4. DESCRIPTION OF THE DEVELOPMENT

4.1 Introduction

This chapter of the rEIAR provides a description of the activities at the Application Site from 1948 at the onset of site preparation up to July 1988, a description of the baseline as of July 1988, a description of activities from 1988 to the cessation of peat extraction in June of 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. The elements of the Project as described in this chapter are the baseline as of July 1988, the activities from July 1988 to the cessation of peat extraction in June of 2020, the management of the Application Site since June 2020, and the activities relating to historic peat extraction intended to be carried out into the future. As described in Chapter 1, July 1988 is taken as the baseline assessment year for this rEIAR as this is the latest date that the EIA Directive (Council Directive 85/337/EEC) was required to be transposed into Irish legislation. This approach has been taken on a precautionary basis and strictly without prejudice, as EIA may not have been a legal requirement at that time. The assessment period for the rEIAR is from July 1988 to the present day.

Section 177E of the Planning and Development Act 2000, as amended, permits an application to be made for substitute consent in respect of development which has been carried out where an Environmental Impact Assessment (EIA), screening for EIA and/or Appropriate Assessment (AA) was or is required.

Neither the EIA Directive (Directive 85/337/EEC) nor the Habitats Directive (Directive 92/43/EC) has retrospective effect; neither Directive imposes legal requirements to have carried out prior assessments of projects which had already commenced or been completed. There was, therefore, no legal requirement for EIA, screening for EIA or Appropriate Assessment in respect of *any* project prior to the latest dates for transposition of the Directives. In the case of the EIA Directive, the latest date for transposition was 3rd July 1988. In the case of the Habitats Directive, the latest date for transposition was 10th June 1994.

Accordingly, this application for substitute consent is, of necessity, confined to the development which took place after those dates. The baseline against which the environmental effects of the development required to be assessed has therefore been identified as being the position as of July 1988 (being the earlier of the transposition dates of the relevant Directives).

However, as that Project formed part of a development which commenced many years prior to those dates, in order to facilitate as complete an assessment as is possible of the project since July 1988, a description of the Application Site and the peat extraction activities and all ancillary works which took place there up to July 1988 are included in this chapter.

Although no EIA or AA can be required of development which took place prior to the latest date for transposition of the Directives, it is clear that in considering cumulative or in combination effects of development to which the Directives do apply, it is necessary to consider the effects of that development cumulatively or in combination with existing development, even development which took place before the Directives came into force: see Case C-142/16, *Commission v Germany*. Moreover, where an application for consent relates to development which is functionally interdependent on another development such that they should be considered part of the same project, it is necessary to carry out a cumulative assessment of the separate parts of that project: see *O'Grianna v An Bord Pleanála* [2014] IEHC 632; *Fitzpatrick v An Bord Pleanála* [2019] 3 IR 617.

In this case, therefore, in carrying out any EIA or AA, it will be necessary to consider the cumulative or in-combination effects of the development which has taken place since July 1988 with that which had already taken place prior to that date in order to properly consider those cumulative or in-combination effects. Since development which took place before and after that date are part of a single project. It is

necessary and appropriate, therefore, that the development which took place before July 1988 is adequately described to enable that cumulative or in-combination assessment to be completed.

The historic activities described below include: the peat extraction processes, the construction, operation, and maintenance of supporting infrastructure and a description of ancillary activities undertaken. It also describes the current onsite activities and infrastructure as well as the proposed future remedial measures which will be implemented at the site in the form of decommissioning and peatland rehabilitation plans, subject to the agreement of the Environmental Protection Agency (EPA), and as required under Condition 10 of its Integrated Pollution Control (IPC) Licence P0501-01. Please see Appendix 4-1 for a copy of the licence.

The peat extraction activities and all ancillary works are historic, with a considerable number of activities and site preparation works pre-dating both the commencement of the formal Irish planning system (i.e., were first carried out prior to the establishment of the *Planning & Development Act 1963* (which was enacted on 1st October 1964) as well as both the EIA and Habitats Directive transposition dates in 1988 and 1994 respectively. Other infrastructure such as workshops, storage and loading facilities were also developed prior to the commencement of the formal planning system, while other ancillary services and infrastructure such as electricity distribution infrastructure, workshops, peat storage and loading facilities are located outside of the Application Site boundary and were previously granted their own respective planning consents (where required). This infrastructure is included below and considered within the overall rEIAR assessment.

4.1.1 Statement of Authority

This section of the rEIAR has been prepared by Ellen Costello and reviewed by Sean Creedon, of MKO. Ellen Costello is a Senior Environmental Scientist with MKO with over four years of experience in private consultancy. Ellen holds a BSc (Hons) in Earth Science, and a MSc (Hons) in Climate Change: Integrated Environmental and Social Science Aspects where she focused her studies on renewable energy development in Europe and its implications on environment and society. Ellen's key strengths and expertise are Environmental Protection and Management, Environmental Impact Statements, Project Management, and GIS Mapping and Modelling. Since joining MKO, Ellen has been involved in a range of renewable energy infrastructure projects. In her role as a project manager, Ellen works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs. Sean is an Associate Director in the Environment Team at MKO. He oversees a team of highly skilled environmental professionals working on EIAR for large-and medium scale Renewable Energy infrastructure. Sean has directed and overseen multiple renewable energy projects across wind, solar, battery and hydrogen as well as a range of thermal and other energy related developments. He has worked on the planning and environmental impact elements within all stages of project delivery. He is a member of the MKO senior management team responsible for developing the business, mentoring team members, fostering a positive culture and promoting continuous employee professional development. Prior to joining MKO Sean fulfilled several project and program management roles within Bord na Mona. Sean has over 22 years' experience in program and project development, holds an MSc from NUI Galway and a Diploma in Project Management from Institute of Project Management Ireland.

4.1.2 Project Description Information Sources

- Integrated Pollution Control Licence (IPC) Licence Derrygreenagh Bog Group (Ref. P0501-01) Environmental Protection Agency (included in Appendix 4-1);
- Bord na Móna Cutaway Bog and Decommissioning and Rehabilitation Plans, (included in Appendix 4-2):
    - Ballivor Bog 2024 Draft Cutaway Bog Decommissioning and Rehabilitation Plan;

  - Bracklin Bog 2024 Draft Cutaway Bog Decommissioning and Rehabilitation Plan;
    Bracklin West Bog 2023 Cutaway Bog Decommissioning and Rehabilitation Plan;
  - Carranstown 2022 Cutaway Bog Decommissioning and Rehabilitation Plan;
  - Lisclogher East 2024 Draft Cutaway Bog Decommissioning and Rehabilitation Plan; and,
  - Lisclogher-West 2023 Cutaway Bog Decommissioning and Rehabilitation Plan.
- Bord na Móna Annual Reports which contain information relevant to the Application Site;
- Bord na Móna Living History website[1];
- Brown Gold, A History of Bord na Móna and the peat industry in Ireland, Clarke, Donal 2010;
- IPC Licence, Annual Environmental Reports 2000-2023 (included in Appendix 4-3 (2018 to 2023 are also publicly available[2]));
- Inspection of production records at Ballivor Works;
- IPC Licence P0501-01 Application 1999 (Available at EPA Headquarters on request);
- Aerial Maps from 1973 to 2020 (included in Appendix 4-4);
- Bord na Móna IPC training programme (included in Appendix 4-5);
- Personal communications with former Bord na Móna Employees;
- Silt Committee Interim Report Recommended Measures 1976 (included in Appendix 4-6);
- Silt Committee Excavator records 1984 (included in Appendix 4-7);
- Silt Committee Meeting Records Derrygreenagh 1984 (included in Appendix 4-8);
- Silt Control Report for Peat Energy Division Jim Harkins Bord na Móna Report 1991 (included in Appendix 4-9);
- Bord na Móna Peat Development In Ireland 1954 (included in Appendix 4-10);
- Bord na Móna Environmental & Operational Procedures for the Protection of Surface Water (included in Appendix 4-11);
- Planning Drawing Pack (included in Appendix 4-12);
- Irish Engineers Journal Supplement 1970 (p.13-15);
- Bord na Móna Biodiversity Action Plan 2016-2021 (included in Appendix 4-13);
- Silt Control Study– Internal Bord na Móna Report 1984 (included in Appendix 4-14);
- Drainage Study with Particular Reference to Pumping – Internal Bord na Móna Report 1984 (included in Appendix 4-15);
- Peco Harvester Tests – Internal Bord na Móna Report 1986 (included in Appendix 4-16);
- Distribution and Nature of Mineral 'Ash' Material in a Milled Peat Stockpile – Internal Bord na Móna (included in Appendix 4-17);
- Regional Administration in Relation to Milled Peat Operation – Internal Bord na Móna Report 1988 (included in Appendix 4-18); and,
- Industrial Cutaway Bog Land-Use Studies (Clonsast) – Internal Bord na Móna Report 1978 (included in Appendix 4-19).

[1] *Available at:* https://www.bordnamonalivinghistory.ie/

[2] *Annual Environmental Reports 2018-2023 available at:* https://leap.epa.ie/licence-profile/P0501/compliance

4.1.3 Information Required for the Description of the Project

Article 5(1) of Annex IV of Directive 2014/52/EU and amending Directive 2011/92/EU outlines the items that should be included in an EIAR when assessing the effects of certain public and private projects on the environment. Item 1 of Annex IV is reproduced in Table 4-1 and lists what should be included in the description of the project. These items are described in detail in this chapter and associated appendices. They can also be found in more detail in their respective chapters.

Table 4-1 Information referred to in Article 5(1) *Annex IV of Directive 2014/52/EU, 2011/92/EU* to be included in the description of the project.

1) Description of the project, including in particular:		Relevance to application	Location In rEIAR
a)	*a description of the location of the project;*	Ballivor Bog, Carranstown Bog, Bracklin Bog, Lisclogher Bog and Lisclogher West Bog, part of the Ballivor Bog Group, which is a subset of the Derrygreenagh Bog Group. The Ballivor Bog Group is located on the border of Co. Westmeath and Meath	Chapter 1 Introduction Chapter 4 Description
b)	*a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;*	Site baseline description (as of July 1988), site preparation works pre-commencement of industrial peat extraction, drainage implementation, supporting infrastructure	Chapter 4 Description Chapters 5 to 15
c)	*a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;*	Peat extraction activities and all ancillary works from July 1988 – June 2020, including peat volumes extracted, peat extraction methods, machinery requirements, scale of operational areas required peat extraction methods, supporting activities Vegetation clearance, habitat removal, peat volumes extracted, energy used	Chapter 4 Description Chapter 6 Biodiversity Chapter 7 – Land, Soils and Geology Chapter 8 – Hydrology and Hydrogeology Chapter 9 Air Quality Chapter 10 Climate Chapter 14 Material Assets Appendix 4-3 Annual Environment Reports

	1) Description of the project, including in particular:	Relevance to application	Location In rEIAR
d)	*an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.*	Silt run off, waste management, noise and vibration emissions, dust and CO_2 emissions	Chapter 4 Description Chapter 7 Land Soil and Geology Chapter 8 Hydrology and Hydrogeology Chapter 9 Air Quality Chapter 10 Climate Chapter 11 Noise and Vibration Chapter 14 Material Assets Appendix 4-3 Annual Environment Reports

4.2 Project Description

This rEIAR is prepared in support of an application for substitute consent for peat extraction activities and all ancillary works carried out by Bord na Móna on lands at the Application Site since July 1988.

