



Non-Technical Summary

Bord na Móna Peat Extraction
Substitute Consent Applications

May 2020

Mott MacDonald
South Block
Rockfield
Dundrum
Dublin 16
D16 R6V0
Ireland

T +353 (0)1 2916 700
mottmac.com

Non-Technical Summary

Bord na Móna Peat Extraction
Substitute Consent Applications

May 2020

Directors: J T Murphy BE HDipMM CEng
FIEI FConsEI FIAE (Managing), D Herlihy
BE MSc CEng, R Jefferson BSc MScS
MRICS MCI Arb DipConLaw, J Shinkwin
BE DipMechEng CEng MIEI, M D Haigh
BSc CEng FICE MCIWEM (British)
Innealtóirí Comhairleach (Consulting
Engineers)
Company Secretary: Michael Cremin CPA
Registered in Ireland no. 53280.
Mott MacDonald Ireland Limited is a
member of the Mott MacDonald Group

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	29 May 2020	Caroline Lew	Donna Hassett	Donna Hassett	Draft for Issue
B	29 May 2020	Donna Hassett	Donna Hassett	Donna Hassett	Final for Issue (Minor Change Only)

Document reference: 229384224 | 2 | B

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Introduction

Substitute Consent Application

Bord na Móna are applying to An Bord Pleanála for Substitute Consent under Section 177E (Application for Substitute Consent) of the Planning and Development Act 2000 (PDA 2000), as amended and under Part 19 of the Planning and Development Regulations, 2001 (as amended).

Substitute Consent is effectively a form of retrospective consent and is being applied for with the aim of regularising the planning status of historic peat extraction carried out by Bord na Móna on 41 individual bog units.

A Remedial Environmental Impact Assessment Report (rEIAR) has been prepared to accompany the application to An Bord Pleanála (ABP).

This document is a non-technical summary (NTS) providing a brief overview of the content of the rEIAR. It is recommended that the main rEIAR is reviewed in order to obtain more detailed information regarding the Substitute Consent process and application.

Project Overview

Bord na Móna's peat extraction activities on the 41 individual bog units that are the subject of the Substitute Consent applications have been regulated by the Environmental Protection Agency (EPA) since 2000.

The Substitute Consent applications relate to Bord na Móna's past peat extraction activities associated with the 41 bog units which form part of seven individual Integrated Pollution and Control (IPC) bog groups licenced by the EPA.

The bog units are located across counties Offaly, Westmeath, Laois, Meath, Kildare and Longford.

Peat extraction related activities included the drainage of peat extraction areas, peat handling activities and ancillary works associated with peat extraction such as workshops, fuel storage areas and canteens. The end users of the peat have included:

- Edenderry Power Plant;
- Lough Ree Power Plant;
- West Offaly Power Plant;
- Derrinlough Briquette Factory;
- Littleton Briquette Factory;
- Horticultural peat processing factories located at Kilberry (Athy County Kildare), Coolnamona (Portlaoise, County Laois) and Ballivor (County Meath); and
- Retail and domestic users.

Consultation

In April 2020 consultation letters were issued to a number of stakeholders inviting comment on the proposed application for substitute consent and associated rEIAR including Meath County Council, Kildare County Council, Laois County Council, Longford County Council, Offaly County

Council, Westmeath County Council, Department of Culture, Heritage and the Gaeltacht - Development Applications Unit, Department of Planning, Housing and Local Government, Environmental Protection Agency – Regional Inspectorate (Clonskeagh) and Regional Office (Westmeath), Office of Public Works, The Eastern and Midland Regional Assembly, An Taisce, Inland Fisheries Ireland, Eastern Regional Fisheries Board, and the Shannon Regional Fisheries Board.

Responses were received from Longford County Council, Offaly County Council, Westmeath County Council, Department of Culture, Heritage and the Gaeltacht - Development Applications Unit, Inland Fisheries Ireland, Irish Peatland Conservation Council and Butterfly Conservation Ireland.

The comments/issues raised in these responses have been addressed, where appropriate, in the rEIAR.

Need for the Development and Alternatives

Need for the Development

Bord na Móna was formally set up in 1946 when the Turf Development Board was established as a statutory corporation under the title of Bord na Móna. At this time, the motivation for its establishment was equally social as it was economic. A strategic energy supply could be guaranteed, and, in the process, industrial employment could be provided, thus avoiding emigration, or rural depopulation. Since its establishment, Bord na Móna has acquired and developed approximately 80,000 hectares of bogland which, in turn, has supported whole communities primarily in the Irish midlands.

The justification for this project, which is the regularisation of past peat extraction in the bogs included in the application, and the need for peat production in these bogs since 2012 is set out below.

Edenderry Power Station

Peat was required for the co-firing of Edenderry Power Station with biomass under the existing planning permission which has been in place since 2015. Co-fuelling with biomass commenced in Edenderry Power Station in 2008 and prior to this, the station was fuelled on 100% peat.

The use of biomass has facilitated the orderly and regulated move away from energy peat by reducing the peat supplied to Edenderry Power Station since co-firing with biomass began. This Bord na Móna policy was consistent with government policy under the Just Transition, as referred to in the Government's Climate Action Plan.

Derrinlough Briquette Factory

Since 2018, Derrinlough briquette factory is the only remaining peat briquette factory in Ireland. For many years the factory has manufactured a fuel that has been used by a large number of domestic customers and householders that are not typically connected to networked heating infrastructure.

Horticultural Industry

Bord na Móna Horticulture has focussed on the manufacture, marketing, and sale of quality growing media products to both hobby gardeners and professional growers in 30 countries around the world.

The recent Key Issues Consultation Paper published by the Department of Culture, Heritage and the Gaeltacht states that "...the Irish commercial horticultural industry makes a very significant contribution to the Irish gross agricultural output with a farm gate value of €437 million in 2018.". This industry employs 6,600 persons directly and 11,000 persons indirectly. It is estimated that approximately 50% of the total industry output of €437m is dependent on peat as a growing medium. There have been ongoing efforts in the industry to use peat free substrates, however due to the variability and lack of uniformity a suitable alternative is not yet available. The Minister for Culture, Heritage and the Gaeltacht's recent consultation on the use of peat in the Horticulture Industry, opines that 'there is not at present a technically, environmentally suitable alternative material that could replace peat in professional horticultural crop production'. This project is required to support this industry.

Summary of Reduction in Peat Harvesting

The extraction of peat in recent years has provided revenue for Bord na Móna to further develop their new decarbonisation, or Brown to Green, strategy. This revenue has been utilised to develop and expand Bord na Móna's renewable energy businesses, supporting Government Policy.

Alternatives Locations Considered

The bogs included in this application are those located in proximity to the Derrinlough Briquette factory and the Edenderry Power Station as well as bogs suitable for the supply of horticultural peat. They are bogs that are accessible by rail to Derrinlough Briquette factory, Edenderry Power Station and horticultural Bogs with suitable peat and road connection for the haulage of peat.

