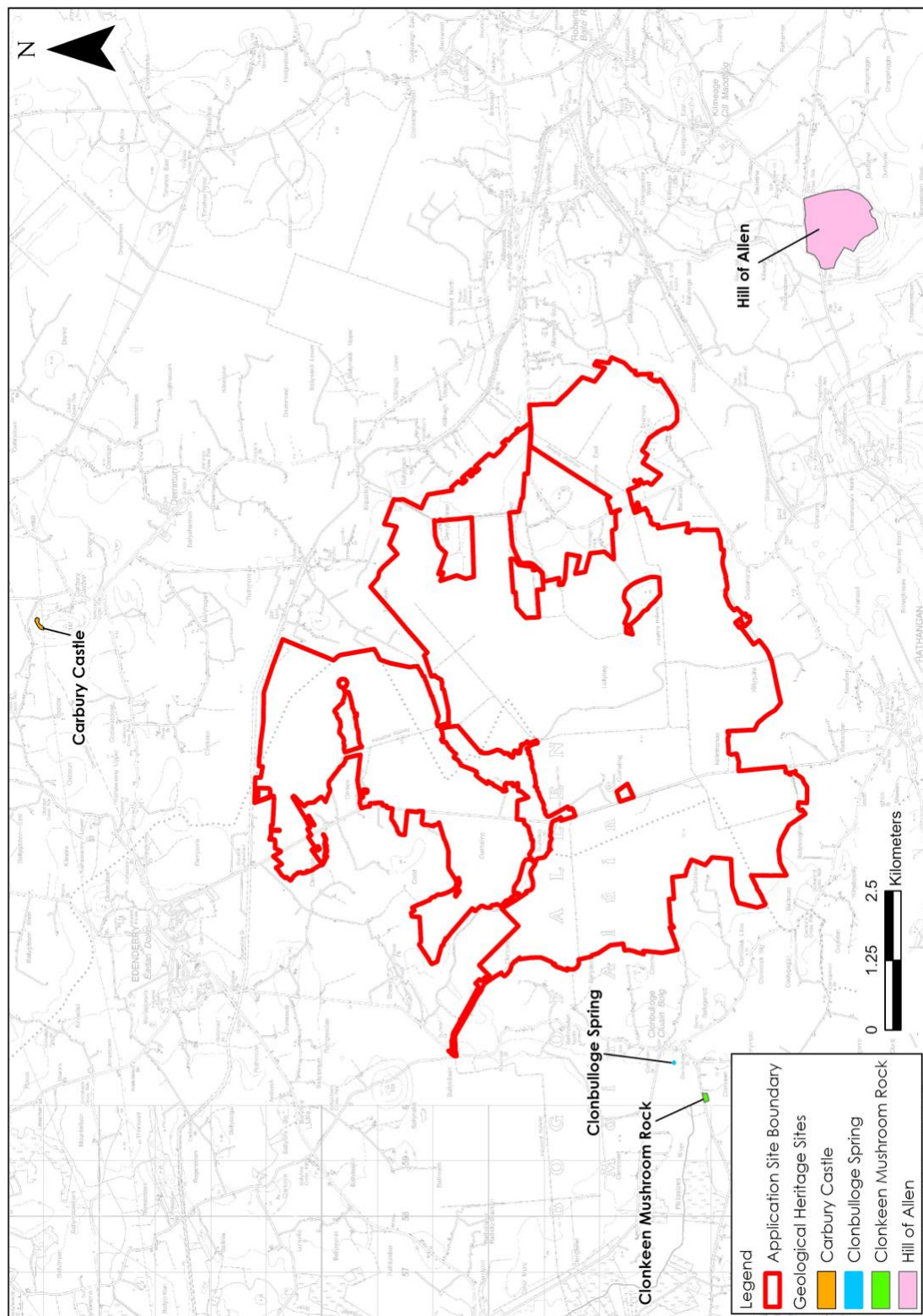


Figure 7-7: Geological Heritage Areas

7.3.10 Peat Stability

The Applicant's records do not document the occurrence of any historic landslides at the Application Site. Similarly, the GSI's online database (www.gsi.ie) does not report any historic landslides within the Application Site or in the surrounding lands. The closest GSI mapped landslide event, dates from 1989 and is located at the Grand Canal embankment in Edenderry, approximately 1km northwest of the Application Site (Ticknevin Bog).

The GSI Landslide Susceptibility Map (www.gsi.ie) classifies the probability of a landslide occurring at the Application Site as Low. This is due to the site's lowland setting and flat topography. Peat failures and landslides are more likely to occur in upland setting where there is sloping ground and high rainfall rates.

Site investigations completed by FTC as part of the Geotechnical and Peat Stability Assessment Report prepared for Ballydermot Wind Farm (FTC, 2026) included the measures of slope angles at the Application Site. FTC conclude that the *"flat topography/nature of the terrain onsite highlights the low risk of peat failure"*.

A qualitative assessment of geohazards at the Application Site has been completed and is presented in Table 7-14. The assessment reviews any local historical failures, residual slopes within the Application Site and the residual peat depths. The assessment presents an evaluation of slope failure risks associated with the Application Site. We note that all of Application Site is drained, and that peat extraction has now ceased. All of the former extraction areas have very low ground slope levels, they occur within low-lying enclosed basins, and these in combination with the historical and continued drainage reduces the peat failure risks significantly.

Table 7-14: Summary of Geohazards

Bog Name	Local Geohazards	Ground Slopes (o) (5%ile/80%ile)	Average Residual Peat Depths (m)	Slope Failure Risks
Ballydermot North	None recorded	0.77 / 8.76	1.25	Negligible
Ballydermot South	None recorded	0.89 / 10.19	0.85	Negligible
Blackriver	None recorded	0.85 / 8.54	1.41	Negligible
Barnaran	None recorded	0.82 / 8.66	1.36	Negligible
Lullybeg	None recorded	1.12 / 6.96	1.09	Negligible
Lullymore	None recorded	0.98 / 7.12	0.86	Negligible
Lodge	None recorded	0.92 / 10.41	1.29	Negligible
Killina	None recorded	1.39 / 10.56	1.0	Negligible
Derrybrennan	None recorded	0.67 / 10.38	1.66	Negligible
Glashabaun North	None recorded	0.76 / 10.61	1.38	Negligible
Glashabaun South	None recorded	1.06 / 7.67	1.49	Negligible

Bog Name	Local Geohazards	Ground Slopes (o) (5%ile/80%ile)	Average Residual Peat Depths (m)	Slope Failure Risks
Ticknevin	None recorded	0.79 / 8.35	3.24	Negligible
Codd 1	None recorded	1.16 / 11.15	1.5	Negligible
Codd 2	None recorded	1.1 / 10.73	2.25	Negligible

7.4 Characteristics of the Project

7.4.1 Peat Extraction Phase (July 1988 – June 2020)

A full description of the Project and all works completed at the Application Site post-dating July 1988 are described in detail in Chapter 4.

During the Peat Extraction Phase several types of peat extraction was completed at the Application Site including milled peat extraction, sod peat extraction, sod moss peat extraction and bin sod extraction. The methodologies associated with these types of peat extraction are described in Section 4.2.2.2 of Chapter 4.

The peat extraction areas were served by a network of permanent railway tracks and temporary tracks which were moved around the Application Site as different areas came in and out of production. During this period several level crossings, rail underpasses, and other infrastructure were constructed at the Application Site to support peat extraction operations. Welfare facilities were also provided across the Application Site. These typically took the form of small buildings and temporary structures to provide workers on peat extraction fields a clean area to take lunch/tea breaks and provide welfare facilities. While facilities were available at the Ballydermot Works offices, smaller outposts were situated across the Application Site to provide easier access to workers further away from the central works buildings. These includes satellite workshops at Blackriver, Lullymore and Glashabaun North bogs. The workshops were all constructed prior to July 1988. Welfare facilities were located at the Ballydermot Works offices and also at the smaller outposts located across the Application Site.

In terms of environmental monitoring, control and monitoring measures have been implemented at the Application Site since May 2000 in accordance with IPC licence conditions (Refer to Section 4.7.1). Prior to 2000, control measures were also implemented with respect to silt control, storage and maintenance of machinery, refuelling and waste management.

7.4.2 Current Phase (June 2020 – Present Day)

The Current Phase of the Project includes all activities carried out at the Application Site from the cessation of peat extraction in June 2020 to the present day.