The peat extraction activities and all ancillary works undertaken at the Application Site, which comprise the Project for which substitute consent is being sought, and for which this rEIAR is prepared, consists of the following:

i. *Installation of surface water drainage infrastructure at Ballivor Bog Group, specifically at Ballivor, Carranstown, Bracklin, Lisclogher, and Lisclogher West Bogs to facilitate peat extraction activity from 1988 to June 2020;*
ii. *Vegetation clearance to facilitate peat extraction activity from 1988 to June 2020;*
iii. *Industrial scale peat extraction (milled peat and sod peat/moss), specifically at Ballivor, Carranstown, Bracklin, and Lisclogher Bogs from 1988 to June 2020;*
iv. *Use and maintenance of pre-existing ancillary supporting infrastructure and services to facilitate peat extraction and associated activities (e.g., railway infrastructure, fixed fuel tanks, drainage (drains, silt ponds, pumps), machine passes etc.), from 1988 to present day;*
v. *Control Measures associated with the above, inclusive of the IPC Licence measures (Ref. P0501-01) which commenced from April 2000 onwards to the present day;*
vi. *All associated site development and ancillary works.*

4.2.1 Project Phases

As detailed in Section 1.1.1, for the purposes of this rEIAR, the Project is defined under three different timeframes termed 'phases':

- **'Peat Extraction Phase':** peat extraction activities and all ancillary works at the Application Site from July 1988 to the cessation of peat extraction in June of 2020 (July

1988 – June 2020). The Peat Extraction Phase is described in detail in **Sections 4.4 to Section 4.7.**

- **'Current Phase':** the management of the Application Site since June 2020 (June 2020 to present). The Current Phase is described in detail in **Section 4.7 and Section 4.8**.
- **'Remedial Phase':** the activities intended to be carried out at the Application Site into the future. The Remedial Phase is described in detail in **Section 4.9.**

4.2.2 General Overview of the Peat Extraction Process

4.2.2.1 Surveying and Drainage

A description of the surveying and drainage methodologies and machinery used across the Bord na Móna bogs, including at the Application Site, is outlined on the Bord na Móna Living History website[3], as taken from Irish Engineers Journal Supplement, 1970, p.13-15.

The key approach and outputs of the surveying works were as follows:

- The lateral extent of the bog deposit was determined using traditional surveying techniques;
- The peat types or the stratification to the bog floor (i.e., the degree of decomposition as expressed on an international scale of humification) was determined. This scale ranges from H.1 to H.10 (the higher the number, the greater degree of decomposition);
- Levels were taken at 100-yard (approx. 91m) intervals or closer along parallel section lines 250 yards (approx. 228m) apart on midlands bogs (the Application Site comprises midlands bogs). The depth of the bog at each level point was determined by a Swedish-type tube borer coupled in lengths of 1m. The leading tube was provided with a special rotating head which enabled a 0.5m sample from any particular depth to be carried to the surface;
- Midland virgin bogs, such as the Application Site, varied in depth from 10 foot (approx. 3m) to over 40 foot (approx. 12m) – the bulk of the soundings lying in the range 15 foot (approx. 4.5m) to 25 foot (approx. 7.5m); and
- Apart from the survey of the bog deposit a detailed survey of all the minor streams and minor rivers carrying waters from the bog to main rivers was also carried out.

Once the detailed survey work was completed and a site deemed suitable for peat extraction, drainage works across the relevant bogs were initiated. The development of the drainage for the site was carried out in stages using a range of machinery. Midland virgin bogs, of which the bogs associated with the Application Site were typical, would, pre-development, have had a moisture content of over 94%, which varied from 96-97% near the surface to 90% at the bog floor. The stages of drain development are outlined below:

- Initial opening of drains:
  - Drains were first opened by a plough pulled by a Bord na Móna tractor at a slow speed (approx. ½ to 1 mile per hour (0.8km/h – 1.6km/h)); and
  - The drain depth at the plough stage was 20″ (0.51m). Drains had a trapezoidal section with a top width of approx. 30″ (0.76m) and a bottom width of 12″ (0.3m) bottom width.
- Deepening of drains:
  - Following their initial opening, drains were deepened by rotating disc machines operating at speeds of 200-600 yards per hour (approx. 180-550m/hour).
  - Rotating disc machines could deepen the drains to a maximum depth of approx. 60″ (approx. 1.5m), with a bottom width of approx. 12″ (approx. 0.3m); and

[3] https://www.bordnamonalivinghistory.ie/article-detail/civil-works-in-bord-na-mona/

- Whether further deepening of drains was required depended on the purpose of the drain was achieved by smaller-type bucket excavators and peat cutting machinery, by drag lines specially tracked to Bord na Móna's design, by several other excavator types, or by hand where it was desired that the drain should conform to certain maximum dimensions.

Arterial drainage works were not always adequate to achieve the levels of drainage required to allow the extraction of peat deposit to the bog floor. Pumping of whole bog areas or certain portions of bog areas arose where gravity drainage was impossible or achievable only at prohibitive cost. In these instances, the pumps favoured were the Archimedean screw type or the Axial flow type electrically powered, and electrode controlled. Both the screw pumps and axial flow pumps used were supplied by manufacturers in the Netherlands.

Once drained, the upper acrotelm layer (which comprises the biologically active component of the bog) was removed to facilitate peat extraction activities and all ancillary works and the drying of peat. The acrotelm is one of two distinct layers in undisturbed peat bogs. It overlies the catotelm. The boundary between the two layers is defined by the transition from peat containing living plants (acrotelm) to peat containing dead plant material (catotelm).

The machinery involved in drainage work on the Application Site is described in Section 4.2.2.1.1.

4.2.2.1.1 *Drainage and Bog Preparation Machinery*

Dragline/Shovel Excavator: Types 287 CU. Metres and 478 CU. Metres

These machines excavated the main outfalls for the bog drainage system in the early development stages and maintained main outfalls during the production life of the bog. While these excavators were generally of conventional design and were suitable to be mounted with dragline attachments, back and front acting shovels, and pile driving attachments, they were used mainly with the dragline attachment. The machines were powered by a diesel engine. All drives were mechanical with friction clutches and brake control of winches and turntables, while the track drives and steering were controlled by a claw clutch and brake arrangement.

In 1958, a new underframe for the dragline was designed to minimise surface pressure and eat compaction, thereby eliminating the need for the use of timber mats. The increased mobility and reliability of the machine resulting from the new underframe allowed the machines to move rapidly over the bog to do relatively small jobs which would earlier have been done by hand owing to the slowness and difficulty of moving the dragline over timber mats. Additionally, the elimination of the timber mats meant that groundsmen were no longer required to move the timber mats. This meant that draglines could be operated by the driver only, with no support staff required. The 287-model excavator had caterpillar-type tracks with timber sleepers, which provide the necessary bearing area for operation on bog, without using mats. The 478 model excavator, while equipped with caterpillar track chains, was not fitted with track sleepers but was supported on timber mats where necessary. When excavating bog these machines were fitted with a special dragline bucket of light design with a capacity of 750L. Plate 4-1 below is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-1 Dragline/Shovel Excavator Source: https://www.bordnamonalivinghistory.ie/equipment-detail/draglineshovel-excavator/

Drainage Machine Type – Klassmann

The Klassmann drainage machine was designed and developed for operation on sod moss production bogs. The machine was supplied with a variety of attachments to suit specific duties. For Bord na Móna's applications it was fitted with a slit drainer, a drain cleaner and a levelling screw. The tractor was of light construction with the chassis fabricated from folded steel sections supported on two tracks each comprising two chains carrying steel swamp shoes, running on end sprockets and frictionless bearing mounted intermediate support rollers. The power unit was an air-cooled diesel engine and the transmission consisted of an over-centre single plate clutch, vee belt drive, specially designed four speed gearbox, and chain drives which powered both tracks and the power take off (PTO) for attachments. Additional sprockets were supplied to give a variety of forward speeds to suit specific attachments. Steering was assisted by coil clutch and brake bands. The machine was fitted with a hydraulic system to control the transmission of power to the various attachments. All controls were centralised in an enclosed cab.

The slit drainage attachment was used to open initial drains in virgin bog. It comprised a cutting boom of small buckets carried on special chains and sprockets. The content of the buckets was discharged mechanically into a vane-type spinner which threw the spoil clear of the drain. The drain cleaner attachment was similar to the slit drainer but cut a wider drain and was used to deepen and maintain drains after the first sod cut was made. The screw leveller attachment was used for the preparation of fields on moss peat bogs to remove the vegetation and level the surface to facilitate the performance of cutting machines and the stability of the sod walls formed by these machines. The attachment had the ability to camber surfaces if required.

Drainage Machine Type – M.P. Field Slitter

This machine was developed to cut slit drains in milled peat fields to accelerate drainage in the poorer quality areas. The drains cut to a definite pattern comprising three longitudinal slits, one central and one on either side, with cross drains giving exit to the ditches at regular intervals. The machine comprised a tractor on full tracks with a chain saw cutting attachment similar to the chain saw machine. The tractor had a special transmission to give the correct forward travel speeds in second, and third gear. The modification involved the replacement of the gearbox primary gear train and the differential crown wheel and pinion, in addition to the insertion of a special reduction gearbox. The tracks comprised flat metal cleats carried on two chains and run on the standard tractor tyre wheels with an additional jockey wheel. The attachment was carried at the rear of the tractor, pivoted on the centre of a standard power-take-off bevel box output shaft and is raised and lowered about this pivot by a hydraulic ram operated from the driving position. The cutting element was a standard transmission chain with cutting teeth secured to it by welding, running over top driving sprocket and a bottom driven sprocket whose shaft carries a cutting impeller on either side outside the support bearings. These impellers, in conjunction with the cutting chain, excavated a tunnel of rectangular section at the bottom of the slit drain cut by the chain only. The machine had a cab with toughened glass windows, allowing good vision for manoeuvring and observing the behaviour of the attachment. Plate 4-2 below is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-2 Drainage Machine Type – M.P. Field Slitter. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/drainage-machine/

Ditching Attachment – Milled Peat Type – Disc

The purpose of this attachment was to cut the drains separating the milled peat fields in development bogs and deepen existing drains in production bogs. The attachment consisted of a rotating cutting disc set at an angle to the line of travel, carried on an arm from the tractor unit. The arm and disc were controlled and supported by wire ropes and a hydraulic ram passing over a mast on the tractor unit and anchored to a projecting ballast box on the other side of the tractor unit. The disc was driven by

the tractor main gearbox PTO shaft via a bevel gear reduction box and universal propeller shaft. On other machines a chain drive reduction was inserted between the bevel gearbox and universal propeller shaft to achieve a slower disc speed. The disc had cutting blades and a stationary shield which deflected the flying spoil away from the machine and spread it evenly over the adjacent field.