Over the years Bord na Móna have exited bogs for conservation reasons. The ownership and management of many of these sites was transferred to the National Parks and Wildlife Service (NPWS), with several sites also being transferred to An Taisce, The Irish Wildlife Trust, and the Irish Peatland Conservation Council. The majority of the sites now in ownership by the state are protected areas [Special Areas of Conservation (SACs) and Natural Heritage Areas (NHAs)] and form the core of the State's raised bog restoration protected area network.

A number of additional sites that remain in Bord na Móna ownership have also been set aside for conservation and bog restoration as part of Bord na Móna's Raised Bog Restoration Programme. The main objective of the Bord na Móna Raised Bog Restoration programme is to restore raised bog habitats by blocking drains and restoring bog hydrology. The Raised Bog Restoration Programme is an action of the Bord na Móna Biodiversity Action Plan. There is also a statutory obligation on Bord na Móna under its IPC Licences to decommission and rehabilitate all of its peatlands.

The total area of raised bog restored as part of the Bord na Móna Raised Bog Restoration Programme to date is 3,158 hectares across 26 different sites. Bord na Móna have also targeted an additional 1,500 hectares as part of this programme. This will significantly aid the states biodiversity commitments to the EU Habitats Directive in relation to Annex I raised bog habitat, outlined in the National Raised Bog Special Area of Conservation Management Plan 2017-2022.

Alternative Technologies/Processes and Mitigation Measures

Bord na Móna have been involved in peat production for many years and the technology and controls have advanced during these years.

A key feature of the Third Development Programme in the mid-seventies was the introduction of specially designed silt ponds to remove silt and reduce the suspended solids levels of effluent being discharged into the arterial drainage system. The provision of many silt ponds became a condition of the IPC licences issued for peat extraction in 2000.

The following technologies and control measures have been adopted to address issues that arose or were likely to arise in Bord na Móna bogs:

- Bord na Móna has developed and rolled out hydraulic harrows in dust sensitive areas to allow the operator to lift the harrow spoons while turning and travelling on headlands, thereby reducing the volume of dust that might become air-borne;

- Tea-centres and stockpiles have been relocated to more remote locations in the bog, away from the prevailing south westerly winds;
- To address waste stockpile plastic, Bord na Móna developed a polywrapper attachment for a tractor that allowed the polythene to be wrapped direct from the stockpile and allowed it then to be recycled off site and processed into polymer for reuse in blown plastic film;
- Bord na Móna developed suitable training videos and training packs for the training of production operatives on cleaner production methods;
- In Mountdillon, Bord na Móna developed a specific headland peat unit to lift and maintain the loose peat on the bogs headlands to reduce dust levels;
- For some dust sensitive locations Bord na Móna planted natural screening to capture any fugitive dust and prevent it from depositing on neighboring properties;
- Bord na Móna instigated fire patrols with some staff trained in firefighting;
- Bord na Móna commenced a fire warden programme in 2012 originating on lands outside our boundary. This comprised Bord na Móna volunteers who were trained and equipped to patrol our peatlands once weather conditions and associated bog fire risk was high;
- Bord na Móna achieved certification to ISO9001 the quality management system which installed a management system around peat production, sales and transport and maintenance;
- Bord na Móna achieved certification to ISO50001, the energy management system, to better measure and manage our energy use and associated carbon footprint;
- Bord na Móna developed an Archaeological Code of Practice agreement with the Department of Culture, Heritage and the Gaeltacht (DCHG) and the national Museum of Ireland (NMI) for how we manage our archaeological obligations.

Description of the Project

Peat Extraction

The project comprises the 41 bog units listed in the table overleaf.

Bord na Móna have extracted peat using the following two different harvesting methods:

- Milling: to produce milled peat for fuel, either for power station supply (for example Edenderry Power Station), or for supply to briquette factories (such as Derrinlough Briquette Factory). Milled peat has also been used for horticulture peat for the manufacture of growing media products for the professional and retail/consumer markets.
- Sod Moss for the horticultural market – both the retail and professional markets.

The upper acrotelm layer (which comprises the biologically active component of the bog) was completely removed from the majority of the 41 bog units when the bogs were initially developed for industrial peat extraction between the 1940s and the 1990s. In general, peat for milled peat production was extracted from deep peat layers (which comprise dead plant material). Sod moss production generally occurred at the bog margins within bare peat areas, areas of cutover bog and areas of high bog.

Milled peat production requires good solar drying conditions and can commence anytime from mid-April onwards once suitable drying conditions exist. There are four stages to the production of milled peat: milling, harrowing, ridging and harvesting. Every 11th field was typically used to stockpile the peat from the output of five fields either side; this is referred to as the 'Peco' method. In some areas a system known as "Haku" was utilized where the harvested peat was deposited into trailers and transported to a central stockpile on the headland from where it was removed by road.

Weather permitting, the miller followed the harvester and the production cycle recommenced in the emptied fields. Each production cycle is known as a harvest. In a year of average weather conditions, approximately 12 harvests were completed. When the production season was over, the stockpiles were covered to keep the peat dry unless the peat was scheduled for immediate sale. Peat was stored in these stockpiles until required for use.

Peat production areas were served by a network of permanent narrow-gauge rail tracks, (approximately one metre in width). Temporary tracks were also constructed as required to transfer the peat from peat production areas.

Sod moss is the term used to describe peat produced in block form for horticultural use. The sod moss was extracted mechanically with specially equipped excavators. The sods were cut from mini face-banks or the margins of trenches that were gradually widened and left on the bog to dry for approximately 12 months, reducing moisture content from 90% to 50% - 60%. Once the required moisture content was reached the sod moss was stockpiled at the edge of bog prior to transportation for processing. One layer was typically cut at a time until the horticultural peat was exhausted.

A portion of the sod moss was transported, via Heavy Goods Vehicles (HGVs), directly from the bog site to Dublin Port for shipment overseas. The remainder was transported to processing factories where it was broken down and re-blended to meet the applications for which it was to be used.