During this period activities at the Application Site have included the removal of stockpiled peat, with no peat extraction occurring. All stockpiles had been removed from the Application Site by October 2021. All BnM railway has been removed from the Application Site during the Current Phase.

The drainage infrastructure, silt ponds and surface water discharge locations continue to be in operation and to be maintained as per the IPC Licence requirements. The silt ponds are maintained in accordance with Condition 6 of the IPC Licence, which states that all drainage from boglands is discharged via appropriately designed silt ponds which are desilted twice a year. The silt arising from

these operations is either stockpiled a safe distance from drainage features or spread onto production fields.

Environmental monitoring continues during the Current Phase of the Project in accordance with IPC licence conditions.

7.4.3 Remedial Phase

BnM are obliged to implement site-specific Cutaway Bog Decommissioning and Rehabilitation Plans at each of the bogs comprising the Application Site. This rehabilitation is required in order to fulfil the requirements of Condition 10.2 of the IPC licence No. P0503-01. The Draft BnM Cutaway Bog Decommissioning and Rehabilitation Plans, attached as Appendix 4-2, will be subject to consultation as well as input from the EPA prior to their implementation across the Application Site.

The objective of the rehabilitation plans is to stabilise and rehabilitate the peat bog within the Application Site. The plan uses bespoke interventions designed to firstly stabilise the environment and secondly to rehabilitate the site as much as possible by placing the existing peatland environments on a path towards naturally functioning peatlands.

The Draft Cutaway Bog Decommissioning and Rehabilitation Plans for the Application Site will be undertaken using standard best practices (refer to Appendix III of the Draft Cutaway Bog Decommissioning and Rehabilitation Plans included as Appendix 4-2).

Prior to the finalisation of and submission of the Draft BnM Cutaway Bog Decommissioning and Rehabilitation Plans to the EPA, a baseline ecology survey will be carried out to determine the status of natural colonisation, the potential for targeted revegetation and/or rewetting and the future development at the Application Site to ensure stabilisation of the future cutaway. The Draft BnM Cutaway Bog Decommissioning and Rehabilitation Plans outline the proposed rehabilitation for the bogs at the Application Site. The most appropriate rehabilitation approach is chosen for individual areas of each bog reflecting local ecological and hydrological factors. Further details can be found in the Cutaway Bog Decommissioning and Rehabilitation Plans in Appendix 4-2.

The Draft Cutaway Bog Decommissioning and Rehabilitation Plans comprise short-term planning actions, short-term practical actions and long-term actions. The initial short-term planning actions will involve seeking approval of the rehab plans from the EPA. In addition, detailed site plans of how the various rehabilitation measures will be applied will be developed and a review of all issues and constraints which may affect how the proposed rehabilitation plans will be completed. The short-term planning actions will also ensure that all activities associated with the rehab plans will be completed in accordance with the requirements of the IPC Licence. Several short-term actions will be completed in the first 2 years following EPA approval of the rehab plans. These actions will include drain blocking and monitoring of the rehabilitation measures. Silt ponds will continue to function during this phase. Longer term actions (>3 years) include the evaluation of the success of the short-term rehabilitation measures and undertake further remediation where necessary. Long-term monitoring, aftercare and maintenance will be completed until the IPC licence is surrendered. We understand that during this phase of the rehabilitation plan, silt ponds will be assessed and decommissioned if necessary.

Much of the work associated with the rehabilitation plans will occur during the initial stages of the plans. Once drain blocking and other measures have been implemented the operational activities will comprise non-intrusive ecological and hydrological monitoring and may also include minimal maintenance and repair works.

7.5

Assessment of Significant Effects and Control/Mitigation Measures

7.5.1

‘Do-Nothing’ Scenario

As outlined in the EPA Guidelines (May 2022), the description of ‘Do-Nothing Effects’ relates to the environment as it would be in the future should the project not be carried out. As discussed in Section 3.2.1, the assessment period of this rEIAR commenced in 1988, a time at which peat extraction was already well-established at the Application Site. In the context of this rEIAR, the Project has been ongoing since the baseline assessment year of 1988. As outlined in Section 3.2.1, peat extraction activities commenced at the Application Site in 1935 (refer Table 7-4 for the dates relating to the individual bogs comprising the Application Site) with the installation of drainage.

The ‘Do-Nothing’ scenario is defined as the Project (as described in Section 4.2 of Chapter 4) having ceased at the Application Site in 1988.

In the event of the cessation of the Project at the Application Site in 1988, it is assumed that those lands within the Application Site, which by that point had not been subject to the installation of drainage and peat extraction would have remained as a relatively intact raised bog with varying raised bog habitats (such as bog woodland, fen, sphagnum mosses).

Subsequently, other land-use practices may also have taken place on the Application Site such as agricultural or commercial forestry, or other commercial or non-commercial uses. Under this ‘Do-Nothing’ scenario, the IPC licence (Ref. P0503-01) and associated ongoing decommissioning and planned rehabilitation would not have occurred.

For those lands which as of 1988 had been subject to the installation of drainage in preparation for peat extraction but not peat extraction itself, it is assumed in the ‘do-nothing’ scenario that drainage would have remained in situ. Maintenance works to keep established drainage channels clear would have ceased as of 1988 in the ‘Do-Nothing’ scenario. It is likely that these areas would have been subject to natural recolonisation of the bog surface. Minor third party turbary activities likely would have occurred along the intact bog edges as was common practise at sites such as the Application Site.

Peat extraction and ancillary activities were underway at the Application Site prior to the required date for the transposition of the EIA Directive in 1988. If peat extraction and related activities ceased from 1988 onwards, then the various residual effects, described throughout this rEIAR, would not have occurred.

However, consideration must be given to the following:

- The legislative mandate given to Bord na Móna in the form of the Turf Development Act 1946, as amended) to acquire and develop peatlands; and,
- The uncertainty with respect to the planning status of the activity did not arise until 2020 and was not evident in 1988.

Therefore, this ‘Do-Nothing’ scenario was not the chosen option. Peat extraction and ancillary works have occurred at the Application Site from July 1988 onwards. A decision to cease peat extraction at the Application Site was taken in 2020 and the Application Site needs to be considered in the context of regularising (without prejudice) the planning status of the lands to facilitate future development (subject to planning consent as required). The Application Site has and will continue to revegetate, and there will

be a change from areas of cutover peatland to revegetated, as described in Section 4.8 of Chapter 4.

In the event that Substitute Consent is not granted in effect, the “Do Nothing” scenario represents the current situation as at the date of the application for Substitute Consent. As part of BnM’s statutory obligations under IPC Licence requirements, Cutaway Bog Decommissioning and Rehabilitation Plans will continue to be implemented for the Application Site separate to, and independent of, the Substitute Consent application. The implementation of these plans is included in the impact assessment below.

The role of cutaway/cutover peatlands such as the Application Site as a significant potential resource for amenity, tourism, biodiversity enhancement and conservation, improvement in air quality, climate mitigation, renewable energy development and education are part of BnM’s vision for the Application Site. The regularisation of the planning status of the Application Site is a significant facilitator in ensuring the sustainable use and management of these peatlands. If this does not occur, the opportunity to continue employment and alternative use of the Application Site for the potential resources and activities mentioned above will be significantly restricted.

7.5.2 Identification of Impacts

7.5.2.1 Peat Extraction Phase (July 1988 – June 2020)

The Peat Extraction Phase of the Project includes all works undertaken from July 1988 to the cessation of peat extraction in June 2020.

7.5.2.1.1 Soils/land

Changes to soils/land have been investigated at the Application Site between July 1988 and June 2020 (refer to Section 7.3.3). Due to the nature of peat extraction and ancillary activities, the primary land change occurs during the initial site preparation works where drainage and the removal of vegetation in preparation for the peat extraction operations. Peat extraction and ancillary activities had replaced (land take) a vast expanse of raised bog at the Application Site with large areas of drained bare peat fields by July 1988. The greatest effect of the peat extraction and ancillary activities on soils/land would have occurred during the original drainage and clearance of vegetation in advance of the commencement of peat extraction at the Application Site in 1935 to 1973 (refer Table 7-4 for individual bogs). During these site preparation works the bogs would have experienced a relatively abrupt change in land cover from raised bog prior to drainage to bare peat fields. Therefore, the greatest land take associated with the peat extraction and ancillary activities at the Application Site pre-dated July 1988.