Drain Cutting Attachment – Cross Drain

The purpose of this attachment was to cut small drains in milled peat fields from the centre of the field to the ditches separating the fields. The attachment consisted of a cutting boom which was mounted on the rear of the H.D. Tractor Type II on radius arms, controlled for height and level by hydraulic rams. To cut the drain, the tractor stopped, and the cutting boom started, trimmed for level if necessary and lowered into the bog, discharging the spoil to the centre of the field. The boom was of light construction using standard steel sections. The chain was carried on sprockets at the ends of the boom while it ran in a guide with the aid of welded-on cleats along the bottom horizontal portion of the boom. The drive is taken from the PTO shaft of the tractor main gearbox via chain drivers and universal jointed propeller shaft. Plate 4-3 below is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-3 Drain Cutting Attachment – Cross Drain. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/drain-cutting-attachment-cross-drain/

Drain Cleaner – Screw

This attachment was used to remove slurry from the bottom of milled peat field ditches and dispose of it by spreading it on the adjacent field. The attachment was a screw elevator with radial blades fitted at the top to eject the spoil through an outlet in the casing in a predetermined direction. The attachment was mounted on a cantilevered bracket from the tractor on a pivot arrangement so that the screw casing could be lifted and lowered as required by winch rope. In the working position the screw elevator is lowered into the ditch and scooped the slurry from the bottom of the ditch as the tractor advances. As

the tractor progresses along the ditch or drain it accumulates the slurry; the screw elevated it into the discharge chamber and the radial blades ejected it through the outlet onto the peat field. Plate 4-4 below is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-4 Drain Cleaner Screw. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/drain-cleaner-screw/

Stripping Machine Type – I & II

The purpose of this machine was to cut away the top layer of bog from the section which was to be cut. This layer varied in depth from 305 mm to 762 mm and was deposited at the bottom of the face bank prior to reuse on the adjacent spread grounds. The machine had a lightly constructed main frame mounted on caterpillar type tracks and the spiral cutting/conveyor unit was carried in an off-set position at the rear. The spiral cutter/conveyor unit was pivoted to the main frame and suspended on an overhung mast on which it was raised or lowered as required. A separate trimming control, in the form of a hydraulic ram, was fitted at the cutting end.

The Type I machine was powered by diesel engine and transmission of standard manufacture incorporating a differential brake/gear steering arrangement as used on levelling machine. There were 8 forward speeds and 4 reverse speeds available through gearbox and change sprockets.

The Type II machine was powered by a diesel engine driving through an over-centre type clutch, a 'V' rope drive special worm and spur gear reduction box, and chain drives. The machine was steered by coil clutches on the track final drives. There were 6 forward speeds available using change sprockets. Plate 4-10 is an image of this type of machinery operating on a Bord na Móna bog. Plate 4-5 below is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-5 Stripping Machine. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/stripping-machine/

Levelling Machine Type – Scraper

The purpose of this machine was to prepare the surface of the high bog and cutaway for the efficient operation of all other machines, by levelling it. The machine consisted of a large tractor unit carrying a leveller boom in front. As the machine advanced on its long tracks, the boom cut away the high areas, losing the spoil in the hollows. The tractor unit had a rigid main frame supported on caterpillar type power driven tracks and was powered by diesel engine and gear transmission of standard manufacture. The boom had a light framework made up of standard steel sections, around which was driven two conveyor-type chains running on sprockets at each end and in guides along the bottom and top. Across these two chains, arms were fitted, projecting beyond the front of the boom. The projecting portion of the arm had a cutting knife and scraper palm. The boom was controlled for height and level by hydraulic rams. Plate 4-6 below is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-6 Levelling Machine Type – Scraper. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/levelling-machine/

4.2.2.2 Peat Extraction Process

Three distinct peat products were extracted at the Application Site: sod peat, milled peat, and sod moss. The methods by which these products were extracted varied, and each process is described in detail in the sections below. A description of the machinery used for peat extraction activities and all ancillary works at the Application Site is provided in Section 4.2.2.2.

4.2.2.2.1 *Sod Peat Extraction*

Sod peat, also sometimes referred to as 'machine turf', was extracted utilising technologies developed between 1910 and 1920. The sod peat was initially supplied as a fuel product for both domestic and industrial uses. Once drainage was installed and the bog surface suitable for use by machinery, the bog surface was prepared using levelling and stripping machines (Plates 4-5 and 4-6). Sod peat extraction was subsequently carried out by a range of different bagger/sod peat excavator machines[4]. The German word for both 'excavator' and 'dredger' is 'Bagger' and this was the word adopted in Ireland for machines which mixed the peat from different depths of the bog and then macerated it (Plate 4-21).

In the case of sod peat extraction, large open drainage ditches known as "trenches" were opened at widths of approx. every 240 metres across the entire width of the extraction area. These trenches served as the beginning of the face bank from which sod peat was ultimately extracted. Baggers cut a trench with a width of 2 meters and a depth of 3 to 4 meters. A chain of buckets on the bagger was then inserted into the trench which extracted peat from all strata of peat in the trench. The extracted peat was then deposited into a macerator which pulped and mixed it. Maceration improved the quality of the sods of peat produced, as by thoroughly mixing peat from each strata of the bagger trench, the

[4] https://www.bordnamonalivinghistory.ie/equipment-detail/sod-peat-baggerexcavator/

density and uniformity of the sod was increased. The macerated peat pulp was then extruded through a narrow double mouthpiece which formed it into two rows of continuous sods each of approx. 5 inches (approx. 13cm) wide x 3 ¾ inches (approx. 9.5cm) high. As they were extruded, the rows of peat were deposited on to a continuously moving chain of spreader plates, which when the spreader arm was fully loaded, tripped automatically and deposited the rows of turf onto the bog surface. Trailing discs then cut the rows into 15 inch (approx. 38cm) long sods. The standard length of the spread arm was 54 metres. A short video of the last bagger that was operational on the Application Site can be viewed at: https://www.youtube.com/watch?v=nNcitG0WKPs. The bagger/sod peat excavator machine spread the sod peat on the large area between the trenches which allowed sufficient room to dry the sod peat and allow for processing and collection later in the season when the sods had dried.

Typically, the large sod peat fields were between 800 to 2,000 yards long (approx. 700m to 1,800m) discharging normally to the end of the large drainage trenches. Small, piped outfalls were installed perpendicular to the drains where needed to drain low areas that formed along the sod peat field. The pipes used were either concrete or clay pipes with a small diameter of between 150mm to 300mm.

These bogs utilised Archimedes screw pumps where levels did not allow for gravity drainage. As the sod peat machine (bagger) was electrically powered a power supply for the pumps was easily obtained from the existing internal distribution network.

The large drainage trenches were continuously developed and have a width of between 3 to 8 metres typically and a depth of around 2-5 metres. They were maintained using mechanical excavators or draglines and were continuously deepened as sod peat was extracted from the bog to lower the drainage level.

After about two weeks on the surface of the bog, the sods were turned by a sod turning machine[5] to allow the other side of the sod to dry. When the sods were fully dried, the density and uniform texture resulting from the maceration process made them very impervious to rewetting. The dried sod peat was then collected from the surface of the bog using a sod collector. This machine was used to collect the sod peat from the sod rows into stockpiles which were often referred to as 'ricks'. A permanent 3 ft. gauge railway serviced all bog areas and facilitated connectivity to the various works centres, workshops, and fuel depots across the Bord na Móna landbank. When it was decided to move a stockpile, a temporary railway track was laid alongside from the permanent railway line. On completion of loading, the temporary track was lifted and re-laid along another stockpile as required. Please see Plate 4-7 for a Flow Chart of the Sod Peat Extraction Process produced by Bord na Móna.

4.2.2.2.2 *Milled Peat Extraction*

In the case of milled peat extraction, parallel open drains were cut at 50 ft. (approx. 15.2m) centres which divided the peat extraction area into fields 45 ft. (13.7m) wide. Typically, the field drains were from 800 to 2,000 yards (approx. 700 to 1,800m) long, discharging at either end into piped outfalls which ran at 90° to the open drains and which themselves discharged into the nearest natural outfall. Beyond the piped outfall was left a headland or turning ground 70 to 100 ft. (21 to 30m) wide which ran parallel to the piped outfall to enable production machines to turn from one field into another. When fully developed, the open field drains had a depth of approx. 4′ 6" (approx. 1.4m) and a top width of approx. 5′ 0" (approx. 1.52m). The field drains were excavated and initially maintained by machines called disc ditchers. The disc ditcher consisted of a cutting disc. which was mounted on an arm offset from a tractor unit. Tractors were powered by a diesel engine, and they were mounted with timber and swamp shoes and front rollers.

Milled peat extracted from the bogs supplied horticulture peat for the manufacture of growing media products for the professional and retail markets. Milled peat extraction requires good solar/wind drying conditions and so commenced any time from mid-April and usually ran until mid-August, once suitable

[5] https://www.bordnamonalivinghistory.ie/equipment-detail/sod-turning-machine/

drying conditions prevailed. Following drainage, there were four stages to the production of milled peat:

1. **Milling** - During the milling process the top 10-15 mm of the surface of each field was broken into peat crumbs by powered milling drums towed behind agricultural tractors. This layer of crumbed or milled peat is called a crop and has a moisture content of about 80% when milled. Please see Plate 4-8 for details.
2. **Harrowing** - After milling, the peat crop was dried. To assist in this drying, the loose peat was harrowed, or turned over. The harrow consisted of a series of spoons which are towed behind an agricultural tractor. The spoons on the harrow were fitted with special base plates which prevented the scraping of wet particles from below the milled peat layer. Harrowing was usually required 2 to 5 times per peat crop, depending drying conditions, the water table level in the peat extraction fields, the initial moisture content of the peat at milling, and peat quality. If rain interrupted the drying process, more harrowing may have been needed. Please see Plate 4-9 for details.
3. **Ridging** - When the milled material was dried to a moisture content of between 45% and 55%, it was gathered into ridges in the centre of each peat extraction field. The ridger consisted of a pair of blades towed in an open V behind an agricultural tractor. The open V blades rest on the bog and channel the loose crop into a triangular ridge in the centre of each peat extraction field. Please see Plate 4-10 and Plate 4-11 for details.
4. **Harvesting** - Harvesting is the final stage of the milled peat extraction process. Each individual ridge was lifted mechanically by a machine called a harvester, transferred and dropped on top of the adjoining field's ridge, until five ridges had been accumulated into a single large ridge. This ridge forms the final lift into the peat storage stockpile.