Bord na Móna Bog Units

Ref	Bog	Functional Area	Bog Group
1	Bellair Nth	Offaly and Westmeath	Boora
2	Lemanaghan	Offaly	Boora
3	Noggusboy	Offaly	Boora
4	Boora	Offaly	Boora
5	Galros	Offaly	Boora
6	Killaun	Offaly	Boora
7	Derrinboy	Offaly	Boora
8	Derryclure	Offaly	Boora
9	Monettia	Offaly and Laois	Boora
10	Killaranny	Offaly	Boora
11	Bracklin	Westmeath	Derrygreenagh
12	Carranstown	Meath and Westmeath	Derrygreenagh
13	Ballivor	Meath and Westmeath	Derrygreenagh
14	Kinnegad	Meath	Derrygreenagh
15	Ballybeg	Offaly	Derrygreenagh
16	Ballaghurt	Offaly	Blackwater
17	Daingean (Derries)	Offaly and Westmeath	Allen
18	Daingean Rathdrum	Offaly	Allen
19	Clonad	Offaly	Allen
20	Ballykeane	Offaly	Allen
21	Esker	Offaly	Allen
22	Garrymore	Laois	Allen
23	Derrylea	Offaly and Kildare	Allen
24	Ticknevin	Offaly and Kildare	Allen
25	Glashabaun Sth	Offaly and Kildare	Allen
26	Glashabaun Nth	Offaly and Kildare	Allen
27	Codd Nth (Codd 2)	Offaly	Allen
28	Codd Sth (codd 1)	Offaly	Allen
29	Ballydermot North	Offaly and Kildare	Allen
30	Ballydermot South	Offaly and Kildare	Allen
31	Blackriver	Kildare	Allen
32	Barnaran	Kildare	Allen
33	Lodge	Kildare	Allen
34	Cuil na Gun	Westmeath	Mountdillon
35	Milkernagh	Westmeath and Longford	Mountdillon
36	Coolcraff	Longford	Mountdillon
37	Gilltown	Kildare	Kilberry
38	Allen	Kildare	Kilberry
39	Prosperous	Kildare	Kilberry
40	Kilberry	Kildare	Kilberry
41	Cuil na Carton	Laois	Cuil na Móna

Ancillary Activities

As part of the development of the bogs for milled peat production, parallel surface water drains were created at intervals of 15m and the strip of bog between these drains formed the peat production fields. The fields were cambered to facilitate run-off and prevent standing water on the production fields. The drains fall towards the headland which is located at both ends of each production field. The drainage network continued by either open channel or pipe to a silt pond or ponds prior to discharging to a local watercourse. Drainage was by gravity flow where possible, however in some bogs it was necessary to use pumped systems to drain the bogs. Drainage water from the peat production areas was discharged to the nearest watercourse via a silt pond treatment system in accordance with the IPC Licences for each of the bog groups. Surface water effluent discharges are regulated by the under the IPC regime.

Some of the peat production areas are served by a permanent rail system, much of which was constructed in the 1950's and 1960's. In some areas temporary tracks were laid and removed as required to remove peat from production areas. This rail network allowed for direct delivery of peat by rail to Derrinlough Briquette Factory Edenderry Power Station, ESB power stations and to various lorry tippler locations.

The following are ancillary structures and features associated with peat extraction activities:

- railway lines, rail underpasses/bridges;
- rail structures;
- work sites;
- production centres (including canteen structures);
- mobile fuel tanks;
- fixed fuel tanks;
- peat loading facility,

Fixed gas oil tanks, with an overall capacity of approximately 1.5 tonnes, have been stored at locations across the bog units. Loading and unloading of fuel oil has taken place at fixed locations serviced by oil-interceptors. All tank and drum storage areas have been bunded and bunds have been integrity tested every two years in line with the IPC licences.

Refuelling of production machines took place in designated areas away from drains or rivers at a frequency of up to three times a week during the peak production season. This frequency was significantly reduced outside peak production. Refuelling of peat production plant took place on the bog using fixed bunded tanks or bunded service trains. The loading of tanks from the fuel supplier took place either directly into these fixed bunded tanks on the bogs or the fixed bunded main tanks at the workshop in the vicinity of the bog. At the workshops, concrete bunds and oil interceptors were provided and the service train was filled and travelled by rail to refill the plant machinery on the bog.

Welfare facilities were provided for employees involved in peat extraction on each bog. The existing foul sewage facilities at these sites have been replaced with portable serviced toilets and the foul sewage is removed off site for disposal in a licenced treatment plant on a weekly basis.

The main end users of extracted peat are listed below:

- Derrinlough Briquette Factory located in Birr, County Offaly s operated by Bord na Móna Fuels Ltd.

- Littleton Briquette Factory near Thurles, County Tipperary which is now closed. It was located within the landbanks associated with IPC licence P0499-01 (Bord na Móna Fuels Ltd Littleton) and its operation controlled in accordance with the conditions specified in IPC licence P0499-01. The factory produced up to 90,000 tonnes of briquettes per annum. It was in operation since 1982 employing approximately 55 staff during production.
- Horticultural peat processing: Bord na Móna produced approximately 359,000 tonnes of horticultural peat per annum. The processing factories are located at Kilberry (Athy County Kildare), Coolnamona (Portlaoise, County Laois) and Ballivor (County Meath).
- Edenderry Power Plant: located in the townland of Ballykilleen (Coolestown) Edenderry Power Limited (EPL) operates the existing peat/biomass co-fired power plant in accordance with the conditions of an Industrial Emissions Directive (IED) Licence (Reg. No. P0482-04) issued and monitored by the Environmental Protection Agency (EPA). The plant has a net electrical output of 118MW (128 MW gross) and produced approximately 694 MWh of electricity in 2019. The fuel inputs during 2019 were approximately 476,000 metric tonnes of peat (supplied by a spur of Bord na Móna Energy Limited's peatland rail network) and approximately 300,000 tonnes of biomass predominantly delivered by road via designated and agreed haul routes. The peat supply bogs for Edenderry were predominantly from the Allen Group. Co-fuelling of peat with biomass at the power plant commenced in 2008 at a rate of 2%. By 2019 the rate of co-fuelling with biomass had increased to 46.4%.
- West Offaly Power Plant located in Shannonbridge in County Offaly and is the largest peat fired power plant in Ireland. Approximately 1.245 million tonnes of peat (supplied by a spur from Bord na Móna's peatland rail network and via the public road network) was supplied to West Offaly Power Plant in 2015. Peat was exclusively supplied to the power plant from Bord na Móna bogs. The West Offaly Power Plant is owned and operated by the Electricity Supply Board (ESB). The ESB operates the power plant in accordance with the conditions of an Industrial Emissions Licence (Registration Number P0611-02) which is regulated by the EPA.
- Lough Ree Power Plant in Lanesborough, County Longford. Approximately 835,000 tonnes of peat (supplied by a spur from Bord na Móna's peatland rail network and via the public road network) was supplied to Lough Ree Power Plant in 2015. Peat was exclusively supplied to the power plant from Bord na Móna bogs. Lough Ree Power Plant is owned and operated by the Electricity Supply Board (ESB). The ESB operates the power plant in accordance with the conditions of an Industrial Emissions Licence (Registration Number P0610-02) which is regulated by the EPA.
- Bord na Móna supplied horticultural products to the retail sector both within the island of Ireland and internationally. Bord na Móna also supplied products directly to domestic users and have depots located throughout the Republic of Ireland.

Remedial EIAR

Introduction

The following sections provide a summary of the technical chapters of the rEIAR, as follows.