By July 1988 peat extraction and ancillary activities were already well established across the Application Site. Therefore, by 1988 the soils/land at the Application Site had already been significantly altered and some of the ancillary structures were already in place (including the machine storage, fuel tank and welfare facility in North West Killina. In 1988 approximately 5,251ha (96.38% of the Application Site) had been drained, with industrial peat extraction ongoing across ~4,828ha (88.61% of the Application Site) with landcover consisting of drained bare or vegetated peat fields separated by field drains. Only small areas of remnant raised bog existed around the periphery of the Application Site (197ha or 3.6% of the Application Site).

Between 1988 and 2020 ~100ha of bog was drained, equating to 1.8% of the Application Site. In terms of ancillary infrastructure a total of 9 no. local holding areas, 2 no. sheds, 1 no. welfare facility and 19 no. containers were established across the Application Site.

Any changes in soils/land which post-date the initial drainage and removal of vegetation would have been imperceptible in comparison to the original changes which predate July 1988. Slight annual topographic changes (~0.1-0.2m/year) associated with peat extraction and ancillary activities will have occurred in the extraction areas during the peat extraction phase.

Pathway: Drainage, removal of acrotelm, removal of vegetative surface and extraction of peat.

Receptor: Soils/land.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures were implemented there would not have been a significant change to the soils/land in terms of land take or topography. By July 1988, the vast majority of the Application Site had already been drained and cleared of vegetation. The peripheral areas which were not drained by July 1988 represented a very small proportion of the Application Site. Topographic changes would have occurred throughout this phase associated with the peat extraction. The effect on soils/land in the absence of control measures would have been similar to the residual effect described in Section 7.5.3.1.1 *i.e.* a negative, direct, moderate, permanent effect on the soils/land at the Application Site. In the absence of control measures there was no potential for significant effects on soils/land.

Control Measures:

No known control measures for land and soils/land exist in the context of the activity being assessed here, other than working on the Applicant's owned land, and implementing peat extraction and ancillary activities in an established operational system.

7.5.2.1.2 **Peat and Peat Subsoils**

Peat extraction and ancillary activities were undertaken at different levels of intensity throughout the Peat Extraction Phase. The total volume of peat removed from the Application Site from July 1988 to the June 2020 is estimated to 11,174,206 tonnes (average of 349,194 tonnes extracted per year).

During an average year of milled peat extraction approximately ~12 – 18cm of peat has been removed from the peat extraction fields. This equates to approximately 3.8 – 5.8m of peat during the Peat Extraction Phase. This is likely to be an overestimate as no extraction field would have remained in production for the entire Peat Extraction Phase (*i.e.* certain extraction fields would have been bypassed at different times and for various reasons). Furthermore, certain years would have had lower yields due to poor weather conditions.

Pathway: Extraction/excavation.

Receptor: Peat and peat subsoils.

Assessment of effects in the absence of control measures: Due to the very nature of peat extraction, and ancillary activities, a significant effect on peat and subsoils occurred. The significant effect results from the permanent removal of peat from the Application Site resulting in a loss of peat depth. However, by July 1988, peat extraction and ancillary activities was already well established at the Application Site, with an estimated 12,595,201 tonnes of peat having been removed from the Application Site before July 1988. The effect on peat and peat subsoils in the absence of control measures would have been similar to the residual effect described in Section 7.5.3.1.2 *i.e.* negative, direct, moderate, permanent effect on peat and peat subsoils at the Application Site. The effect is moderate as peat extraction was consistent with the July 1988 baseline environment. In the absence of control measures there was no potential for significant effects on peat and peat subsoils.

Control Measures:

Pre-IPC Licence:

As detailed in Section 4.3.6 in Chapter 4 of this rEIAR, with the exception of silt control (which from 1974 was subject to a formal management program as discussed in Section 4.3.6 in Chapter 4), formal documentation outlining dedicated measures referred to as control measures practised on site from 1935 - July 1988 are not available. However, based on personal communication with retired BnM personnel, the following measures below were enacted at the Application Site as part of daily, monthly, and annual bog management and operations and were outlined in the 2000 IPC Licence application.

Due to the nature of the operations ongoing at the site, there were no control measures to prevent or minimise the removal of peat from the site. Best practice procedures and control measures have been implemented to both protect peat from contamination (see Section 7.5.2.1.3) and from erosion by air and water.

The following management measures were implemented for peat sediment control/dust suppression:

- Stockpiles were compacted on either side by large rollers drawn by tractors;
- Stockpiles were covered with polythene film gauge sheets and secured in position by spreading an even layer of high moisture content milled peat;
- Extraction was avoided during windy weather;
- Headlands were kept clean and loose peat removed;
- Low driving speeds for machinery were used along dusty headlands; and,
- Road crossings were kept clean.

At this time BnM were also implementing several control measures in order to minimise the impact of peat extraction and ancillary activities on surface water quality including:

- Internal drains were cleaned on a regular basis in suitable weather. This was completed to remove sludge from the bottom of ditches, allowing them to retain full functionality. The sludge was disposed of by spreading it on the adjacent production fields;
- Drain maintenance was carried out using drag lines and excavators, ensuring that these drains were fit for purpose;
- Drain maintenance was carried out mainly prior to and post the harvesting season (i.e. between March and October);
- Visual inspection of surface water pumps daily;
- Operational check of surface water pumps biweekly;
- Service of surface water pumps monthly;
- Silt ponds were utilised to control the amount of sediment being discharged at outfalls. At this time, silt ponds were designed for an upper limit of 100mg/l suspended sediment;
- Silt ponds were upgraded in the 1990s to cater for the settling of sufficient amount of silt. This often included the construction of a second silt pond adjacent to the first, which was used as a backup and to facilitate desludging of the primary pond; and,
- Silt ponds were de-sludged twice per annum.

Active IPC Licence:

With the implementation of the IPC Licence in 2000, the control measures implemented previously by the Applicant were updated and expanded to include:

- The avoidance of harvesting during windy weather;

- Headlands were kept clean and free of loose peat;
- The covering of stockpiles with polythene sheets;
- Drains were protected and maintained free of excessive peat;
- Machinery did not drag loose peat into drains;
- Outfalls were controlled to minimise silt discharge; and,
- The avoidance of excavations during windy weather.

These control measures specifically pertain to preventing the erosion of exposed peat by both wind and water and therefore aim to protect both air and water quality (refer to Chapter 5: Population and Human Health, Chapter 8: Hydrology and Hydrogeology and Chapter 9: Air Quality for full details).

7.5.2.1.3 **Contamination of Soil by Leakages and Spillages**

Accidental spillage during refuelling of machinery and plant (static and mobile) with petroleum hydrocarbons was a pollution risk. The accumulation of small spills of fuels and lubricants during routine plant use can also be a significant pollution risk over time. 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.

Discharges from wastewater systems (septic tanks) at office buildings, and workshops could potentially have caused surface water and groundwater contamination.

These potential effects (i.e. the potential for contamination of peat, subsoils and bedrock from the spillage of hydrocarbons or the release of wastewater) existed at the Application Site and Ballydermot Works. However, it is understood from a review of available AERs (Annual Environmental Reports submitted to the EPA under the IPC licence) that no significant pollution events/spills to groundwater have occurred since 2000 (surface water is dealt with separately in this rEIAR). It was also deduced that there were no significant peat contamination issues arising prior to 2000 as these would have been mentioned and assessed in the EPA licence Application documentation and there are no records of such occurrences.

Pathway: Infiltration through pore space in peat, subsoil and bedrock.

Receptor: Peat, subsoil and bedrock.

Assessment of effects in the absence of control measures: In the absence of the IPC Licence control measures relating to the refuelling and the storage of hydrocarbons, the effect could potentially have been greater than the residual effect described in Section 7.5.3.1.3, but to the best of our knowledge there was no evidence of significant contamination at the Application Site, and if there was a spill it would have been localised and would likely have been absorbed by the environment at a local scale. The effect could potentially have been a - negative, moderate, direct, long-term, unlikely effect on peat, subsoils and bedrock. In the absence of control measures, there was no potential for significant effects on peat, subsoil and bedrock.