The 'Peco' stockpiling method was practised at the Bracklin, Ballivor and Carranstown bogs whereby the eleventh field, i.e., one field in between two groups of five fields, was retained for stockpiling peat from the neighbouring ten fields. The extraction-stockpiling cycle is referred to as a 'harvest' and each group of eleven fields generally produced 12 No. harvests per year. When the production season was over, the stockpiles were covered to keep the peat dry unless the peat was scheduled for immediate transportation from the site for sale or use. Peat was stored in these stockpiles (up to 25 m wide, 10 -15 m high) until required for use. Please see Plate 4-12 to 4-14 for details.

A permanent 3 ft. gauge railway serviced all bog areas and facilitated connectivity to the various works centres, workshops, and fuel depots across the Bord na Móna landbank. As in the case of sod peat stockpiles, when it was decided to move a stockpile of milled peat, a temporary railway track was laid alongside from the permanent railway line. On completion of loading, the temporary track was lifted and re-laid along another stockpile as required. Please see Plate 4-7 for a Flow Chart of the Milled Peat Extraction Process produced by Bord na Móna.

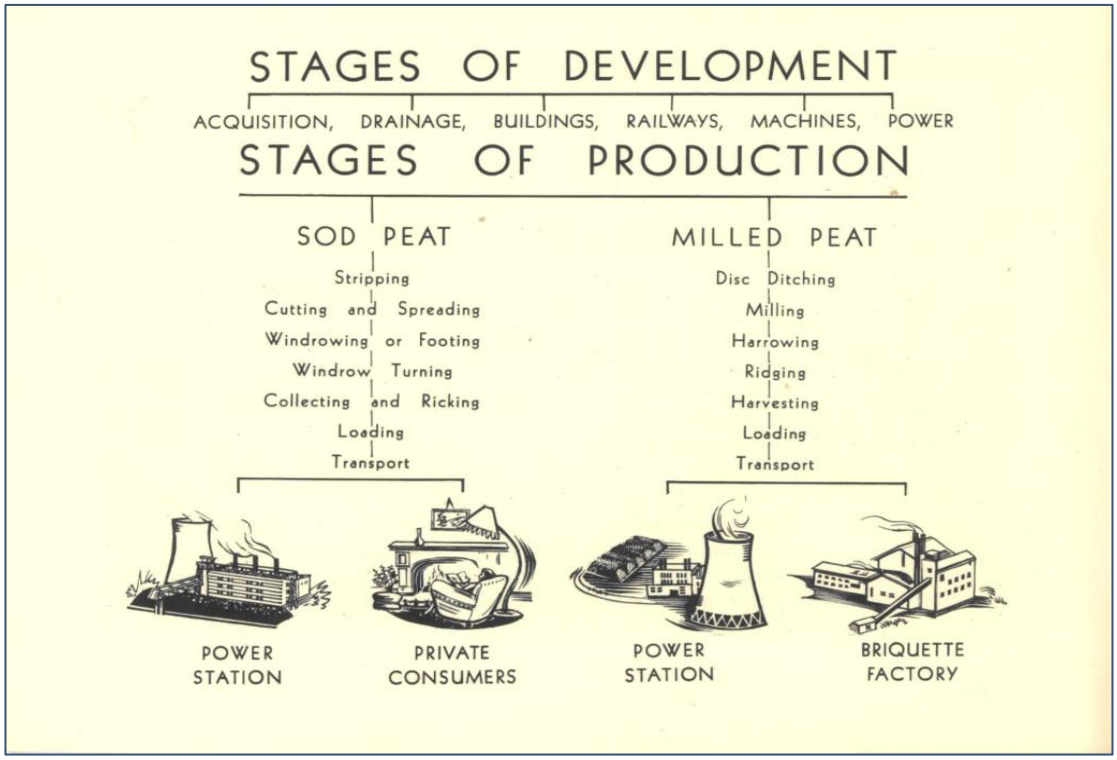


Plate 4-7 Flow Chart of the Sod and Milled Peat Extraction Process produced by Bord na Móna in 1954

Plate 4-8 Milling process. Image: Bord na Móna

Plate 4-9 Harrowing process. Image: Bord na Móna

Plate 4-10 Ridging process. Image: Bord na Móna

Plate 4-11 Ridging process. Image: Bord na Móna

Plate 4-12 Harvesting -Peco method. Image: Bord na Móna

Plate 4-13 Harvesting -Peco method. Image: Bord na Móna

Plate 4-14 Stock Protection. Image Bord na Móna

4.2.2.2.3 Sod Moss Extraction

'Sod moss' is the term used to describe peat produced in block form for horticultural use. Sod moss is made up of incompletely humified mossy or fibrous peat consisting mainly of sphagnum moss, cotton grass and other vegetable fibres. When dry, sod moss is very light and able to absorb and retain moisture to over ten times its dry weight. It is this characteristic which makes it ideally suitable for horticulture.

To facilitate the extraction of sod moss, bogs were drained using a system of longitudinal drains opened at intervals of approx. 7.5 metres. The drainage process was slow, and it took between five and seven years to prepare a bog before the extraction of sod moss could commence. The sod moss extraction season generally extended from June right through the winter and early spring. The peat was cut in sods, but not macerated as was the case with sod peat as described in Section 4.2.2.2.1. Unlike both sod and milled peat, sod moss was left out in peat extraction fields over the winter, so that it could be subjected to the action of frost and rain. Sod moss which has been frozen in winter dries more quickly in the spring and it remains looser while doing so and it is, therefore, more easily disintegrated. It is also more absorptive than sod moss which has not been subject to frost. Rain helped to improve the quality of the sod moss by washing away humified particles of peat.

Following drainage, 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 approx. 12 months, reducing moisture content from 90% to between 50% and 60%. Once the required moisture content was reached, the sod moss was stockpiled at the edge of the bog prior to transportation via rail for processing. One layer was typically cut at a time until the sod moss deposit was exhausted. Please see Plate 4-15 and Plate 4-16 for details.

Plate 4-15 Sod Moss Extraction (left) and Sod Moss stockpiles (right). Images Bord na Móna

Plate 4-16 Sod Moss drying (left), Sod Moss stockpiles (right). Images Bord na Móna

4.2.2.3 Peat Extraction Machinery

The following machinery was used in the extraction process once the bogs had been cleared of vegetation and drains inserted. The type of machinery used at any given time would vary depending on machine availability, bog conditions, the type of peat being extracted (i.e. milled, sod, or sod moss) and operator preference.

4.2.2.3.1 *Tractors*

A variety of tractors have been used throughout the history of peat extraction activities and all ancillary works on the Application Site. As with all machinery used during peat extraction activities, the choice of tractor used for any given activity would have been based on availability, bog conditions, and activity type (which would dictate the mechanical requirements of the tractor in terms of power output, drivetrain, weight, wheelbase dimensions, tyre type, PTO specifications, hydraulic requirements etc.). Throughout the decades as improvements in tractor design were made, newer more powerful and efficient tractors were employed on the Application Site. A non-exhaustive overview of the types of tractors used is provided below.

H.D. Tractor II

The H.D. Tractor II was a half-track tractor specially designed for harvesting and ditching operations in the Peco system of milled peat. The machine consisted of a robust main frame supported on caterpillar type tracks, which are exceptionally high to accommodate the attachments within them, and on large steering rollers in front. The tractor was powered by a diesel engine fitted with automotive-type clutch. The transmission consisted of a main gearbox, an auxiliary gearbox, a worm drive bevel gear differential unit and a spur gear reduction final drive contained within the back axle casting. The tracks comprised a special cast steel link type chain, with swamp shoes or sleepers bolted on, which ran on track rollers suitably spaced on the track frame. The driving sprockets were built up from steel plate discs with steel rollers between, to register with the track chain. The idler sprocket had the steel disc, with distance pieces, allowing the track link driving spuds to pass between them. Both the driver and idler sprockets are fitted with wear resisting cast steel pads where the track link driving spuds make contact with the sprocket plates. The front rollers were steel rimmed with spokes from a central cast hub. A circumferential steel angle section was fitted to obtain steering adhesion. The rollers were mounted on a swinging axle. The steering was manual through a wormbox, operating winding drums with wire ropes to the axle. The driver's platform was spacious, located at a high level over the main gearbox. For ditching operations, a protective cab was fitted over this platform to protect the driver from ditching spray and the elements. On some tractors on ditching operation, a simple hydraulic steering system was fitted. Plate 4-17 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-17 H.D. Tractor II. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/h-d-tractor-ii-2/LHT

This tractor was designed to operate miller and ridger attachments in accordance with the Peco system of winning milled peat. This machine consisted of a simple main frame with caterpillar-type tracks and front steering rollers. It was powered by a diesel engine fitted with an automotive type clutch. The transmission was a special speed change gearbox with PTO shaft, and a worm-driven bevel gear differential unit housed in a conventional back axle. The half shafts from the differential unit are coupled to the track drive sprockets direct.

The main frame accommodated either of two engines, the size depending on the attachment to be used with the tractor. Steering was manual by hand wheel through a worm reduction gearbox, draglink and track rod. The front axle swung in the vertical plane to avoid undue distortion of the tractor frame. The front rollers were fitted with a circumferential ring of steel angle section to obtain steering adhesion. Plate 4-18 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-18 LHT Tractor II. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/lht-tractor

LHT Tractor III

This tractor, fitted with attachment, is used for ridging the milled peat into the centre of the field. The tractor is the half-track type with front steering rollers. The main frame is fabricated from standard steel angle and channel sections. The tracks are single chain cast link type with timber swamp shoes bolted on and runs on cast sprockets and intermediate supporting rollers. The front steering rollers are spoked with fabricated steel rims and cast iron hub and are mounted on stub axles on a pivoted axle beam which swings in the vertical plane. Steering is effected manually through worm reduction gearbox, drag link and track rod. The tractor is powered by a water cooled diesel engine fitted with automotive type clutch. The transmission consists of a speed step-up primary gearbox of special design, a standard agricultural tractor change speed gearbox and differential assembly with a chain reduction final drive between the standard transmission unit half shaft and the track sprockets. Since this tractor is used only for ridging operations during daylight hours no electric generator is fitted and the engine is hand started. A hydraulic pump assembly is incorporated in the standard agricultural transmission unit and this is used to actuate the attachment hydraulic system.