- Noise
- Air Quality
- Climate
- Biodiversity
- Surface Water
- Flood Risk
- Land, Soils and Groundwater
- Cultural Heritage
- Traffic and Transportation
- Landscape and Visual
- Population and Human Health
- Material Assets
- Interactions of the Foregoing

Noise

The noise associated with peat extraction activities was generated through the use of mobile plant which is similar to agricultural type machinery; such as harvesters, tractors etc. and the use of both permanent and temporary rail tracks.

Since April 2000 all peat extraction and associated activities at the 41 bog units have been carried out in accordance with the conditions prescribed in IPC licences regulated by the EPA. Noise has been regulated under Condition 8 of the licences '*Activities on-site shall not give rise to noise levels off site at any noise sensitive location which exceed the following sound pressure limits (Leq,30min) subject to Daytime: 55 dB(A) Night-time: 45 dB(A).*

Peat production activities generally took place during daylight hours from 07.00. Workshops generally operated between 08.00 and 16.00.

According to GeoDirectory data, there are 354 properties within 150 metres of the IPC licence boundaries of the bog units comprising 273 residential, 32 commercial, 35 residential / commercial and 14 unknowns. Unknown is one that does not receive mail. This assessment assumes that Residential or Residential / Commercial properties are noise sensitive.

It is possible that significant cumulative impacts at noise sensitive locations in proximity to multiple bog units could have arisen in the past as a result of operations taking place in more than one field/bog at a time. As noise associated with peat extraction activities is similar in nature to the noise generated by agricultural machinery it is also possible that significant noise impacts occurred at locations as a result of peat harvesting operations and agricultural activities occurring simultaneously. The noise assessment study commissioned by Bord na Móna as part of the IPC licence application process recorded noise levels higher than the EPA limit values of 55 dBA due to cumulative impacts associated with third party operators.

The impact that transportation of extracted peat has had on noise is difficult to assess, as detailed data relating to the transportation routes is not available. A traffic impact assessment shows that for the three destinations which were in receipt of the most peat transported by road (for the period 2012 to 2019), the relative contribution to the overall traffic of the areas was between 0.22% and 0.50%. The overall contribution to HGV traffic in the area was between 2.60% and 9.28%. This is not expected to have had a discernible impact on road traffic noise.

As there are a number of sensitive receptors close to the IPC licence boundary and the historic peat production area and peat extraction activities have most likely resulted in nuisance impacts at the closest noise sensitive locations. The impacts would have been temporary, yet significant in their nature, and likely limited to periods of peat milling, harrowing, ridging and harvesting.

Air Quality

The key atmospheric emission associated with peat extraction in terms of air quality is fugitive Particulate Matter emissions (i.e. dust).

The results of a Peat Dust Deposition Monitoring Study carried out by Mott MacDonald in 2018 at Killaun Bog show that, whilst there are some elevated rates of deposition that have been monitored, these are due to localised events. The effects are not spatially large and are located within a few tens of metres of the production area. As a conservative measure a zone of dust impact of 150 metres from milled peat production zones has been assumed.

Peat extraction activities have most likely resulted in nuisance impacts at the closest dust sensitive locations. The impacts would have been temporary, and occasional, yet significant in their nature, limited to periods of peat milling, harrowing, ridging and harvesting.

Transportation of peat by rail would also have resulted in temporary nuisance impacts at sensitive receptors located within 150m of the rail lines. As the vehicles used for road haulage are covered, no dust impacts would have arisen from peat transported by road.

Climate

Two aspects of the project have been considered in relation to climate;

- Climate change and extreme weather; and
- Greenhouse gas emissions resulting from the draining of the peatland, extraction activities and the indirect emissions from end users.

The concept of ecosystem-based adaptation recognises that high quality, well-functioning ecosystems provide services which help people and the wider environment to adapt to the adverse effects of climate change. Undisturbed peat bogs undoubtedly offer resilience benefits locally, primarily through storage of flood water, ecological capacity for species adaptation, and delivery of improved water quality. This approach commonly includes wetland maintenance and rehabilitation, and management and establishment of protected areas, among other things. At the same time, conservation, rehabilitation and management can also contribute to climate change mitigation. In the context of the bog units in the Project, the twin benefits emphasised from rehabilitation of degraded peatlands are increasing carbon storage and enhanced storage of flood water. However, past peat extraction activities have already drained the bog units under consideration. The capacity for these bog units to provide the climate resilience benefits offered by undisturbed peat bogs is therefore extremely reduced.

The extraction of peat has resulted in on-site greenhouse gas emissions from a loss of Carbon Dioxide (CO₂) and (N₂O) associated with the drainage and exposure of the peat surface,

methane emissions from drained organic soils and drainage ditches, losses from uncovered peat stockpiles and from machinery and transport use.

Off-site greenhouse gas emissions are released from the combustion of peat to produce electricity, losses from horticultural products and as part of the peat briquette manufacturing process.

Biodiversity

Retrospective impacts both within the Bord na Móna properties and in adjoining areas with particular focus on bog habitats emphasising habitats listed on Annex I of the EU Habitats Directive have been considered having regard to;

- Rare flora – legally protected and/or Red-listed species.
- Wintering birds, especially species listed on Annex I of the EU Birds Directive and/or Red-listed.
- Breeding birds, especially species listed on Annex I of the EU Birds Directive and/or Red-listed.
- Mammals, especially species listed on Annex II of the EU Habitats Directive and/or Red-listed.
- Other important species, such as marsh fritillary butterfly (Annex II listed).

The baseline assessment for each site was derived from available information (mostly in-house Bord na Móna data) and site visits. Aerial photography was reviewed during the compilation of the habitat descriptions, i.e. the OSI series of photographs (for years 1995, 2000 and 2005) as well as publicly available aerial imagery (e.g. the BING map series) and satellite imagery (Google Earth).

A site visit (or visits) were made to all the sites between 2013 and 2017. Although all habitats of conservation interest were targeted during the site visits, due to the predominant peatland nature of the sites, the main focus was to assess the areas of high bog which were identified on the Bord na Móna habitat maps and to consider habitats of conservation interest lying outside of the Bord na Móna property boundary.

For the majority of the 41 bogs, commercial production pre-dates the 1995 OSI Aerial photography, and it is anticipated that the bulk of the raised bog habitat was removed by 1985. Continued development works on these bogs would have lowered the height of the commercial peat fields, which would have caused continued drawdown of water from adjoining areas of high bog. The loss of water is an impact of significance with potential adverse effects on the two Annex I habitats 'Degraded raised bogs still capable of regeneration' and 'Depressions on peat substrates (*Rhynchosporian*)'. This is a significant adverse impact which has occurred on all the bogs assessed.