Control Measures:

Pre-IPC Licence:

As detailed in Section 4.3.6 in Chapter 4 of this rEIAR, with the exception of silt control (which from 1974 was subject to a formal management program as discussed in Section 4.3.6 in Chapter 4), formal documentation outlining dedicated measures referred to as control measures practised on site from 1935 - July 1988 are not available. Based on personal communication with retired BnM personnel, the following measures below were enacted at the Application Site as part of daily, monthly, and annual bog

management and operations and were outlined in the 2000 IPC Licence application. The following best practice procedures were implemented at the site pre-2000 in order to prevent the occurrence of hydrocarbon leakages and spillages at the Application Site:

- All peat harvesting machinery were stored at the Application site at the end of each workday.
- All machinery were regularly inspected and serviced.
- All machinery was regularly cleaned via power steam wash system at a wash bay and drained into an interceptor tank and associated gravel soak pit. The interceptor unit facilitated the removal of any floatable oil/grease components.
- A self-contained machine parts washer was located at the Workshop.
- All refuelling and vehicles maintenance was undertaken at the Application site depot.
- If on-site refuelling was required, it was done so with a mobile fuelling unit.
- In the event of a spill, the General Manager was immediately informed of the incident.
 - The spill was assessed by the General Manager for potential risk to the health and safety of employees and the potential environmental consequences.
 - A spill would be sourced, isolated and contained with polystyrene booms or dry peat (moisture content of 10%).
 - All effort should be made to prevent the spill from entering a storm drain or nearest outfall.
 - Once the spill has been contained, a suitable absorbent (dry peat) is to be used to soak the spillage.
 - All possible ignition sources such as electrical equipment, naked lights, machinery should be removed from the area. Any combustibles in the spill area should be removed.
 - Follow up action measures taken must include the implementation of appropriate remedial work to prevent such a spillage recurring in the future.
 - In the event of a significant spillage, the General Manager must notify the local authority.
- All waste oil and break fluids drained from machinery were collected in drums and emptied into a waste oil storage tank which were transported off-site by a licenced disposal contractor.
- All used oil and fuel filters and used batteries were collected by licenced disposal and battery collection contractors respectively.
- All washing from the self-contained machine parts washer was collected within a sludge tank at the Ballydermot Works.

Active IPC Licence:

These control measures were upgraded to comply with the IPC Licence conditions in 2000:

- Effective spill/leak management of mobile fuelling units.
- Replacement (and remediation where necessary) of all underground fuel tanks.
- There shall be no other emissions to water of environmental significance.
- All tank and drum storage areas shall be rendered impervious to the materials stored therein. In addition, tank and drum storage areas shall, as a minimum be bunded.
- Drainage from bunded areas shall be diverted for collection and safe disposal.
- The integrity and water tightness of all the bunding structures and their resistance to penetration by water or other materials stored therein shall be tested and demonstrated by the licensee to the satisfaction of the Agency and shall be reported to the Agency within eighteen months from the date of grant of this licence and every two years thereafter.
- The loading and unloading of fuel oils shall be carried out in designated areas protected against spillage and leachate run-off.

- While awaiting disposal, all materials shall be collected and stored in designated areas protected against spillage and leachate run-off.
- With the exception of roof water, all surface water discharges from workshop areas shall, be fitted with oil interceptors.
- An inspection for leaks on all flanges and valves on over-ground pipes used to transport materials other than water shall be carried out weekly.
- Inspections and monitoring of wastewater systems and associated discharges.

7.5.2.1.4 **Peat Stability**

Peat instability or failure refers to a significant mass movement of a body of peat that would have a negative effect on individual bogs and potentially the surrounding environment. Peat instability could have occurred during development of bog drainage or ancillary activities associated with peat extraction activities and all ancillary works, including e.g. railway lines, machine passes, canteen structures, work sites, production centres, mobile fuel tanks, fixed fuel tanks, peat loading facilities, and end user sites. The significant effects of peat failure at the Application Site could have resulted in:

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

Pathway: Peat slide/Landslide.

Receptor: People, land and infrastructure.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures were implemented there would not have been a significant effect relating to peat instability due to the low lying and flat nature of the Application Site. Peat slides are usually associated with areas of upland blanket bog located on sloping land, and peat flows are more common on lowland raised bogs. There is no historical record of any peat flow at Application site. The effect on people, land and infrastructure due to instability in the absence of control measures could potentially have been similar to the residual effect described in Section 7.5.3.1.4 *i.e.* no effect. In the absence of control measures, there was no potential for significant effects on people, land and infrastructure.

Control Measures:

Generally, the only recorded landslides which relate to peat instability on raised bogs have occurred during the initial stages of bog drainage. The GSI or BnM records do not document the occurrence of any peat slides within the Application Site. The Application Site has active and extensive drainage systems. The residual peat depths across much of the Application Site are shallow, and slopes are small, so the risk of large-scale peat failure is negligible. Control and management measures that have been implemented relating to peat stability include:

- All drainage works were completed by experienced and competent operatives;
- All works were designed and overseen by experienced and qualified BnM personnel;
- The drainage systems around the bog were maintained and managed by BnM throughout the duration of the Peat Extraction Phase (July 1988 –June 2020); and,
- BnM implemented their own best practice drainage maintenance pre-2000 when these were updated to comply with IPC licence conditions in 2000 (refer to Chapter 4).

7.5.2.1.5 **Construction of Supporting Infrastructures and Buildings**

From July 1988 to June 2020, several supporting infrastructures and facilities were constructed to aid the peat extraction and ancillary activities. These works included the laying of the railway network across the Application Site as different areas of the site were brought in and out of production. Prior to 1988, 1 no. rail underpass (Offaly Co. Co. Ref. 86/184) was already present at the Application Site. During the Peat Extraction Phase, 3 no. underpasses were constructed, 1 no. located adjacent to the western boundary of the Application Site (Offaly Co. Co. Ref 97/699), 1 no. located within the southwest of the Application site connecting Ballydermot North and South bogs to Blackriver Bog within the Application Site (Kildare Co. Co. Ref: 97/1140) and 1 no. located within the northwest of the Application Site connecting Codd 2 and Glashabaun North bogs (Offaly Co. Co. Ref: 97/520). Please note that the rail underpasses were consented but are assessed here for completion due to their association with peat extraction and ancillary activities at the Application Site. The workshops and offices associated with the Ballydermot Works were built by 1949 and predate the Peat Extraction Phase. While facilities were available at Ballydermot Works offices, these smaller outposts were situated across the Application Site to provide easier access to workers further away from the central buildings. Facilities are located to the north of Glashabaun North Bog and the northwest of Killina Bog. A total of 9 no. local holding areas and 2 no. sheds were established across the Application Site during this phase. In addition to this, a total of 40 no. storage containers were placed across the Application Site from 1995 to 2019. Currently 19 no. storage containers remain on the Application Site in Blackriver, Ballydermot North, Glashabaun North, Glashabaun South, Killina and Codd 1 bogs.

The greatest risks associated with these supporting infrastructures was potential contamination of the soils and subsoils from hydrocarbon spillage during the construction works. In the absence of control measures the release of untreated wastewater from the welfare facilities would also have had the potential to contaminate local soils and subsoils.

However, these developments had a small footprint in the context of the entire Application Site. Additionally, the construction of these infrastructure (rail underpasses and Tea Centres) would have been completed over a relatively short time. Therefore, the potential for these developments to affect land, soils/land, soils, subsoils and bedrock is much reduced when compared with the potential effects associated with peat extraction and ancillary activities which were ongoing during this time period (Section 7.5.2.1.1 to Section 7.5.2.1.4).

Pathway: Excavation of soils/subsoils, infiltration of contaminants through pore space in peat, subsoil and bedrock.

Receptor: Land, soils/land, peat subsoils and bedrock.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures were implemented there would not have been a significant effect relating to the construction of the supporting infrastructure due to its small scale in comparison to the overall Application Site. The effect on land, soils/land, peat, subsoils and bedrock in the absence of control measures could potentially have been similar to the residual effect described in Section 7.5.3.1.5 *i.e.* a negative, slight, direct, short-term, likely effect. In the absence of control measures, there was no potential for significant effects.

Control Measures:

BnM received planning permission for the many of the above developments and these developments were constructed in accordance with the conditions set out in their respective permissions.