Ridger Tractor (LHT IV)

A tractor specially designed to perform the milled peat ridging operation at more than twice the speed of the L.H.T. II & III by covering the full width of the field in one pass. The chassis is fabricated from standard rolled steel sections mounted on half-tracks which incorporate our manganese track links and sprockets with intermediate support rollers. Timber swamp shoes are bolted to the track links. The power unit is a diesel engine with automotive type clutch and it drives through a heavy duty automotive type gear box and cardan shaft – the differential unit of a standard heavy duty truck back axle with epicyclic gear reduction between half shaft and wheel hubs. The track sprockets are bolted directly to

the axle hubs. The tractor is carried on front rollers of generous proportions carried on stub axles and steering is powered by hydraulics. The engine is fitted with two hydraulic pumps, one for power steering and the other for the attachment hydraulic system. The attachment consists of double blades similar to the single ridger attachment, one blade on either side of the tractor converging at the rear. The blades are supported by sturdy spars which radiate from the tractor chassis. Adjustment of the sole-plate of the blade relative to these spars is provided. The attachment is lifted and lowered hydraulically through a multi-guy rope system over the top of a central mast on the tractor. Plate 4-19 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-19 Ridger Tractor. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/ridger-tractor/

Massey Ferguson 35

The Massey Ferguson (MF) 35 would have been used from the 1960s and 1970s. It has a rated engine power of approx. 37 horsepower (hp). The MF 35 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It is commonly equipped with a 6-speed or 12-speed gearbox, depending on the model and design. It has a hydraulic system with a variable capacity. The tractor's weight is approx. 1,500kg.

Ford TW15

The Ford TW15 was used from the 1980s. It has a rated engine power of approx. 140hp, with a PTO output of approx. 120hp. The TW15 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is approx. 5,000kg.

Landini 5830

The Landini 5830 was used from the 1980s. It has a rated engine power of approx. 50hp, with a PTO output of approx. 42hp. The 5830 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is approx. 2,500kg.

Ford F4630

The Ford F4630 was used from the 1990s. It has a rated engine power of approx. 60hp, with a PTO output of approx. 56hp. The F4630 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is between 2,350kg and 2,750kg, depending on the drivetrain.

New Holland TL70/TL70a

The New Holland TL70 was used from the late 1990s. It has a rated engine power of approx. 65hp, with a PTO output of approx. 56hp. The TL70 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is between 2,700kg and 3,200kg, depending on the drivetrain and cab specifications.

The New Holland TL70a was a variation of the TL70 which was used from the early 2000s. It had a higher rated engine power than the TL70, of approx. 70hp. Powered by a diesel engine, it weighed between 3,550kg and 3,850kg, depending on the drivetrain.

New Holland TM150

The New Holland TM150 was used from the late 1990s/early 2000s. It has a rated engine power of approx. 150hp, with a PTO output of approx. 120hp. The TM150 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is between 4,750kg and 5,250kg, depending on the drivetrain.

New Holland TM165

The New Holland TM165 was used from the late 1990s/early 2000s. It has a rated engine power of approx. 165hp, with a PTO output of approx. 135hp. The TM165 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is between 5,000kg and 5,500kg, depending on the drivetrain.

New Holland TM140

The New Holland TM140 was used from the early 2000s. It has a rated engine power of approx. 140hp, with a PTO output of approx. 115hp. The TM140 was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is between 5,150kg and 5,410kg, depending on the drivetrain.

John Deere 5070M

The John Deere 5070M was used from approx. 2010. It has a rated engine power of approx. 140hp, with an independent PTO. The 5070M was available in both 2WD and 4WD configurations. The tractor is powered by a diesel engine. It has a hydraulic system with a variable capacity. The tractor's weight is approx. 3,700kg.

4.2.2.3.2 Sod Peat Machinery

Windrow Machine

The purpose of the machine is to pick up the partly dried sods from the spread ground and form them into windrows to accelerate drying. The machine consists of a tractor unit propelling large diameter spiked drums in front of it and carrying chain/bar conveyors extending from the pick-up drums to the rear of the tractor unit. The tractor unit is supported on caterpillar type, power driven tracks and steered by coil clutch and brake arrangement. The power unit is an air cooled diesel engine. The pick-up drums (8off) are independently supported and free to follow the bog surface. As they pass over the spread, the spikes penetrate the sods and lift them to the level of the conveyors, where fingers force them off the spikes and are carried away by the conveyors. The sods are discharged at the rear of the machine in windrow form, ½ metres apart.

Sod Turning Machine

This machine does the same work as the Single Turning Machine but has greater output. The elevator mechanism is exactly the same as the single machine and the components are interchangeable. These elevator units are located in front of the tractor tracks and they discharge either into a cross conveyor, rubber belt type, or two return conveyors, rubber belt type, positioned over the tracks. The cross conveyor is reversible and moveable to either side of the machine. The tractor unit consists of a strong main frame mounted on caterpillar type tracks suitable for high idle travel speeds. It is powered by a standard diesel engine and transmission gearbox which is fitted with a proprietary clutch and brake steering equipment. A standard hydraulic pump is also built into this transmission and is used to operate the hydraulic lift of the elevators for idle travel. A special chain reduction drive is inserted between the half shaft of the standard tractor transmission and the track drive sprocket. The drive to the elevators and conveyors are taken off from the standard PTO shaft of the transmission unit. Plate 4-20 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-20 Sod turning machine. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/sod-turning-machine/

Sod Peat Bagger/Excavator

The purpose of the machine, and the various versions of it, is to excavate, macerate and spread turf for the production of sod peat. This is necessary as the high spread ground area diminishes to the point where it will not take a full spread. The machine consists of a sturdy main frame, supported on power driven caterpillar tracks, which carries the various units and their transmission drives and to which is attached a spreader arm. The turf is excavated by a multi-bucket type digger boom which is retractable to facilitate operation at varying depths, and is pivoted on the main machine so that it can be stowed for idle travel. The boom cuts a face bank at 600 to the horizontal. The turf is discharged from boom buckets into a scraper conveyor, and in turn, into a screw conveyor and twin screw macerator. The macerator extrudes the turf onto the spreader plate chain which carries the extrusion for a distance of 54 metres, when it is discharged to the bog surface. Cutting discs trailing behind the spreader arm, marks the extrusion into sods as the machine advances. The machine is powered by electricity, and friction clutches are fitted to all motor drives for starting up. All unit drives are protected by shear pins. The machine is fitted with lights for night work and equipped with a short-wave radio transmitting/receiving set. Plate 4-21 and Plate 4-22 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-21 Sod Peat Bagger/Excavator. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/sod-peat-baggerexcavator/

Plate 4-22 Sod Peat Bagger/Excavator. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/sod-peat-baggerexcavator/Peat Extraction Volumes

Cutaway Boom Attachment

The attachment comprised a short boom complete with a catchment conveyor overhung from the main machine by wishbone frames.

The boom had a lightweight framework fabricated in square hollow steel sections, within which the motor, gearbox, and chain drive, common to the original boom, were housed. The boom supporting wishbones were fabricated in square hollow steel sections of generous proportions, the pivots of which were arranged to maintain the same angle of the boom relative to the bank for various depths of cut. The upper wishbone frame was supported on a hydraulic ram from the side of the main machine, which was operated by a valve from the driver's cab, providing convenient control of cutting depths and lift for idle travel. The pivots of the lower wishbone frame were carried on arms from the main machine and were hydraulically adjustable to alter the slope of the bank cut.

The catchment conveyor, supported from the boom frame, was a rubber/canvas conveyor belt running on conventional driver, end roller, and troughing idlers. The section of the belt receiving the turf from the buckets was supported on a series of slides of self-lubricating nylon to prevent deflection of the belt and ensure more efficient sealing. The conveyor had an independent motor/gearbox drive. The catchment conveyor discharged into the original scraper conveyor of the main machine. The attachment could be readily fitted to or removed from the machine by five pins. Plate 4-23 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-23 Cutaway Boom Attachment. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/cutaway-boom-attachment/

Sod Peat Loading Machine

The purpose of this machine was to load sod peat from bog ricks into railway wagons on one side of the rick only. The machine consisted of a lightly constructed mainframe mounted on caterpillar-type power driven tracks and carried a short scraper elevator in front, extending over the width of the tracks, and a low level cross conveyor which elevated as it projected from the side of the machine. These loading machines were either diesel- or electric-powered and would be fitted with either a diesel engine or electric motor as required. Plate 4-24 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-24 Sod Peat Loading Machine. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/loading-machine/

Fóidín Machine

The fóidín machine originated from an experiment, the 'short cycle harvesting project' conducted at Oweninny bog Co. Mayo in 1965. The aim of the experiment was to produce fast drying peat sods from the surface of milled peat fields that were easy to crush in power stations, this led to the development of the fóidín machine in 1966. It came in two sections: the towing unit, which cut the peat, and the towed unit, which would macerate, extrude and spread the sods. Each of these sections was powered by its own diesel engine. It was steered by coil clutch and all other controls were operable from a cab which overlooked the working parts of the machine. The collection and stockpiling of the sods could be carried out with a combination of existing sod and milled peat machinery, modified in some cases. Fóidín production was suspended in most areas in 1972 and was abruptly terminated in 1973 due to several reasons, mainly that the yield from the fóidín system was small and insignificant compared to that of milled peat, complications arose burning crushed sods at ESB stations due to the higher calorific content of fóidín peat, and the cost of production was high relative to other peat extraction methods. Out of the 25 fóidín machines owned by Bord na Móna, one was sold to the Finnish State Fuel Supply Department, four were retained, and 20 sold as scrap.

Plate 4-25 Fóidín Machine. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/loading-machine/

Sod Moss Peat Collector

The purpose of the machine was to collect the dried moss peat sods from the drying grounds by hand feeding and convey them to the storage rick. Two passes of the machine cleared a belt of 700 feet (approx. 213m) wide to form one rick.

The construction of the machine was unique, as it was carried on caterpillar-type tracks which supported it through hydraulic rams and facilitated travel over partly-cut bog while maintaining the machine in the horizontal position.

The machine consisted of a rubber canvas conveyor belt in two sections, the running gear of which was carried in a robust structure fabricated in four sections from square hollow section steel; this conveyor was suspended from high masts on either side of the main frame of the machine. The main frame was of rigid design to resist diagonal loading; fabricated in square and circular hollow section steel, all main members were pin jointed to facilitate dismantling for transport. The tracks comprised a framework of castellated beam construction around which two conveyor-type chains carried the steel swamp shoes.