In addition to the impacts caused by drawdown of water described above, additional impacts have occurred at bogs where drainage and/or first peat production commenced after 1985. OSI Aerial photography from 1995 confirms that in many cases the sites were drained but still apparently vegetated at this time. It can therefore be concluded that raised bog habitat was removed since 1985. While the ecological quality of the original intact bog is not known, taking the size of the sites into account and from the quality of the remnants that remain it can be assumed that much of it was intact and part may have been Active Raised Bog (Annex 1 with priority status). At the least, the Annex I habitats 'Degraded raised bogs still capable of regeneration' [code 7120] and 'Depressions on peat substrates (*Rhynchosporian*)' [7150] would have been widespread. The loss of the raised bog habitats at these sites since 1985

due to peat production is rated as an Irreversible Adverse Impact of International Significance. The sites at which this has occurred, and the dates when drainage and peat production first commenced are listed in the table below:

Bog Unit	Date of First Drainage	Date of First production
Galros	1983	1988
Killaun	1996	2003
Derrinboy	1988	2003
Derryclure	1987	1992
Kilaranny	1983	1989
Ballaghurt (eastern sector)	1990	1995
Daingean Derries	1995	1999
Daingean Rathdrum Bog	1995	1999
Garrymore	1992	1999
Ticknevin	1977	2000
Codd Nth (Codd 2)	1983	1989
Codd Sth (Codd 2)	1983	1989
Coolcraff	1981	1989
Prosporous	1991	2003

Ticknevin Bog and Glashabaun North Bog adjoin the Long Derries, Edenderry SAC. Prior to the implementation of mitigation (2000), dust deposition from the continued harvesting of peat at these bogs could have had an adverse impact on the conservation objectives of the adjoining Long Derries, Edenderry SAC.

Surface Water

The assessment of historic impacts of peat extraction on the water quality environment involved desktop research supported by a review of water survey data to evaluate whether a fundamental, material or detectable change in water quality might have occurred from past peat extraction within the 41 bogs. The assessment included a review of publicly available water quality data and Water Framework Directive data for the study area (www.gis.epa.ie), including EPA data on the historic biological (Q-Value) for the waterbody catchments. The seven IPC licences (for each of the Bog Groups) and conditioned monitoring returns were reviewed with regard to emissions to water.

The influence of external activities such as adjacent farming, forestry, other land-uses (including peat extraction outside of the bog units), wastewater treatment works was considered in the assessment of historic impacts on peat extraction activities.

The Department of Housing, Planning and Local Government in their River Basin Management Plan for Ireland 2018 – 2021 states that the environmental impacts associated with peat extraction generally relate to suspended solids, ammonia and hydromorphological alterations and that high levels of ammonia are released from peat-extraction activities during the draining process and, along with suspended solids, may be causing ecological impacts in receiving water bodies.

Hydromorphology refers to the hydrological (water flow, etc) and geomorphological (surface feature) processes and attributes of watercourses. Hydromorphology was considered under *Land., Soils and Groundwater*.

The pathway for environmental effects on the aquatic environment is therefore via bog drainage. Drainage within the bogs is achieved through a network of open drains and pipes with all surface water discharges directed through silt ponds prior to discharge to local water courses.

The Boora Bog Group is spread across three watercourse catchments: the Lower Shannon, Upper Shannon and the Barrow. The majority however are located within the Lower Shannon catchment. This bog group spans across three counties: Kildare, Laois and Offaly, with the majority of the group located in County Offaly. The Boora bog group is made up of a total of 10 bog units. The majority of the bog units in the Boora Bog Group do drain into the River Brosna, which flows into the River Shannon downstream.

The Derrygreenagh Bog Group is spread across three counties, Meath, Offaly and Westmeath. However, the majority of this bog group is located within the Boyne catchment, with the exception of a very small part of bog located in the Barrow catchment.

The Blackwater bog group is located within County Offaly and only consists of one bog unit: Bellaghurt Bog Unit. The Blackwater bog group is situated within the Lower Shannon catchment, with two small sections of c. 300m spilling into the Upper Shannon catchment.

The Allen bog group spreads across counties Kildare, Laois, Offaly and Westmeath. It is also spread across three watercourse catchments: the Lower Shannon, the Boyne and the Barrow.

The Mountdillon (Mostrim Peat) Bog Group is located between counties Longford and Westmeath. There are a total of three bog units within this bog group. The southern end of this bog group, which contains two of the bog units, is located in County Westmeath, with the northern end in County Longford. This bog unit is entirely located in the Upper Shannon catchment.

The Kilberry Bog Group is located entirely in County Kildare and there is a total of four bog units within this bog group. One bog unit, the Kilberry bog unit, is located far further south than the other bog units. However, the Kilberry bog group is spread across three catchments: The Liffey and Dublin Bay catchment, the Boyne and the Barrow catchment.

The Coolnamona bog group is a small bog group with only one bog unit contained within it: Coolnacartan bog unit. The Coolnamona bog group is located in County Laois. This bog group spans over two separate catchments, the Nore catchment and the Barrow catchment

The hydrological connectivity between bog drainage within the 14 bogs and waterbody catchments is presented in the Table below:

Surface Water Catchments

Ref	Bog Group	Bog	Catchment (WFD)
1	Boora	Bellair Nth	Upper Shannon 26G Lower Shannon 25A
2	Boora	Lemanaghan	Upper Shannon 26G Lower Shannon 25A
3	Boora	Noggusboy	Lower Shannon 25A
4	Boora	Boora	Lower Shannon 25A
5	Boora	Galros	Lower Shannon 25B
6	Boora	Killaun	Lower Shannon 25B
7	Boora	Derrinboy	Lower Shannon 25A
8	Boora	Derryclure	Lower Shannon 25A

Ref	Bog Group	Bog	Catchment (WFD)
9	Boora	Monettia	Lower Shannon 25A Barrow 14
10	Boora	Killaranny	Lower Shannon 25A
11	Derrygreenagh	Bracklin	Boyne 07
12	Derrygreenagh	Carranstown	Boyne 07
13	Derrygreenagh	Ballivor	Boyne 07
14	Derrygreenagh	Kinnegad	Boyne 07
15	Derrygreenagh	Ballybeg	Boyne 07
16	Blackwater	Ballaghurt	Lower Shannon 25B
17	Allen	Daingean (Derries)	Lower Shannon 25A
18	Allen	Daingean Rathdrum	Barrow 14 Lower Shannon 25A
19	Allen	Clonad	Barrow 14 Lower Shannon 25A
20	Allen	Ballykeane	Barrow 14
21	Allen	Esker	Barrow 14
22	Allen	Garrymore	Barrow 14
23	Allen	Derrylea	Barrow 14
24	Allen	Ticknevin	Barrow 14
25	Allen	Glashabaun Sth	Barrow 14
26	Allen	Glashabaun Nth	Barrow 14
27	Allen	Codd Nth (Codd 2)	Barrow 14
28	Allen	Codd Sth (codd 1)	Barrow 14
29	Allen	Ballydermot North	Barrow 14
30	Allen	Ballydermot South	Barrow 14
31	Allen	Blackriver	Barrow 14
32	Allen	Barnaran	Barrow 14
33	Allen	Lodge	Barrow 14
34	Mountdillon	Cuil na Gun	Upper Shannon 26F
35	Mountdillon	Milkernagh	Upper Shannon 26F
36	Mountdillon	Coolcraff	Upper Shannon 26F
37	Kilberry	Gilltown	Boyne 07
38	Kilberry	Allen	Liffey and Dublin Bay 09
39	Kilberry	Prosperous	Boyne 07 Barrow 14
40	Kilberry	Kilberry	Barrow 14
41	Cuil na Mona	Cuil na Carton	Barrow 14 Nore 15