Tried and tested, best practice measures with regards to hydrocarbons and refuelling were implemented during the construction of all supporting infrastructure in line with IPC Licence requirements. These

control measures are detailed in Section 7.5.2.1.3 above. Furthermore, there was no discharge of untreated wastewater associated with the welfare facilities. Wastewater was discharged to an on-site septic tank with the effluent discharged to a percolation system through the peat prior to discharge to ground. During this phase, the septic tank was inspected and de-sludged annually by a licenced contractor to ensure that the treatment system worked efficiently.

7.5.2.1.6 **Designated Sites**

The Long Derries, Edenderry SAC is designated for the presence of orchid-rich calcareous grassland. The only potential effect in terms of the land, soils and geological environment on this SAC would have been in terms of a direct effect and land-take. The SAC was designated as an SAC in 2016 (S.I. No 528/2016) and was first proposed as an cSAC (candidate SAC) in 2003. By this time peat extraction activities were well underway at the Application Site. No extraction of gravel was completed from the former gravel pits within the SAC during this phase as all of the railway infrastructure had been laid across the Application Site prior to 1988.

Pathway: Drainage, removal of acrotelm, removal of vegetative surface and extraction of peat.

Receptor: Soils/land at the Long Derries, Edenderry SAC.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures were implemented there would not have been a significant effect on the Long Derries, Edenderry SAC. The site was first proposed a cSAC in 2003 and by this time the gravel has already been extracted from the BnM gravel pits to facilitate the construction of the railway infrastructure across the Application Site. The effect on the SAC in the absence of control measures would have been similar to the residual effect *i.e.* a negative, direct, imperceptible, permanent effect. In the absence of control measures there was no potential for significant effects on soils/land.

7.5.2.2 **Current Phase (June 2020 – Present)**

The Current Phase of the Project encompasses the period of time between the cessation of peat extraction at the Application Site in June 2020 to the present day.

7.5.2.2.1 **Soils/land**

Following the cessation of peat extraction in June 2020, land use at the Application Site is no longer classified as industrial peat extraction. The land that was in subject to peat extraction up to that time became available for re-vegetation and natural colonisation.

However, given the relatively short time period which has elapsed since the conclusion of peat extraction, there has been no significant change in land cover to date, with much of the Application Site containing bare peat fields or pioneer open cutaway habitats. The pioneer cutaway habitats correlate with the areas where peat extraction ceased first (*i.e.* the greatest degree of revegetation of the peat extraction fields has occurred at Derrybrennan Bog where peat extraction ceased in 2015). These works will have had a positive effect on soils within the bog. These works are assessed in the cumulative impact assessment (refer to Section 7.5.5).

Pathway: Extraction of peat and drainage works.

Receptor: Land and Soils/land.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures associated with the IPC Licence were implemented there would not have been a significant positive

change to the soils/land with the cessation of peat extraction activities. The effect on soils/land from the cessation of peat extraction would have been the same as the residual effect described in Section 7.5.3.2.1 i.e. a positive, direct, significant, permanent effect on soils/land at the Application Site. In the absence of control measures, there was a significant positive effect on land and soils/land.

Control Measures:

Any works during this time period have been completed under licence from the EPA and BnM's Environmental Management System.

The area of land owned by BnM remains the same.

No specific control measures were required.

7.5.2.2.2 **Peat and Peat Subsoils**

No peat extraction has occurred since the cessation of the Applicant's peat extraction in June 2020. Stockpiled peat has been removed from the Application Site, with the last stockpiles removed in 2021.

Therefore, no significant change has occurred in terms of peat depths/residual peat during the Current Phase.

Pathway: Extraction/excavation.

Receptor: Peat and peat subsoils.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures were implemented there would not have been any effects on peat and peat subsoils as peat extraction ceased in June 2020. The effect would have been the same as the residual effect described in Section 7.5.3.2.2 i.e. no residual effect. In the absence of control measures, there was no potential for a significant effect on peat and peat subsoils.

Control Measures:

No control measures were required as peat was not excavated from the site during the Current Phase. The measures outlined in Section 7.5.2.1.2 to prevent the erosion of peat continue to be in operation in accordance with IPC Licence Conditions.

7.5.2.2.3 **Contamination of Soil by Leakages and Spillages**

Despite the cessation of peat extraction at the Application Site, there is still some limited activity at the Application Site involving machinery and plant with which there is always a risk of accidental spillage of hydrocarbons. Similarly, the office buildings at the Application Site and in the welfare facility at the centre of the site remain occupied and discharges from wastewater systems (septic tanks) have the potential to cause surface water and groundwater contamination. These risks are the same as those outlined in Section 7.5.2.1.3 but to a lesser extent due to the lower volumes of plant, machinery and workers operating at the Application Site during the Current Phase.

Pathway: Infiltration through pore space in peat, subsoil and bedrock.

Receptor: Peat and subsoil, bedrock.

Assessment of effects in the absence of control measures: In the absence of the IPC Licence control measures relating to the refuelling and the storage hydrocarbons, the effect could potentially have been greater than the residual effect described in Section 7.5.3.2.3, but to the best of our knowledge there was no evidence of significant contamination at the Application Site, and if there was a spill it would have been localised and would likely have been absorbed by the environment at a local scale. The effect could potentially have been a - negative, slight, direct, long-term, unlikely effect on peat and subsoils and bedrock. In the absence of control measures, there was no potential for significant effects on peat, subsoil and bedrock.

Control Measures:

Measures that mitigated against contamination of peat, subsoil and bedrock are outlined in Section 7.5.2.1.3 and are currently being adhered to at the Application Site. These control measures significantly decrease the risk of soil contamination. These control measures have been implemented as part of compliance with IPC licence conditions across the Application Site. No further control measures, beyond that implemented to date, are deemed necessary. The existing wastewater services have been in operation for years with no reported issues.

7.5.2.2.4 **Peat Stability**

No peat extraction has occurred since the cessation of the Applicant's peat extraction in June 2020. Therefore, no significant change in topography and/or drainage has occurred across the majority of the Application Site during the Current Phase.

The risk of peat failure at the Application Site remained very low with no change observed from Section 7.5.2.1.4.

Pathway: Peat slide/Landslide.

Receptor: People, land and infrastructure.

Assessment of effects in the absence of control measures: Even in the scenario where no control measures were implemented there would not have been a significant effect relating to peat instability to peat instability due to the low lying and flat nature of the Application Site. Peat slides are usually associated with areas of upland blanket bog located on sloping land, and peat flows are more common on lowland raised bogs. There is no historical record of any peat flow at Application Site. The effect on people, land and infrastructure due to instability in the absence of control measures could potentially have been similar to the residual effect described in Section 7.5.3.2.4 *i.e.* no residual effect. In the absence of control measures, there was no potential for effects on people, land and infrastructure.

Control Measures

No further control measures, beyond that implemented and outlined in Section 7.5.2.1.4 are deemed necessary.

7.5.2.3 **Remedial Phase**

This section presents an assessment of likely significant effects resulting from the Applicant's proposed rehabilitation plans for the Application Site on the land, soils and geological environment.

7.5.2.3.1 Soils/Land

As discussed in Section 7.3.4, the overall aim of the rehabilitation plans is to put the bogs on a trajectory towards becoming naturally functioning peatlands. One of the main criteria which will be used to define the success of the rehabilitation plans will be the stabilisation of the Application Site that underwent peat extraction and ancillary activities.

Natural colonisation is likely to form the basis for stabilisation of the current bare peat fields. Former peat extraction areas across the Application Site have already re-vegetated naturally so it would be expected that the any areas of bare peat present today would develop in a similar manner. The main target will be to maintain water-levels close to the peat surface, and to avoid the creation of large-water bodies. Re-wetting and water levels close to the peat surface accelerates the re-vegetation processes, the development of vegetation cover and therefore environmental stabilisation. It will take some time for stable naturally functioning habitats to fully develop at Application Site. It is not expected that the former peat production areas at the Application Site have the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat. Furthermore, only a small proportion of the bog has potential to develop Sphagnum-rich habitats. Nevertheless, re-wetting across the entire bog, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.

This will result in a positive change in land and soils/land across the Application Site. Land cover will change from bare peat fields to an array of scrub, woodland, wetland and peatland communities. However, the Application Site is unlikely to ever revert to the original raised bog which existed prior to the commencement of peat activities and all ancillary works.