In addition to hydraulically tilted tracks, the conveyor sections on either side of the machine and the elevator section were raised and lowered hydraulically. Plate 4-26 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-26 Sod Moss Peat Collector. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/moss-peat-sod-collector/

Chain Saw Excavator

A machine of compact, sturdy construction with a high output for its size was used in Bord na Móna primarily for drainage with turf production as a secondary feature. The tractor unit was powered by a diesel engine, had proprietary transmission gearboxes, and final chain drive to caterpillar-type tracks.

The excavator, macerator, and spreading equipment were carried on the rear of the tractor unit, while a guide roller was carried on the front. All this equipment was lifted and lowered by hydraulics. The turf was excavated by a high-speed chain sword carrying cast steel teeth and discharged by centrifugal force at the upper sprocket into a screw/conveyor/macerator unit. This unit extruded the turf through a fan-tail spout, with an adjustable outlet, onto the spread ground. A series of cutting discs and a marking frame divided the layer of turf into the required sod size.

After the first cut was made, using the clutch and brake steering on the tractor unit, the front guide roller could be lowered into the excavation made to steer the machine for subsequent cuts.

A pair of loaded rollers were trailed behind the cutting sword to close the top of the excavation just made, preparing the spread ground for the next run of the machine. In this way, all available bog could be covered with spread turf, leaving only nominal spaces between the extrusions. Plate 4-27 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-27 Chain Saw Extractor. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/chain-saw-excavator/

4.2.2.3.3 *Milled Peat Machinery*

Miller Attachment

Miller attachments were used to break the surface of the bog into fine, milled crumbs which were left on the surface of the bog to be dried by the wind and sun. Milling attachments initially comprised single or triple units. Both single and triple units worked in the same way, with the difference between the two being the number of milling drums, and thus the output (which was approx. 2.25 times higher with the triple unit). Miller attachments were mounted on the rear of tractors and drew power from the tractor's PTO. The single and triple miller units attachments were later replaced by an offset miller attachment known as a 'Type – I'.

Single Miller Attachment

Single miller attachments consisted of a simple but strong tubular steel frame, the main members of which extended to, and were pivoted, at the mid-position of the tractor tracks. Rigidly mounted on the underside of the frame was a pin-type milling drum which was driven from the tractor PTO shaft through a bevel gearbox and chain drive. The single miller attachment was supported by a ground roller, through springs, located immediately in front of the milling drum and by a depth control castor a few feet behind the milling drum. For idle travel, the single miller attachment was lifted by hydraulic ram so that the pin milling drum is clear of the bog surface. This attachment, by virtue of the sprung main supporting roller, caused the milling drum to cut deeper on the hills and shallower in the hollows, thus having a levelling effect on the bog surface. The drive to the milling drum is protected by a tension bolt safety device. Plate 4-28 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-28 Single miller attachment. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/miller-attachment/

Triple Miller Attachment

As mentioned above, the triple miller attachment operated in much the same was as the single miller attachment, but with a higher output.

The triple miller attachment consisted of units similar to the single attachment, ganged together. The front centre unit was attached to the tractor drawbar, while the two side rear units were drawn by brackets from the side of the front centre unit frame. These brackets were pivoted, and the level of the front of the side unit frame was controlled by roller castors running on the bog surface. The drives to the three milling drums were by universal jointed propeller shafts with splined slip sleeves, two bevel gearboxes and final chain drives. The milling drum speed was lower than the single unit, but in all other respects the behaviour of the individual units is the same as the single miller attachment. For idle travel the units were lifted on hydraulic rams incorporated in the rear castor roller assemblies. Depth of cut was also adjusted by these rams from the driving seat. The drive to each of the three units was protected by a tension bolt safety device. Plate 4-29 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-29 Triple miller attachment. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/miller-attachment/

Offset Miller Attachment (Type-I)

This attachment was used to form a bevel on the edges of milled peat fields, to assist surface drainage. The attachment was a miller drum, projecting from the rear of the tractor unit on a casing arm which is pivoted at a central position on the rear of the tractor main frame, and extended to carry a ballast weight. The drive was taken from the tractor PTO shaft, through a bevel gearbox which formed the pivot assembly of the arm and a universally jointed propeller shaft extended to the actual milling drum. The milling drum was set backwards as it extended from the tractor so that the spoil was thrown back towards the centre of the milled peat field, where it could be harvested. A supporting trolley fixed to a projecting bracket at the centre of the tractor track and supported on a roller behind the drum, carried the drum arm on an adjustable suspension. The trolley, complete with extension arm and drum could be lifted by a winch rope passing over a mast frame mounted on the tractor. For bogs in early development a bladed drum was used, while a pin drum was used on production bogs. Plate 4-30 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-30 Offset (Type-I) Miller attachment. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/miller-attachment/

Harrow

The attachment was made up of four spoon frames, each supported on two twin rollers, and towed by a common frame, which was also supported on rollers and hitched to the tractor. The spoon frames were made of steel tubes and were triangular in shape, with two spars projecting at 45 degrees from the base of the triangle at the rear, each to carry a bank of spoons. The spoon was a curved plate, the base of which was a straight line, set at an angle to the line of travel, and while the front was curved back from its base, the rear was curved forward. The actual spoon was welded to an arm made of spring steel, which was pin jointed to the 45-degree spar to allow movement in the vertical plane. These spoons were pitched to ensure that all the peat was turned.

The four spoon frames were each free to follow the bog surface on their supporting rollers but were connected to each other by a pin-jointed link to facilitate turning. The supporting rollers of the towing frame were located in line with the towing points of the rear frames and were free to move laterally to facilitate turning.

The harrow was fitted with a spoon lifting gear. Each spoon arm was connected to a miniature beam over each bank of spoons. A wire rope from the centre of this beam passed over a supported pulley and secured to a special frame on the rear of the tractor. The standard tractor hydraulics actuated this frame to lift or lower the spoons as required. Plate 4-31 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-31 Harrow. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/harrow/

Harvester

The purpose of this machine is to harvest milled peat from the bog fields in exactly the same way as the Type II harvester attachment on the HD Tractor. The tractor was a full track unit comprising a lightly constructed mainframe mounted on caterpillar-type tracks; on one side of the tracks returned at a high level to accept the harvesting attachment. The track chain was the cast link type running on cast sprockets and intermediate rollers. It was powered by a diesel engine, and the transmission consisted of a primary gearbox of special design, with a PTO shaft, and increased the transmission RPM through a standard automobile change-speed gearbox and a standard agricultural tractor transmission unit. The final drive reduction between the rear transmission half shaft and track sprocket was by a special spur gear reduction box.

The tractor was steered by a clutch and brake system of proprietary manufacture, which was built into the rear transmission unit. A driver's cab of generous proportions was fitted, with sliding doors and safety glass panels all around. Some of these cabs were of fiberglass construction, and others were of steel. The attachment consisted of a single or double spiral unit and a single belt conveyor, articulated at two points.

The spiral unit was a steel sheet casing suitably stiffened with standard steel sections, capable of housing one or two spirals. The front and rear of the casing were open. The peat ridge was allowed to enter on the front side as the machine advanced, while the rear opening was blanked off by a trailing board, which was raised and lowered in guides as required, and when in the lowered position, was free to move in these guides as the surface of the bog demanded. The spiral or spirals were supported in this rigid casing by a bearing at each end of the shaft. The revolving spiral or spirals conveyed the peat along the bog surface and trailing board and up a sloping plate of the casing, discharging it onto the belt conveyor.

The spiral unit was supported on two inner and two outer rollers, each pair arranged so that each roller was free to follow the surface of the bog while carrying its share of the load. The drive to the spiral or spirals was by a double universally jointed propeller shaft, and the casing was pin-jointed to a structural frame, which in turn was pin-jointed to the tractor unit, allowing complete flexibility of the spiral unit to follow the contour of the bog.

The belt conveyor was partly constructed on the structural framework connecting the spiral unit and tractor unit, including the conveyor drive pulley, and partly on the tractor unit, and the remainder formed the jib, projecting from the machine. While flat carrying idlers were used for the receiving end of the belt, flexible shaft type troughing idlers were used over the articulated portion, and conventional type troughing idlers on the jib. At the discharge end of the jib, a moveable deflector was fitted to control the trajectory of the peat.

The attachment was carried on the tractor unit, and a mast on the tractor unit was braced back to the spiral casing by a wire rope, while a multiple rope system actuated by a hydraulic ram on the mast was passed over the top of the mast and connected to the projecting conveyor jib. The top of the mast was also controlled relative to the tractor unit by a wire rope and hydraulic ram.

The driver of the machine could raise or lower the jib and the trailing boards and raise the spiral casing completely off the bog surface by hydraulics and control the jib deflector by a simple rope winch. Plate 4-32 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-32 Harvester. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/harvester/

Milled Peat Loading Machine

The purpose of this machine was to load milled peat from peat stockpiles into railway wagons. The machine consisted of a tractor unit carrying a ground spiral on the front, extending either side of the bottom shaft was a bucket elevator which sloped back over the tractor unit. As the buckets overtopped the top sprockets of the elevator, they discharged onto a rubber belt conveyor which discharged into the railway wagons. Plate 4-33 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-33 Milled Peat Loading Machine. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/loading-machine/

4.2.3 Ancillary Services and Infrastructure

There are a number of ancillary structures and infrastructure associated with peat extraction activities and all ancillary works. These include:

- Workshops;
- Works offices;
- Welfare Facilities;
- Mobile fuel tanks;
- Fixed fuel tanks;
- Peat loading facility; and,
- Railway infrastructure

With the exception of railway infrastructure, the remaining ancillary infrastructure is located outside of the Application Site boundary and as such substitute consent is not being sought in respect of this ancillary infrastructure. Nonetheless, in order to provide as detailed a description as possible of the Project, all of the ancillary infrastructure is described below.

4.2.3.1 Workshop

The Ballivor Works (also referred to as 'the Works') provided a central location for support services to the adjacent bogs and includes workshops, offices and welfare facilities such as toilets and a canteen. Staff parking is provided at the Ballivor Works, and it was the central location for management of the activities within the Application Site. It is now under third party lease and is not supporting current onsite activities.

During the Peat Extraction Phase, the majority of bog workers would arrive to the centralised Works area prior to mobilising machinery stored on the Works site and moving out into the peat extraction fields. Machinery was parked at the Works and refuelling of machinery was carried out from dedicated refuelling areas at fixed fuel tanks located in the yards. Concrete bunds and oil interceptors were provided to prevent release of fuels to the ground or surface water bodies. All tanks and drums were, and continue to be, stored in bunded areas. These standard practices were in place prior to the implementation of the IPC Licence in 2000. The workshops were mainly used to carry out repairs and maintenance on machinery which was brought in from the production areas.

A machine and wheel wash facility is also located at Ballivor Works. Machine washings generated due to the cleaning of various plant machinery (using a power steam wash system when machinery left the bogs) at wash bays drained into the adjacent peatlands drainage system.