The hydrological connectivity of the bogs to European sites is presented in the Table below. A remedial Natura Impact Statement (rNIS) has been prepared in support of the Substitute Consent application. Further details on effects on peat extraction on European Sites hydrologically connected to the bogs is presented therein.

Surface Water Connectivity to European Sites

	Date of Designation	Bogs Hydrologically connected	First Drained
River Shannon Callows SAC and Middle Shannon Callows SPA	2002 and 1996	Galros	1983
		Ballaghurt 1	1975
		Ballaghurt 2	1990
		Daingean Rathdrum,	1996
		Bellair North,	1970
		Lemanaghan,	1951
		Noggusboy,	1951
		Boora,	1954
		Derrinboy,	1988
		Derryclure,	1987
		Monettia,	1976
		Kilaranny	1983
		Daingean (Derries),	1995
		Killaun,	1996
River Little Brosna Callows SPA	1996	Killaun	1996
River Barrow and River Nore SAC	2002	Ticknevin,	1976
		Daingean Rathdrum,	1996
		Clonad,	1956
		Ballykean,	1951
		Esker,	1959
		Garrymore,	1992
		Derrylea,	1968
		Glashabaun North,	1946
		Glashabaun South,	1946
		Codd North,	1983
		Codd South,	1983
		Ballydermot North,	1946
		Ballydermot South,	1946
		Blackriver,	1946
		Barnaran,	1951
		Lodge,	1951
		Kilberry,	1945
		Cuil na Carton	1962
		Monettia	1976
		Prosperous	1991
River Barrow and River Nore SPA	2010	Cuil na Carton	1962
	2003 and 2011	Ballybeg,	1951

996

200

	Date of Designation	Bogs Hydrologically connected	First Drained
River Boyne and River Blackwater SAC and SPA		Kinnegad,	1977
		Ballivor,	1948
		Carranstown,	1979
		Bracklin,	1979
		Gilltown,	1977
		Propserous	1991
Lough Derravaragh SPA	1995	Coolnagun	1947
		Milkernagh	1947
		Coolcraff	1981
Lough Iron SPA	1995	Coolnagun	1947
Lough Ree SAC & Lough Ree SPA	2002 & 1995	Coolnagun	1947
		Milkernagh	1947
		Coolcraff	1981
North Dublin Bay SAC & South Dublin Bay SAC & North Bull Island SPA & South Dublin Bay SPA	1999, 2000, 1986 & 1995	Mouds/Allen	1966

Since 2000 mitigation and monitoring of surface water impacts have been carried out in accordance with the conditions of IPC Licences Registration No's. 0500 to 0507.

Existing mitigation/control measures that were implemented (and continue to be implemented) under the IPC licences have limited runoff rates from the bog units, and included:

- Appropriately designed silt pond treatment arrangement with an emission limit value for suspended solids of: 35mg/l for all surface water outfalls from boglands.
- Field drains with low gradients.
- Silt ponds were cleaned at least twice a year to maintain adequate storage and treatment (sedimentation/settlement) capacity.

The water quality in the waterbodies within the study area has varied in response to many different pressures within the catchment. Examples of other pressures are agricultural, commercial forestry, urban wastewater treatment. Examination of water quality data in the receiving water bodies shows that it is likely that peat extraction activities have had an adverse impact on water quality in receiving water bodies, however, in the majority of cases this impact has occurred at a time in advance of the temporal scale of this assessment. It is possible that the initial impacts are having legacy effects on the receiving waterbodies e.g. due to the level of historic sedimentation that would have occurred at initial bog drainage. However, in the absence of data it is not possible to quantify the magnitude or significance of the impact given the multitude of other factors that have influenced these water bodies.

Flood Risk

Bord na Móna (and Hydro-Environmental Ltd.) have prepared a Flood Risk Assessment (FRA) Report which considers the 41 bogs, in accordance with the flood risk requirements as set out in the Department of Environment, Heritage and Local Government *The Planning System and*

Flood Risk Management - Guidelines to Planning (DEHLG, 2009). A copy of the Flood Risk Assessment Report is included in Appendix 13 *Flood Risk*.

The FRA concludes that pluvial flooding is considered the primary flood risk across the bogs, rather than flooding from groundwater or fluvial flooding. Historical fluvial flooding was not recorded across the bogs, with the only evidence of historical flooding coming from aerial photographs in 2007 and 2009 in some bogs, which is presumed to be pluvial. The majority of the bogs are within Flood Zone C and are appropriate for all types of development. Some areas of the 41 bogs, particularly near the bog drains are mapped as Flood Zone A, but all were deemed appropriate for peat extraction following Justification tests.

The FRA indicates that the downstream flooding, as a result of increased runoff from operational bogs is controlled by limiting bog discharges through the use of piped outfalls. Modelling indicates that there is adequate storage capacity in the bogs to attenuate flood waters when discharge is limited to greenfield runoff rates.

Land, Soils and Groundwater

A desk study of the 41 sites and surrounding area was carried out to collate all available and relevant geological, hydrogeological, hydrological and meteorological data for the study area. Site inspections and walkover surveys were completed at 14 of the 41 no. bogs.

Historically, the 41 bog units were drained between the period of 1946 – 1996. The largest bogs, such as Lemanaghan and Boora were drained early on in the 1940's and 50's, while later, smaller bogs such as Killaun and Prosperous were drained in the 1990s. Peat production generally began 5-10 years after initial drainage.

From a landuse and geological perspective, the main impacts on these bogs occurred during these early stages of drainage and production when the acrotelm (topmost living peat layer) was removed and extraction of the peat (catotelm) began. Landuse and geological changes since this time are generally limited to the depth of peat removed, which has been estimated to average ~0.43m across all 41 bog units and the limited topographical change that has created. While the original land and landuse changes during initial drainage and production at each bog was significant at that time, the recent peat extraction from these drained and in-production bogs had only a slight impact on the land and geological environment.