Pathway: Natural colonisation, rewetting measures and targeted revegetation.

Receptor: Land and Soils/land

Pre-Mitigation Potential Effect: The pre-mitigation potential effect is considered to be a positive, direct, moderate, permanent, likely effect on soils/land within the Application Site. In the absence of mitigation measures, there is no potential for significant effects on land and soils/land.

Mitigation Measures:

Any works undertaken as part of the rehabilitation plans will be completed in compliance with the licence from the EPA with the Applicant reporting to the EPA until the IPC Licence is surrendered.

The Draft Cutaway Bog Decommissioning and Rehabilitation Plans cater to the requirements of the Application Site. Given that the objectives of each plan are to place the respective bogs on a trajectory towards becoming a naturally functioning peatland, no mitigation measures are required except that the bog rehabilitation will be restricted to within the footprint of the Application Site.

7.5.2.3.2 Peat and Peat Subsoils

As discussed above, the overall aim of the rehabilitation plans is to put the Application Site on a trajectory towards becoming a naturally functioning peatland. One of the main criteria which will be used to define the success of the rehabilitation plans will be the stabilisation of the former peat extraction areas.

This stabilisation will be achieved primarily through natural colonisation of the former peat extraction areas. Remaining areas of bare peat will likely develop in a similar manner to the areas of the Application Site which have been out of production for some time and have begun to revegetate. The revegetation and rewetting of the Application Site will prevent surface erosion of peat which currently occurs on areas of bare peat.

Despite the best practice measures to be implemented as part of the rehabilitation plans it is unlikely that the entire site will return to the same level of active peat forming conditions which likely existed at the Application Site prior to commencement of peat extraction operations.

Pathway: Natural colonisation, rewetting measures and targeted revegetation.

Receptor: Peat and peat subsoils.

Pre-Mitigation Potential Effect: The pre-mitigation potential effect is considered to be a positive, direct, moderate, permanent, likely effect on peatland within the Application Site. In the absence of mitigation measures, there is no potential for significant effects on peat and peat subsoils.

Mitigation Measures:

Any works undertaken as part of the rehabilitation plans will be completed as required by the licence from the EPA with BnM reporting to the EPA until the IPC Licence is surrendered.

7.5.2.3.3 Contamination of Soil by Leakages and Spillages

During the Remedial Phase there will be some activity at the Application Site involving machinery and plant with which there is always a risk of accidental spillage of hydrocarbons. This activity will be greatest during the initial stages of rehabilitation when works associated with rewetting and revegetation such as drain blocking will be completed. Once this work has been completed there will only be very limited activity at the Application Site which will mainly comprise of non-intrusive monitoring and minimal repairs to peat blockages and or additional fertilization to aid the development of successional communities.

Pathway: Infiltration through pore space in peat, subsoil and bedrock.

Receptor: Peat and subsoil, bedrock.

Pre-Mitigation Potential Effect: The pre-mitigation potential effect is considered to be a negative, slight, direct, long-term, unlikely effect on peat, subsoils and bedrock. In the absence of mitigation measures, there is no potential for significant effects on peat, subsoil and bedrock.

Mitigation Measures:

The following environmental control measures will be implemented during the Remedial Phase in order to mitigate against leaks and spills:

- All machinery will be regularly checked and maintained prior to arrival at the site;
- Fuelling and lubrication of equipment will only be completed in designated areas and away from surface water features;
- Vehicles will never be left unattended during refuelling;
- All refuelling will occur in mobile fuel bowers;
- Only dedicated, trained and competent personnel will complete refuelling operations;
- Tank and drum storage areas will be bunded to 110% capacity of the largest tank or drum within the bunded area to prevent any spills;
- Storage tanks for bowers and generators will be double skinned;
- Waste oil and fluids will be collected in leak proof containers and removed from the site for disposal;
- Spill kits will be kept on site; and,
- All activities will be completed in accordance with current 'best practice' procedures.

7.5.2.3.4 **Peat Stability**

The Draft Cutaway Bog Decommissioning and Rehabilitation Plans aim to revegetate and rewet the Application Site. Generally, the only recorded landslides which relate to peat instability on raised bogs have occurred during the initial stages of bog drainage. No additional peat will be removed from the Application Site, or no drainage will be implemented during the Remedial Phase. The risk of peat failure at the Application Site will remain very low with no change observed from Section 7.5.2.1.4.

Pathway: Peat slide/Landslide.

Receptor: People, land and infrastructure.

Pre-Mitigation Potential Effect: Even in the scenario where no mitigation measures are implemented there would not be any significant risk of peat instability due to the low lying and flat nature of the Application Site and the lack of any significant earthworks or peat disturbance during the Remedial Phase. The pre-mitigation potential effects are considered to be a negative, direct, imperceptible, permanent, unlikely, effect. In the absence of mitigation measures, there is no potential for significant effects on people, land and infrastructure.

Mitigation/Monitoring:

No further mitigation, beyond that implemented and outlined in Section 7.5.2.1.4 are deemed necessary.

7.5.3 **Residual Effect**

7.5.3.1 **Peat Extraction Phase (July 1988 – June 2020)**

7.5.3.1.1 **Soils/land**

Following the initial drainage, vegetation removal and cutting which occurred across much of the Application Site prior to July 1988, the operations between July 1988 and June 2020 would not have resulted in any significant changes to land cover and there would have been no significant additional land take. The only effects in these areas postdating July 1988 are minor annual topographic changes associated with peat removal for the majority of the Application Site, and the removal of vegetation and insertion of drainage from the 99.77ha (representing 1.8% of the Application Site).

The residual effect post July 1988 was a negative, direct, moderate, permanent effect on the soils/land and topography at the Application Site.

7.5.3.1.2 **Peat and Peat Subsoils**

Peat extraction and ancillary activities by their very nature will have a significant effect on peat and subsoils. The operations involve the permanent removal of peat from the Application Site for energy production purposes resulting in a loss of peat depth at the Application Site. However, by 1988, peat extraction and ancillary activities was already well established at the Application Site, with an estimated 12,595,201 tonnes of peat having been removed from the Application Site before July 1988. Therefore, the continued removal of peat during the Peat Extraction Phase (July 1988- June 2020) was consistent with the baseline trends which existed in 1988. For these reasons the residual effect was a negative, direct, moderate, permanent effect on peat subsoils at the Application Site.

7.5.3.1.3 **Contamination of Soil by Leakages and Spillages**

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all industrial sites. No adverse effect has occurred. From review of the available AER reports it is understood no significant fuel spills or wastewater discharges have occurred to groundwater prior to or since 2000. Proven and effective measures to mitigate the risk of spills and leaks have been implemented by BnM at the Application Site. These control measures break the pathway between the potential source and the receptor. The residual effect was a - negative, imperceptible, direct, long-term, unlikely effect on peat and subsoils and bedrock.

7.5.3.1.4 **Peat Stability**

No peat instability was recorded at the Application Site during the Peat Extraction Phase.

No residual effect on peat, subsoils and bedrock.

7.5.3.1.5 **Construction of Supporting Infrastructures and Buildings**

Due to the small scale of the supporting infrastructures within the wider the Application Site the residual effect was a negative, direct, imperceptible, short-term effect on soils/land, peat and peat subsoils and a negative, direct, imperceptible, short-term, reversible effect on land (associated with loss of land due to footprint of infrastructure).

7.5.3.1.6 **Designated Sites**

Due to the lack of any activities at the Long Derries, Edenderry SAC, the presence of the operational machine pass and the gravel pits prior to the site's proposal as an cSAC in 2003, the residual effect was a negative, direct, imperceptible and permanent effect.

7.5.3.2 **Current Phase (June 2020 – Present Day)**

7.5.3.2.1 **Soils/land**

A significant effect to the land/soil environment occurred following the cessation of the peat extraction at the Application Site in June 2020. The residual effect on soils/land was a positive, direct, significant, permanent effect on soils/land at the Application Site.

Therefore, the residual effect on landcover and topography during this time period was imperceptible.

7.5.3.2.2 **Peat and Peat Subsoils**

No residual effect on peat/subsoils.

7.5.3.2.3 **Contamination of Soil by Leakages and Spillages**

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all industrial sites. Proven and effective control measures to mitigate the risk of spills and leaks have been implemented. No adverse effect has occurred. From review of the available AER reports it is understood that no significant fuel spills or wastewater discharges have occurred to groundwater since June 2020.