4.2.3.2 Works Offices

The offices at Ballivor Works provided an administration centre for the Application Site and other bogs within the wider bog group. Permanent administration staff were employed throughout the Peat Extraction Phase from the time of construction of these buildings.

4.2.3.3 Welfare Facilities

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 Ballivor Works offices, these smaller outposts were situated across the Application Site to provide easier access to workers further away from the central works buildings. Any remaining welfare facilities will be decommissioned as required as part of the IPC Licence decommissioning plans.

4.2.3.4 Fuel Storage

As outlined in Section 4.3.5.2 below, fuel was, and still is, stored within above ground tanks alongside the main workshop at Ballivor Works. The fuel tanks are bunded to contain any potential fuel spills or leaks. The practice of bunding at the Works and for mobile refuelling units was introduced in the 1970s. Refuelling procedures were subsequently upgraded to standard bunding specifications to comply with IPC Licence requirements in 2000 (refer to Appendix 4-1 for details). Refuelling of vehicles and machinery was primarily carried out at the Ballivor Works, but in some circumstances where machinery could not be tracked back to the Works buildings, refuelling was also carried out on the bogs at designated areas, away from drains or rivers, as required. Service trains/railcars with a bunded fuel dispensing unit, travelled from the Works to the designated bog area to refuel the machine in question. This occurred at a frequency of up to three times a week during peak times of the Peat Extraction Phase. This frequency was significantly reduced outside peak peat extraction.

The filling of tanks from the fuel supplier took place at the main fixed tanks at Ballivor Works. The service trains were filled from the main tanks at Ballivor Works and travelled by rail to refill the plant machinery on the bog.

4.2.3.5 Peat Loading Facility

A sod moss peat loading facility is provided within the Ballivor Works yard. This facility received planning consent from Westmeath Co. Co. in 1983 (Ref. 382/83) and was subsequently opened in 1985. The facility was designed to allow for the bulk distribution of peat moss from the Application Site by compressing the peat into shipping containers for delivery to the horticulture industry overseas.

4.2.3.6 Railway Infrastructure

Peat extraction areas were served by a network of permanent and temporary narrow-gauge rail tracks, (approx. 1m in width and with track lengths of approx. 9m), the majority of which was constructed in the 1950s and 1960s. During the early years of peat extraction activities and all ancillary works, the lifting and laying of rail was done by hand before equipment was designed for that purpose.

The Annual Report of 1951 indicates that Bracklin Bog was listed for development with expenditure earmarked for railway infrastructure as well as drainage, buildings and other ancillary items. In 1952-53, a railway connection between Ballivor and Bracklin commenced and was completed in 1956-57. Aerial photographs from 1973 indicate that railway infrastructure connecting Ballivor Bog, Carranstown Bog, Bracklin Bog and Lisclogher Bog was in place by this time. No railway infrastructure was laid down in Lisclogher West Bog. Please see Figure 4-1 below.

As discussed in Section 4.2.2.2, the track sleepers were approx. 1.8m in length and 0.76m apart. The total length of permanent track in the Ballivor bogs is 18.9km. The remaining track is termed temporary track, i.e., it was lifted and laid up to 12 times in a year for transport of extracted peat from stockpiles.

There are no rail underpasses at the Application Site. However, there are two at-grade level crossings, one at the Ballivor-Raharney road (since designated R156 in 1993), to facilitate train crossing from Ballivor Bog to Carranstown Bog and vice versa and one to facilitate crossing from Bracklin Bog to Lisclogher Bog across a local road. This level crossing went out of use post-cessation of peat extraction activities and all ancillary works at the Application Site. Standard level crossing lamps with light sensors that switched to light on when daylight faded were fitted across all Bord na Móna crossing gates. Catch points are also fitted into railway tracks on either side of level crossing gates as a standard safety practice to de-rail any runaway trans before reaching the level crossing.

The Bord na Móna railway infrastructure was designed to be moveable, supporting infrastructure that was laid to facilitate the transportation of peat off the bogs and into the Ballivor Works for processing. Once peat stocks were exhausted from one area, the temporary tracks were taken up and re-laid in new areas of bog which had entered production. Thus, over the decades the railway line layout changed shape regularly. Furthermore, as areas fell out of permanent production, some railway lines were taken up completely.

4.2.3.7 Railway Equipment

Extracted peat was transported from stockpiles on the Application Site via a series of permanent and temporary railway tracks to Ballivor Works for processing. The equipment which facilitated the installation and maintenance of the railway tracks, as well as the equipment used to transport peat on the railway lines, are described below. A map of the railway network at the Application Site is presented in Figure 4-1.

Rail Shifter

A rail shifter was an attachment fitted on to tractors which was used to lift temporary railway tracks in sections and build them onto bolster bogies for transport to a new area. The rail lifter consisted of a lightly constructed main frame supported on two bogies and an overhead lattice work beam supported from the main frame to allow the passage of the rail sections through the machine. When seven sections were built on the bolster bogies, they were hauled away by a locomotive. Plate 4-34 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-34 Rail Shifter. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/rail-shifter/

Rail Moving Attachment

The purpose of the rail moving attachment was to lift and lay temporary railway track along sod peat ricks and milled peat piles. The attachment was fitted to a tractor and consisted of an A-frame jib pivoted on a bracket secured to the track frame of the tractor and braced back at the top by wire rope to a projected ballast box on the other side of the tractor. A short jib was used for sod peat operations while a longer and a longer jib was used for milled peat operations. Plate 4-35 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-35 Rail Moving Attachment to lift and lay temporary railway track, along Sod Peat ricks and milled peat piles. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/rail-moving-attachment/

Locomotive 80HP (Wagonmaster)

The locomotive hauled peat from the stockpiles across the Application Site to Ballivor Works for processing. The locomotive was powered by a water-cooled diesel engine driving through a fluid coupling, automotive type clutch, standard automobile change speed gearbox, a special reversing bevel/spur reduction gearbox and drive and coupling rods to the wheels. The main frame was fabricated steel plate. The axles ran in self-aligning double row roller bearings in cast steel housings sliding in horn guides with manganese steel wearing faces. A cab of generous size was included, with a tumbling-type seat to facilitate driving in both directions. The clutch control pedal was duplicated for the two driving positions. The braking system was mechanical hand operated. The locomotive was fitted with beam lighting, electric windscreen wipers and driving mirrors for both directions of travel. Plate 4-36 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-36 Locomotive with wagons. Source: https://www.bordnamonalivinghistory.ie/equipment-detail/diesel-locomotive/

Wagons

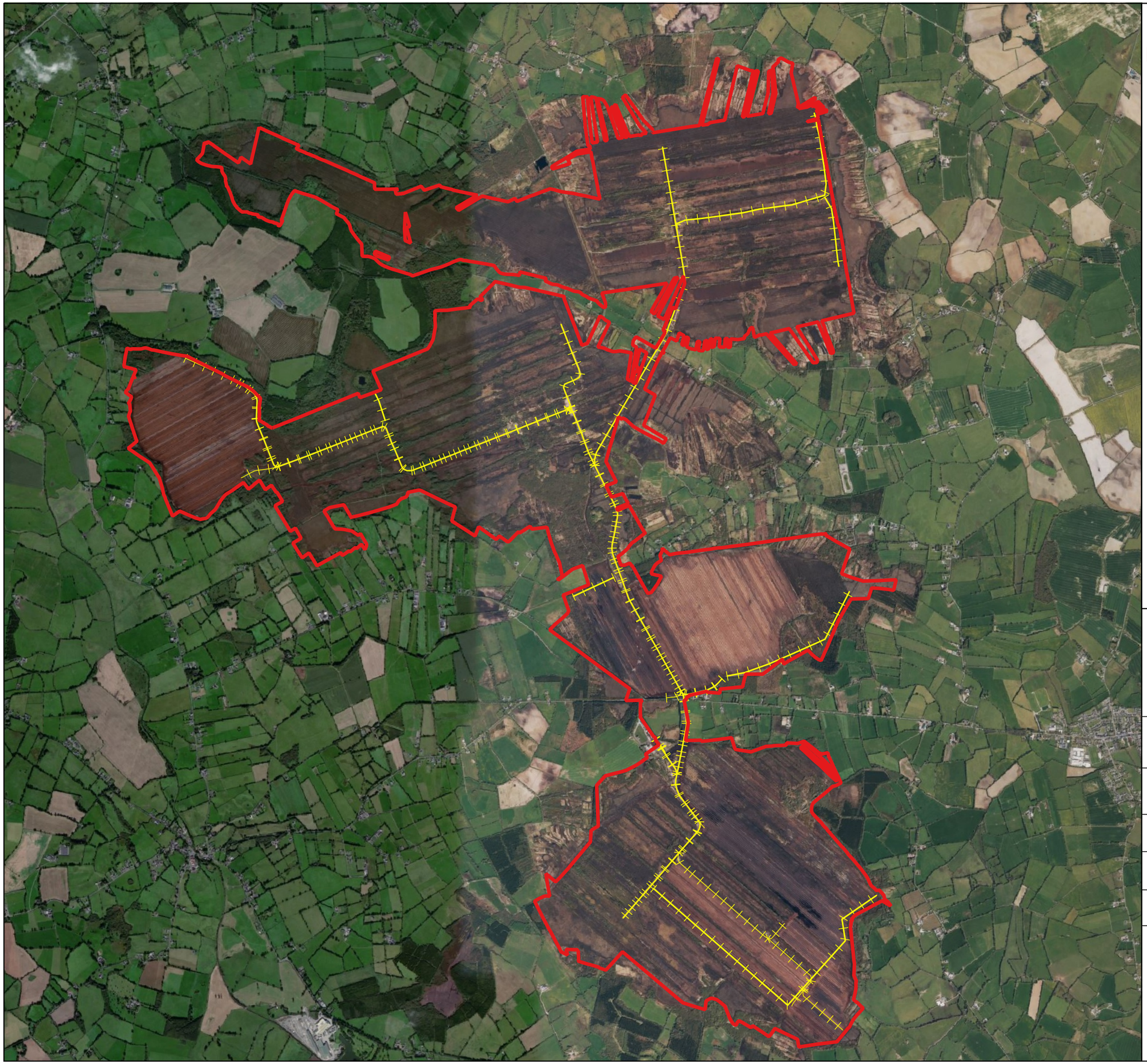
Wagons had a capacity of 16 cubic metres and were designed with two diamond bogies for sod and milled peat haulage. One bogie of each wagon was free to float 152mm in any direction to prevent derailment on uneven temporary track. The diamond bogie with its centre springs gave great flexibility and prevented axle failures. The wagon bearings were taper roller bearings which were grease-packed and fitted in the wheel hubs.