The bogs are generally underlain by calcareous bedrock, and the status for the groundwater bodies underlying the bogs is Good. Groundwater vulnerability is generally Low-Moderate and the connection between the groundwater in the bog and the regional aquifer groundwater is minimal. The groundwater in the bogs is hydraulically connected to the surrounding surface water bodies. While the original drainage of the bogs would have altered the surface water flows, and to a lesser extent the local groundwater levels and flows at each bog unit, the peat extraction from these drained and in-production bogs had only a slight to moderate impact on groundwater and downstream hydrology.

An assessment of groundwater and surface water dependent designated ecosystems has been completed. Designated sites are located at various distances from the 41 bog units, some are relatively close (e.g. The Long Derries SAC is <0.1km from Ticknevin bog, and Garriskil Bog is <0.1km from Coolnagun bog), and some bogs are distant from their closest connected SAC/SPA (e.g. Galros bog is 5.5km from All Saints Bog and Esker, and Mouds/Allen bog is <0.7m from Mouds/Allen bog). No direct impacts on SAC/SPA sites have been identified. Indirect impacts on SAC/SPA sites have been identified in cases where surface water pathways exist, but the scale of river flows in downstream receiving waters are many times larger than the runoff from the bogs being drained in that catchment. In addition, at many of the 41 bog units, peat extraction,

associated drainage and ancillary activities, were in place many years in advance of nearest/downstream SAC/SPA designations. Therefore, the altered hydrology and hydrogeology, associated with the development of the bog units, was part of the baseline environment at the time of designation of the SACs/SPAs.

Control of discharges from the 41 bog units has been governed by the existing IPC licences for peat extraction since early 2000. The existing licences include mitigation and controls for management of risks associated with contamination/leaks and discharges from wastewater systems across the 41 bog units. Past compliance with IPC licence conditions has ensured minimal impact on groundwater and surface water quality from spills/leaks and discharges from wastewater systems.

Historically, the only recorded landslides related to peat instability on raised bogs have occurred during the initial stages of bog drainage, generally during the 1950's. All 41 bog units have extensive bog drainage systems. The residual peat depths remaining on many of the 41 bog units are shallow, and slopes are small, so the risk of large-scale peat failure on the 41 bog units was/is negligible.

The relatively shallow nature of bog drainage on the 41 bog units means that the potential to alter shallow or bedrock water levels or interrupt groundwater flows in any significant manner does not generally exist. As such the potential for impact of existing water supplies, which are often significant distances from bog unit boundaries, was small with either "no Impact" or "imperceptible" impacts determined for all water supply sites. Drainage from the 41 bog units manages surface water runoff, with only minor drawdown impacts on underlying groundwater regime local to pumping stations and deeper perimeter drains.

Impacts from peat extraction works and ancillary activities on County Geological Sites (CGS) has been assessed and no impact on County Geological sites has occurred.

Cultural Heritage

Bog landscape features were often utilised throughout all periods of history and the anaerobic conditions preserve organic matter, such as wood and leather, which does not often survive in more usual terrestrial archaeological conditions.

Objects can be preserved in peatlands because of the acidity of peat and the anaerobic environment which exists within peatland deposits.

Irish Archaeological Consultancy Ltd. has carried out desk-based surveys of Bord na Móna bogs, including the 41 bogs that are the subject of this assessment.

The assessments involved a detailed study of the archaeological and historical background of each site and the surrounding area including information from the Record of Monuments and Places, the topographical files within the National Museum and available cartographic and documentary sources for the areas.

Compliance with the statutory duties prescribed under the Turf Development Act 1998 (section 56) and the implementation of the 2012 Code of Practice affords protection to the cultural heritage associated with peatlands/bogs where peat extraction activities have been carried out by Bord na Móna. However, given that the bogs have been drained and peat production has taken place on all of the bogs prior to the implementation of the Code of Practice it is likely that permanent and profound adverse cultural heritage impacts have occurred.

Traffic and Transportation

An assessment of the impacts of peat extraction in the 41 bog units on the traffic and transportation network of the surrounding areas from 2012 to the present day (the time period for which road haulage data was made available) was undertaken.

The extracted peat was transported from each bog to its destination either by rail, or by road haulage, depending on the destination or end use of the peat. The mode of transport was dependent on the location of the bog, and the surrounding infrastructure, with some bogs transporting peat via a combination of these two methods. 63% of all peat produced in the bogs under consideration was transported by rail to its end point, with the remaining 37% transported by road.

The tonnage of peat transported, and the number of runs taken was compared with existing traffic conditions to assess the impact of the peat extraction on the traffic of the area. The relative impact that traffic generated had on the areas was taken as the ratio of the traffic generated by the peat production and existing traffic and was expressed as a percentage. As exact routes taken for peat transported by road are not available, a direct route was chosen between each of the identified bogs and their destination. Where the sites were served by the national primary road network, the TII Traffic Data website (www.nratrafficdata.ie) has been utilised to identify annual average daily traffic for the roads between the production site and the destination.

The average daily runs are marginal when compared with the annual average daily traffic or the daily HGV movements of the connecting road. This impact analysis showed that for the three destinations which are in receipt of the most peat transported by road (Lough Ree Power Station, West Offaly Power Station and Dublin Port), the relative contribution of the peat extraction to the overall traffic of the areas was between 0.22% and 0.50%. The overall contribution to HGV traffic in the area was between 2.60% and 9.28%. For the purposes of this assessment, this contribution was deemed to be negligible.

The traffic generated due to historic peat extraction activities have had a minimal impact on road users, as a large proportion of the product is transported via the private rail network. Where road transport was utilised, the facilities are in close proximity to the national primary road network, which they did not saturate.

Landscape and Visual

A desktop review of the relevant, county development plans which are available online for each functional area has been undertaken, with particular reference to landscape characters and context and protected viewpoints. The assessment also considered landuse change further to a review of aerial imagery (from 1995) and mapping, such as GeoHive and Corine map data.

The bogs themselves can be characterised as evenly exposed surfaces of peat. The surrounding areas can, in general, be characterised as agricultural with small areas of forestry, rural settlements and farm buildings.

Bord na Móna's peat extraction, and ancillary, activities have had significant adverse landscape and visual impacts.

The bogs included in this application have been drained, developed and have been in production for many years, some as far back as the 1940s. The majority of the permanent rail system was constructed in the 1950's and 1960's. It is therefore not likely that peat extraction

carried out on the 41 bogs between 1985 and 2020 has resulted in a significant change to the overall landscape character and visual impacts associated with the receiving environment.

Significant adverse cumulative landscape and visual impacts associated with peat extraction activities outside of the 41 bog units are likely to have occurred.

Bord na Móna's peat extraction activities are confined to the bog units and internal rail network themselves and public roads. Over time the spatial area of peat extracted has reduced and some natural processes of colonisation, re-vegetation and vegetation succession have occurred which may have reduced visual impacts at a localised level.