Therefore, residual effect was a negative, imperceptible, direct, short-term, unlikely effect on peat and subsoils and bedrock.

7.5.3.2.4 **Peat Stability**

No peat instability was recorded at the Application Site during the Current Phase.

No residual effect on peat/subsoils.

7.5.3.3 **Remedial Phase**

7.5.3.3.1 **Soils/land**

The residual effect on land and soils/land following the implementation of the Draft Cutaway Bog Decommissioning and Rehabilitation Plans that are currently proposed is a positive, direct, moderate, permanent effect on Land and Soils/land.

7.5.3.3.2 **Peat and Peat Subsoils**

The residual effect on peat following the implementation of the Draft Cutaway Bog Decommissioning and Rehabilitation Plans that are currently proposed is a positive, direct, moderate, permanent effect on peat as it will be wetter and closer to its natural condition with increases in vegetation cover across the Application Site.

7.5.3.3.3 **Contamination of Soil by Leakages and Spillages and Alteration of Peat/Soil Geochemistry**

Proven and effective measures to mitigate the risk of spills and leaks will be implemented. With the implementation of these mitigation measures the residual effect will be a negative, direct, imperceptible, short-term, unlikely effect on peat and subsoils and bedrock.

7.5.3.3.4 **Peat Stability**

No residual effect on existing peat stability.

7.5.4 Significance of Effects

7.5.4.1 Peat Extraction Phase (July 1988 – June 2020)

7.5.4.1.1 Soils/land

For the reasons outlined above, it is considered that there were no significant effects on soils/land (in terms of land-take) as a result of peat extraction and ancillary activities from July 1988 to June 2020 as the activity was consistent with emerging trends at the Application Site.

7.5.4.1.2 Peat and Peat Subsoils

For the reasons outlined above, it is considered that there has been a moderate effect on the peat soils and subsoils at the Application Site as a result of peat extraction and ancillary activities. The effects were in line with the baseline merging trends and are therefore considered to be not significant.

7.5.4.1.3 Contamination of Soil by Leakages and Spillages and Alteration of Peat/Soil Geochemistry

For the reasons outlined above, and with the implementation of the control measures it is considered that there have not been significant effects on peat, subsoil and bedrock.

7.5.4.1.4 Peat Stability

For the reasons outlined above, and with the application of the control measures outlined above, no significant effects on people, land and infrastructure have occurred.

7.5.4.1.5 Construction of Supporting Infrastructures and Buildings

For the reasons outlined above, and with the implementation of the building works in accordance with the planning permissions and/or best practice measures, it is considered that there has not been a significant effect on the soils/land, peat soils and subsoils at the Application Site as a result of the construction of the supporting infrastructure.

7.5.4.1.6 Designated Sites

For the reasons outlined above, there was no significant effect on the Long Derries, Edenderry SAC.

7.5.4.2 Current Phase (June 2020 – Present Day)

7.5.4.2.1 Soils/land

For the reasons outlined above no significant effects on land (to date, but it will change in vegetation cover over time), but there is a significant effect on soils/land, having changed from industrial peat extraction to recovering peatland habitats.

7.5.4.2.2 Peat and Peat Subsoils

For the reasons outlined above no significant effects on peat and peat subsoils has occurred during the Current Phase.

7.5.4.2.3 **Contamination of Soil by Leakages and Spillages and Alteration of Peat/Soil Geochemistry**

For the reasons outlined above, and with the application of the control measures outlined above, no significant effects on peat, subsoil and bedrock have occurred as a result of contamination during the Current Phase.

7.5.4.2.4 **Peat Stability**

For the reasons outlined above, and with the application of the control measures outlined above, no significant effects on people, land and infrastructure have occurred due to peat instability during the Current Phase.

7.5.4.3 **Remedial Phase**

7.5.4.3.1 **Soils/land**

For the reasons outlined above, it is considered that there will be a significant positive effect on land and soils/land as a result of the Remedial Phase.

7.5.4.3.2 **Peat and Peat Subsoils**

For the reasons outlined above, it is considered that there will be a significant positive effect on peat as a result of the Remedial Phase.

7.5.4.3.3 **Contamination of Soil by Leakages and Spillages and Alteration of Peat/Soil Geochemistry**

For the reasons outlined above, it is considered that there will be no significant effects as a result of soil contamination during the Remedial Phase.

7.5.4.3.4 **Peat Stability**

For the reasons outlined above, it is considered that there will be no significant effects as a result of the Remedial Phase.

7.5.5 **Summary**

Please see the below table for a summary of all identified impacts relating to land soils and geology.

Table 7-15: Assessment Classification Summary

Topic	Effects in the Absence of Control Measures	Control Measures Section Reference	Residual Effect	Significance
Peat Extraction Phase				
Soils/Land	Negative, Direct, Moderate, Permanent	Section 7.5.2.1.1	Negative, Direct, Moderate, Permanent	no significant effects
Peat and Peat Subsoils	Negative, Direct, Moderate, Permanent	Section 7.5.2.1.2	Positive, Direct, Moderate, Permanent	no significant effects

Leakages and Spillages	Negative, Moderate, Direct, Long-Term	Section 7.5.2.1.3	Negative, Imperceptible, Direct, Long-Term	no significant effects
Peat Instability	None	Section 7.5.2.1.4	None	no significant effects
Supporting Infrastructure	Negative, Slight, Direct, Short-Term	Section 7.5.2.1.5	Negative, Direct, Imperceptible, Short-Term	no significant effects
Designated Sites	Negative, Direct, Imperceptible, Permanent	Section 7.5.2.1.6	Negative, Direct, Imperceptible, Permanent	no significant effects
Current Phase				
Soils/Land	Positive, Direct, Significant, Permanent	Section 7.5.2.2.1	Positive, Direct, Significant, Permanent	no significant effects
Peat and Peat Subsoils	None	Section 7.5.2.2.2	None	no significant effects
Leakages and Spillages	Negative, Slight, Direct, Long-Term	Section 7.5.2.2.3	Negative, Imperceptible, Direct, Short-Term	no significant effects
Peat Instability	None	Section 7.5.2.2.4	None	no significant effects
Topic	Pre-Mitigation Effect	Mitigation Measures Section Reference	Residual Effect	Significance
Remedial Phase				
Soils/Land	Positive, Direct, Moderate, Permanent	Section 7.5.2.3.1	Positive, Direct, Moderate, Permanent	significant positive effect
Peat and Peat Subsoils	Positive, Direct, Moderate, Permanent	Section 7.5.2.3.2	Positive, Direct, Moderate, Permanent	significant positive effect
Leakages and Spillages	Negative, Slight, Direct, Long-Term	Section 7.5.2.3.3	Negative, Direct, Imperceptible, Short-Term	no significant effects
Peat Instability	Negative, Direct, Imperceptible, Permanent	Section 7.5.2.3.4	None	no significant effects

7.5.6 Cumulative and In-Combination Effects

7.5.6.1 Peat Extraction Phase (July 1988 – June 2020)

The geological impact assessment undertaken above in this chapter outlines those significant effects that have occurred within the Application Site as a result of the Peat Extraction Phase of the Project.

Due to the localised nature of the works associated with the peat extraction and ancillary activities within the Application Site, the potential for significant cumulative effects with other local developments (located outside the site, including forestry, agricultural development, turbary peat extraction) on the land, soils and geological environment would have been imperceptible.

Third party and private sod peat cutting was occurring within the Application Site during this time period (July 1988 – June 2020). However no significant cumulative effects on the land, soils and geological environment will have occurred due to:

- These works were not overlapping with any BnM peat extraction areas;
- The small area of the private peat extraction in comparison to BnM operations;
- The volumes of peat removed by private peat extraction would be very small in comparison to the volumes removed BnM; and,
- Any drainage required by the private peat extraction would be of a very small scale when compared with that implemented by BnM.

As such no significant cumulative effects have occurred between the BnM operations and the third-party private peat cutting at the Application Site.

The Peat Extraction Phase (July 1988 - June 2020) advanced the peat extraction and ancillary activities, and site preparation works which were completed previously at the Application Site between 1935 and 1988. The cumulative effect of the Peat Extraction Phase with the works completed prior to 1988 was the removal of 23,769,407 tonnes of peat from the Application Site (12,595,201 tonnes prior to July 1988 and 11,174,206 tonnes between July 1988 and June 2020). Therefore, there was a significant cumulative effect on peat and peat subsoils within the Application Site.