Population and Human Health

Information regarding human beings, population, and employment and general socio-economic data were sourced from the Central Statistics Office (CSO), the county development plans, Fáilte Ireland and any other literature pertinent to the area. Due to the large spatial area of the 41 bog units, the baseline environment was assessed on a regional and county level. Counties Meath, Offaly, Longford, Laois, Kildare and Westmeath form the study area and the CSO data was examined on a county by county basis and then in agglomerated figures to assess the cumulative impact of the project on the population and human health indicators for the area.

Bord na Móna has historically been a vital employer for the rural community of the Midlands of Ireland with an average employment of approximately 4,688 in the mid 1980's, and a peak employment of 6,100 during the production season, which placed it among the country's largest commercial employers. The importance of such levels of employment were largely due to its regional concentration in the Midlands and the lack of alternative employment opportunities at the time.

Between 1989 and 1993, the company embarked on a programme to reduce high production costs and to increase productivity resulting in substantial reductions in the numbers employed.

According to the Energy Crop Socio-Economic Study undertaken by Fitzpatrick Associates in 2011, there were an estimated 1,443 jobs supported by the peat-to-power industry in Ireland, some 81% of which were located in the catchment areas of the three peat-fired generating stations (Lough Ree, West Offaly, and Edenderry Power Stations) which lie within the study area of the 41 bog units. These constituted jobs in the plants and in peat extraction, jobs indirectly supported in upstream supply industries and jobs induced through the trickle-down effects of the wages and salaries of those supported directly or indirectly. According to this study the annual average full-time equivalent jobs to extract and deliver peat to the three power stations between 2006 – 2010 was just under 800.

As the primary employer in many Midland counties, Bord na Móna played a central role in building communities through a number of initiatives. These included: education (bursaries and other supports), supporting sports clubs, supporting music (for example, sponsorship of the project: *Composing the Island: A century of music in Ireland 1916 – 2016*), Providing and building amenity areas often in partnership with local authorities and community groups (Lough Boora Discovery Park, Lullymore, Abbeyleix and Mount Lucas Cycle and Walkway path, Corlea Community Walk Project, Ballydangan Community Conservation Project, AES Bord na Móna's charity programme, and Community Gain Funds (the Drehid Waste Management facility, and the Mountlucas and Bruckana wind farms).

Having regard to the above, the large-scale peat production undertaken by Bord na Móna, has contributed significantly to the local economy by supporting employment both directly and indirectly as well as providing a secure source of indigenous energy. In addition, Bord na Móna

has developed many community initiatives and amenities which have contributed to a significant positive impact on population and human health.

Material Assets

The bogs included in this application have been drained, developed and have been in production for many years, some as far back as the 1940s. The majority of the permanent rail system was constructed in the 1950's and 1960's.

The network of telecoms and other services in the vicinity of the bogs has in general evolved since the 1980s in a piecemeal fashion on a sector by sector basis with very little integration in terms of shared services (primarily the road network accommodating water and sewerage infrastructure with electricity and linear telecommunications networks adjacent to the public road networks).

Bord na Móna's peat extraction and ancillary activities are not likely to have had significant impacts on telecoms and other services for the following reasons:

- The geographical areas of historic peat extraction are generally limited and confined to the bog units and internal rail network themselves and public roads.
- Bord na Móna's peat extraction and ancillary activities pre-date many telecoms and other services.

As Bord na Móna's peat extraction and ancillary activities are not likely to have had significant impacts on telecoms and other services, cumulative impacts are not likely to have occurred.

Interactions of the Foregoing

Where there is potential for significant environmental effects, there is also potential for interactions between these effects which may exacerbate the magnitude of the effects.

Impact interactions have been considered throughout the environmental process and are presented the Table overleaf.

Interaction	Potential Impact Interaction
Noise and Biodiversity	The noise associated with peat extraction activities was generated through the use of mobile plant which is similar to agricultural type machinery. As the activities have been ongoing for many decades, and mammals and birds have been recorded on a number of the bogs it is not likely that significant noise impacts have occurred on biodiversity as a result of noise.
Noise and Traffic and Transportation and Population & Human Health	Transportation of extracted peat by road is not expected to have had a discernible impact on road traffic noise
Noise, Air Quality and Population & Human Health	There are a number of properties in close to the IPC licence boundaries of the bogs and the historic peat production area and peat extraction activities have most likely resulted in both noise and dust nuisance impacts
Air Quality and Climate and Traffic and Transportation	The extraction of peat has resulted in on-site GHG emissions associated with the drainage and exposure of the peat surface, methane emissions from drained organic soils and drainage ditches, losses from uncovered peat stockpiles and from machinery and transport use. Off-site GHG emissions are released from the combustion of peat to produce electricity, losses from horticultural products and as part of the peat briquette manufacturing process.
Air Quality and Biodiversity	Dust deposition from the continued harvesting of peat could have had an adverse impact on biodiversity
Climate and Surface Water and Flood Risk and Land, Soils and Groundwater	Undisturbed peat bogs offer climate resilience benefits locally, primarily through storage of flood water, ecological capacity for species adaptation, and delivery of improved water quality. The drainage of the bogs has significantly reduced the capacity for the bog units to provide the climate resilience benefits offered by undisturbed peat bogs
Climate and Surface Water and Flood Risk and Cultural Heritage and Land, Soils and Groundwater	Changes in hydrology, including drainage and flooding, could have impacted on cultural heritage
Climate and Surface Water and Flood Risk and Population and Human Health and Land, Soils and Groundwater and Material Assets	A Flood Risk Assessment of the 41 bogs indicates that pluvial flooding is the primary flood risk across the bogs, rather than flooding from groundwater or fluvial flooding and that downstream flooding, as a result of increased runoff from operational bogs is controlled by limiting bog discharges to greenfield runoff rates.
Biodiversity and Surface Water and Land, Soils and Groundwater	Examination of water quality data in the receiving water bodies shows that it is likely that peat extraction activities have had an adverse impact on water quality in receiving water bodies. The removal of peat has had a significant impact on biodiversity but in many cases the bog habitat was removed by 1985.

Interaction

Potential Impact Interaction

Land, Soils and Groundwater and Landscape and Visual and Population and Human Health	Bord na Móna's peat extraction, and ancillary, activities have had significant adverse landscape and visual impacts. However, the bogs included in this application have been drained, developed and have been in production for many years, some as far back as the 1940s. It is therefore not likely that peat extraction carried out on the 41 bogs between 1985 and 2020 has resulted in a significant change to the overall landscape character and visual impacts associated with the receiving environment.
Traffic and Transportation and Materials Assets	Traffic generated due to historic peat extraction activities have a minimal impact on road users, as a large proportion of the product is transported via the private rail network. Where road transport is utilised, the facilities are in close proximity to the national primary road network, which they do not saturate. A significant effect on materials assets is therefore not expected to have occurred.