7.5.6.2 Current Phase (June 2020 – Present Day)

The geological impact assessment undertaken above in this chapter outlines those significant effects that have occurred within the Application Site as a result of the Current Phase of the Project.

The potential for significant cumulative effects with other local developments (located outside the Application Site (i.e. forestry, agriculture, and turbary peat extraction) on the land, soils and geological environment would have been imperceptible.

Due to the activity at the Application Site being limited to decommissioning works during the Current Phase and enhanced rehabilitation works at Lodge Bog as described in Chapter 4, the potential for cumulative effects arising from the Project are significantly decreased in comparison to the Peat Extraction Phase. Furthermore, third party peat extraction was terminated in June 2020, eliminating the potential for cumulative effects to arise.

As such no significant cumulative effects on the land, soils and geological environment have arisen during the Current Phase of the Project.

7.5.6.3 Remedial Phase

Due to the localised nature of the proposed works associated with the Remedial Phase within the Application Site boundary, the potential for significant cumulative effects with other local developments on the land, soils and geological environment will be imperceptible. There will be very limited movement of peat during the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans, and all proposed works will be local to the Application Site. The implementation of the measures in the Draft Cutaway Bog Decommissioning and Rehabilitation Plans for the Application Site will either coincide with or postdate the construction of the proposed Ballydermot Wind Farm if this wind energy application is permitted. Even if the construction of the wind farm development and the decommissioning and rehabilitation works overlap there will be no significant effects on the land, soils and geological environment. Detailed, tried and tested, best practice mitigation measures for the protection of the lands, soils and geological environment are prescribed in the EIAR for the wind farm development and as stated above, there will be very limited movement of peat associated with the decommissioning and rehabilitation plan.

In addition to the standard remedial measures as detailed in the rehabilitation plans for the bogs comprising the Application Site, BnM are also committed to enhanced peatland rehabilitation and restoration measures, subject to government funding, targeting c. 33,000ha in over 80 no. BnM bogs. In the event that any of the other bogs comprising the Application Site, in addition to Lodge Bog, are selected for PCAS in the future there will be the potential for cumulative effects. In the event that future PCAS plans are not implemented or prepared, the Application Site will be rehabilitated in line with the rehabilitation plans presented in Appendix 4-2. Any PCAS works, including those at Lodge Bog, would have a positive long-term effect on the land environment at the Application Site.

Planning permission for the Water Supply Project Eastern and Midlands Region has been submitted to ACP (Case no: 323980). The pipeline associated with the Ervia Water Supply is proposed to pass through Codd 2, Glashabaun North, Glashabaun South and Derrybrennan bogs and will result in the local disturbance of peat soils/subsoils. An overlap of the construction periods associated with the Water Supply Project and the short-term rehabilitation actions associated with the Remedial Phase could result in cumulative effects on the land, soils and geological environment. However, based on the estimated timeline for the construction of the Water Supply Project, it is expected that the short-term rehabilitation actions at the Application Site will be completed. The remaining long-term rehabilitation works will be minimal, comprising monitoring, aftercare and maintenance and there would be no potential for significant cumulative effects due to the nature of these works.

The only way the rehabilitation plans could 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 8: Hydrology and Hydrogeology.

7.5.6.4 Overall Cumulative Assessment

Due to the localised nature of the works associated with the peat extraction and ancillary activities within the Application Site, the potential for significant cumulative effects with other local developments on the land, soils and geological environment would have been imperceptible. In summary:

- Peat extraction has ceased;
- Any works associated with the Draft Cutaway Bog Decommissioning and Rehabilitation Plans are small and localised within the Applicant's lands;
- The volumes of peat to be moved during the proposed wind farm development will be small in comparison to the large volumes of residual peat remaining on Application Site; and,

- Any identified off-site developments do not overlap with any of the Applicant's lands and therefore cannot have a cumulative effect on Soils and Geology.

No cumulative effects on soils and geology with off-site projects can occur as there can be no overlapping outside of BnM land.

It is intended to utilise the Application Site for both peatland remediation and wind energy infrastructure to facilitate environmental stabilisation of the bog group and the optimisation of climate action benefits.

Bord na Móna Powergen Ltd. are proposing a wind energy development consisting of 47 no. turbines, 20 no. turbines will have a maximum blade tip height of 200 metres (m) above the top of the foundation and 27 no. turbines will have a maximum blade tip height of 220 metres (m) above the top of the foundation at the Application Site³. A separate EIAR and accompanying NIS are being undertaken for the proposed Ballydermot Wind Farm development. At the time of writing, the planning application for this development has not yet been submitted to An Coimisiún Pleanála. It is the intention of the Applicant to integrate the peatland rehabilitation measures with the proposed future wind farm. The key objectives of environmental stabilisation and re-wetting of the cutaway areas will occur between and surrounding the proposed windfarm infrastructure. This has proven successful during construction of Mountlucas, Cloncreen and Derrinlough Wind Farms. There will be a slight cumulative effect on Land, Soils and Geology with the proposed Ballydermot Wind Farm, but the effect is limited by the small footprint of the infrastructure associated with the proposed wind farm relative to the overall Application Site area.

For the reasons outlined above, and with the implementation of the Decommissioning and Rehabilitation Plans there will be no significant cumulative effects on the Land, Soils and Geology environment during the Remedial Phase. The cumulative assessment confirms that there was a significant cumulative effect with the Peat Extraction Phase and the works completed previously at the Application Site between 1950 and 1988. The cumulative effect was the removal of 23,769,407 tonnes of peat from the Application Site (12,595,201 tonnes prior to July 1988 and 11,174,206 tonnes between July 1988 and June 2020).

7.5.7 Conclusions

The Application Site is a group of 14 no. BnM bogs which form part of the Allen Bog Group. The Application Site comprises an area of 5,448 hectares (ha). The Application Site is located 2.2km southeast of Edenderry, 3.3km west of Allenwood, 2.4km north of Rathangan and 1.7km east of Clonbullogue Village. The current topography of the Application Site is relatively flat with an elevation range of between approximately 68 and 84mOD (metres above Ordnance Datum).

The baseline for the assessment of peat extraction and ancillary activities at the Application Site is July 1988, and the Peat Extraction Phase covers the period between July 1988 and June 2020. Drainage and site preparation works had been completed at the bogs comprising the Application Site prior to July 1988. By 1988 peat extraction and ancillary activities were well established at the Application Site.

From a land, soils and geology perspective, the main effects occurred during the early stages of drainage and peat extraction when the acrotelm (topmost living peat layer) was removed and the extraction of the peat (catotelm) began. These site preparation works had been completed across the vast majority of the Application Site prior to July 1988 and any subsequent activities in these areas would not have resulted in any significant changes, with the only effects resulting from minor annual topographic changes associated with peat removal, and other excavations associated with drainage maintenance. The peat

³ <https://www.ballydermotwindfarm.ie/>

extraction and ancillary activities post-dating July 1988 are therefore not considered to have resulted in a significant negative effect on the land, soils and geological environment.

The Draft Cutaway Bog and Decommissioning and Rehabilitation Plans for the Application Site have also been assessed. The plans will typically involve the rewetting and revegetation of the drained bog. The plan will have a positive effect on the soils/land across the Application Site, with rewetting of bare peat areas. The Application Site will never return fully to the original raised bog which was present before commencement of the peat extraction and ancillary activities but the implementation of the Cutaway Bog Decommissioning and Rehabilitation Plans will have a positive effect of land and soils/land, and on the coverage of vegetation at ground level when compared to the 1988 baseline condition of the lands.

The assessment confirms that there was a significant cumulative effect between the Peat Extraction Phase and the works completed previously at the Application Site between 1935 and 1988. The cumulative effect was the removal of 23,769,407 tonnes of peat from the Application Site (12,595,201 tonnes prior to July 1988 and 11,174,206 tonnes between July 1988 and June 2020). No cumulative effects will result from the implementation of the Cutaway Bog and Decommissioning and Rehabilitation Plans, nor from the proposed Ballydermot Wind Farm at the Application Site. Effects on the land and soils environment will only occur as direct effects, local to the point of extraction/excavation, and therefore cannot extend beyond the boundary of the Application Site.