The use of aluminium to fabricate the sides and floor of milled peat wagons reduced the unladen weight of the wagon when compared to heavier materials such as wood and steel, and therefore facilitated a greater payload (i.e. a greater amount of peat) to be transported per train. Furthermore, the use of aluminium resulted in considerable reduction in the maintenance and painting costs.

Rail Car

Rail cars were used by the Manager or authorised members of his staff, to make inspection tours of the bog. Rail cars were equipped with first-aid equipment and also worked as a bog ambulance if needed. Rail cars were fitted with a water-cooled petrol engine, the power from which was transferred through an automotive clutch to a gearbox, and then transferred to each axle via a chain drive. Beam lights and electric windscreen wipers were fitted at each end of the rail car and a short-wave radio transmitting and receiving set enabled the occupants to keep contact with the Works and the larger machines that were fitted with radio units on the bog. Plate 4-37 is an image of this type of machinery operating on a Bord na Móna bog.

Plate 4-37 Rail Car. Sourcehttps://www.bordnamonalivinghistory.ie/equipment-detail/rail-car/



Map Legend

- Application Site Boundary
- Railway Network

Drawing Title: Railway Network at the Application Site	
Project Title: Ballivor Substitute Consent Application	
Drawn By: NS	Checked By: EC
Project No.: 191137f	Drawing No.: Figure 4-1
Scale: 1:35,000	Date: 2024-07-16

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4.2.4 Site Services

Water consumption across the Application Site is primarily at the Ballivor Works for domestic use. The water supply at Ballivor Works is from a bored well supply on the Application Site.

Wastewater from the welfare facilities at the Ballivor Works is discharged to an on-site septic tank with the effluent discharged to a percolation system through peat before penetrating to ground. The septic tank is inspected and de-sludged annually by a licenced waste permit holder to ensure the treatment system is working optimally.

Electricity supply to Ballivor Works buildings, workshops, and drainage pump stations are powered by mains electricity from the national grid connected to overhead electrical power lines, within the Application Site.

Compressed air (oxygen and acetylene) was used mainly at the Ballivor Works for welding and cutting purposes to maintain plant and equipment.

In addition to the above, other materials consumed as part of the peat extraction activities and all ancillary works would have been polythene sheeting for covering stockpiled peat, timber and steel for the rail lines, gravel for the rail beds etc.

4.3 1948 to June 1988 – Initial Development & Peat Extraction (Pre EIA-Directive)

4.3.1 Site Description 1948 (Pre-Extraction)

Prior to the commencement of drainage, which occurred first on the Application Site in Ballivor Bog in 1948, 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. Pre-development topographies would have been higher (in the ranges of 75 - 89mOD) than those observed today, with the remnant areas of high bog located around the perimeter of the Application Site and in Lisclogher West Bog at present resembling pre-development ground elevations more closely.

Water in a raised bog is continuously circulating, and pre-development, the Application Site would have been nutrient-poor and waterlogged on the surface. The principal supply of water to the Application Site would have been from rainfall. Water would have been lost from the Application Site from surface water runoff particularly during the winter months when the storage capacity of the bog would have been fulfilled due to higher levels of seasonal precipitation. Water may also have been lost through the lower levels of the peat deposits, especially where the bog is underlain by gravels or sands without underlying low permeability lacustrine deposits (i.e., clay layer). The pre-development water table at the Application Site was likely very stable with only minor fluctuations and remaining within a few centimetres of the bog’s surface.

The primary land-use change associated with the peat extraction activities and all ancillary works occurs during the initial drainage of the bog in advance of peat extraction. Constructed drainage ditches drain the upper surface of the bog by lowering the local peat water table. After the Application Site was drained, vegetation was removed from the bog surface, leaving only bare peat fields between the drains. Around this time and in the years that followed, ancillary features were also constructed including railway lines, workshops, welfare facilities and peat loading facilities. Historical mapping (Cassini fourth edition data (1935-1938)) of the Application Site indicate entrances prior to extraction were broadly located in the same locations as present day along the local road network.

Prior to 1988, all bogs within the Application Site were fully or partially drained and Ballivor, the western part of Carranstown, Lisclogher, and Bracklin were subject to peat extraction.

During the Peat Extraction Phase of the Project, only minimal land use change occurred which predominantly related to minor annual topographic changes caused by ongoing peat extraction activities and all ancillary works. While peat extraction activities and all ancillary works were ongoing it was not possible to rehabilitate the underlying peatland.

4.3.2 Drainage and Peat Extraction

The timing of the installation of drainage and initiation of peat extraction varied across the Application Site. As outlined above, Ballivor Bog was the first bog to commence clearance and drainage in 1948 and would have experienced a relatively abrupt change in land cover with the commencement of peat extraction in 1953. Clearance and drainage work commenced in Bracklin Bog in 1950 and peat extraction commenced there in 1957. Clearance and drainage of Lisclogher Bog began in 1950, with peat extraction commencing in 1960. Annual reports indicate that peat extraction was already underway at Ballivor, Bracklin (main area) and Lisclogher by the 1960s. The earliest aerial mapping available (1973) confirms that by this period, drains were already inserted at Ballivor, Bracklin and Lisclogher Bogs. Aerial imagery from 1988 indicates that by this period, drainage was inserted at Carranstown and in the west of Bracklin. However, drainage was not completed at Lisclogher West by 1988. The Application Site was mapped as a raised bog in the Peatland Map of Ireland produced by the National Soil Survey in 1978[6]. Figure 4-2 below presents an overview of the peat extraction activities and all ancillary works on the Application Site in 1973, which has been deduced from the earliest available aerial mapping for the Application Site. i.e 1973 aerials included in Appendix 4-4.

As discussed above, drainage ditches to drain the upper surface of the bogs by lowering the local water table were inserted across the Application Site at different stages throughout the decades (please see Table 4-2 below and Section 4.2.2.1 for years of drainage insertion and details on drainage construction methods practiced at the Application Site). After the bogs were drained, vegetation clearance was undertaken across Lisclogher, Ballivor and parts of Bracklin and Carranstown Bogs prior to 1988. It is estimated that prior to 1988, approx. 1,248 hectares (ha) across Ballivor, Bracklin, Carranstown, and Lisclogher Bogs were cleared, drained and subject to peat extraction, and a total of 380ha (predominately in the east of Carranstown bog, the northern portion of Bracklin bog, as well as edges of Ballivor and Lisclogher) were drained, but not cleared of vegetation or subject to peat extraction. This assumes the entire surface of these bogs was covered in vegetation (part of the acrotelm) and it was cleared over a period of time from all bogs except Lisclogher West Bog, which was drained but never subject to peat extraction.

The topography of the Application Site prior to peat extraction activities and all ancillary works is estimated to have been 72 - 89mOD. This is deduced from the present-day topography range for Lisclogher West Bog (which was never subject to peat extraction), the relatively uniform low-lying nature of the Application Site and surrounding landscape, and the presence of benchmarks noted on historical 25" OSI mapping (1897-1913 and) Cassini 6" (1940s) of the area. It is assumed that prior to the installation of drainage to facilitate peat extraction activities and all ancillary works, the Application Site was virgin bog and was therefore an active raised bog.

The primary and greatest land-use change associated with the peat extraction activities and all ancillary works on the Application Site occurred during the initial drainage and vegetation removal of the bogs in advance of peat extraction activities and all ancillary works. This impact would have predominantly occurred in advance of 1988 at the Application Site. A photographic accompaniment illustrating the types of activities described below can be found in Appendix 4-10 *Bord na Móna: Peat Development in Ireland 1954.*

[6] *https://www.teagasc.ie/media/website/environment/soil/Peatlands-of-Ireland-Map.pdf*

Table 4-2 Peat extraction activity timelines taken from Annual Reports (1951 – 1970, 1984 to 1987)

Bog		Commencement of Site Preparation Works (vegetation clearance and drainage insertion)	Extraction Began	Extraction Ceased
Ballivor		1948	1953	June 2020
Carranstown	**Western portion of Carranstown**	1974-1987	By 1988* (Western side)	June 2020
	Eastern portion of Carranstown	1974-1987* drainage inserted only 1989-1995* Clearance works	By 1995	June 2020
Bracklin	**Main Bracklin Bog area**	1950	1957	By 2003
	Western portion of Bracklin	1979-1988, drainage inserted throughout Bracklin West By 1988 vegetation clearance in southern portion only	Between 1985 and 1995* at northern portion of Bracklin West By 1988* at southern portion of Bracklin West	June 2020
Lisclogher		1950	1960	March 2003 for milled peat. Sod peat (third party) was extracted in the northeast until 2020.
Lisclogher-West		Minor works commenced in 1973 Main Drainage installed between 1973 and 1988 Drainage was complete post 1988*	N/A	N/A

*Indicated by aerial photography which are included Appendix 4-4 of this rEIAR;

Table 4-3 describes the general activities within the Application Site over a calendar year during each of the four quarters from 1953 when peat extraction activities and all ancillary works commenced to June 1988. Some drain maintenance was carried out during the full year, but it was mainly restricted to outside the peat extraction season. Fuel handling and refuelling would have increased significantly during the peat extraction season due the increased activity of the peat extraction machinery.

Table 4-3 Annual Peat Extraction Activities 1953 - June 1988

Calendar Quarter	Activities
January to March	Drain/Machinery/Pump maintenance, stockpile removal, peat transportation
April to June	Peat extraction, stockpile creation/removal, peat transportation
July to September	Peat extraction, stockpile creation/removal, peat transportation
October to December	Drain/Machinery/Pump maintenance, stockpile removal, peat transportation

N

Lisclogher West

Lisclogher

Bracklin

Carranstown

Ballivor

Legend

- Application Boundary

1973 Peat Production

- Subject to Peat Extraction
- Drained - Not Subject to Peat Extraction
- Neither Drained nor Subject to Peat Extraction

0 0.5 1 2 Kilometres

Bord na Móna

Ballivor Substitute Consent
1973 Peat Extraction Activities

DRWG No:	Scale:	Drawn by:	Date:	Figure No:
BNM-PG-20-01-25_v3	1:30,000	JG	09/07/2024	4-2

4.3.3 Peat Extraction Volumes 1953 – June 1988

Peat extraction commenced at the Application Site in 1953. 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 1954 to June 1988 period. Peat extraction volumes are not available for 1953. On the basis that peat extraction only commenced at the Application Site in 1953, it is assumed that the volumes generated were not significant and not comparable to the volumes generated in subsequent years. 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 activities and all ancillary works. 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. Bord na Móna records indicate that approx. 1,626,398 tonnes (sod and milled combined) were extracted from the Application Site for the period 1954 to June 1988 inclusive. Figure 4-3 and Table 4-4 below outlines the peat extraction tonnages over the 1954 to June 1988 period.

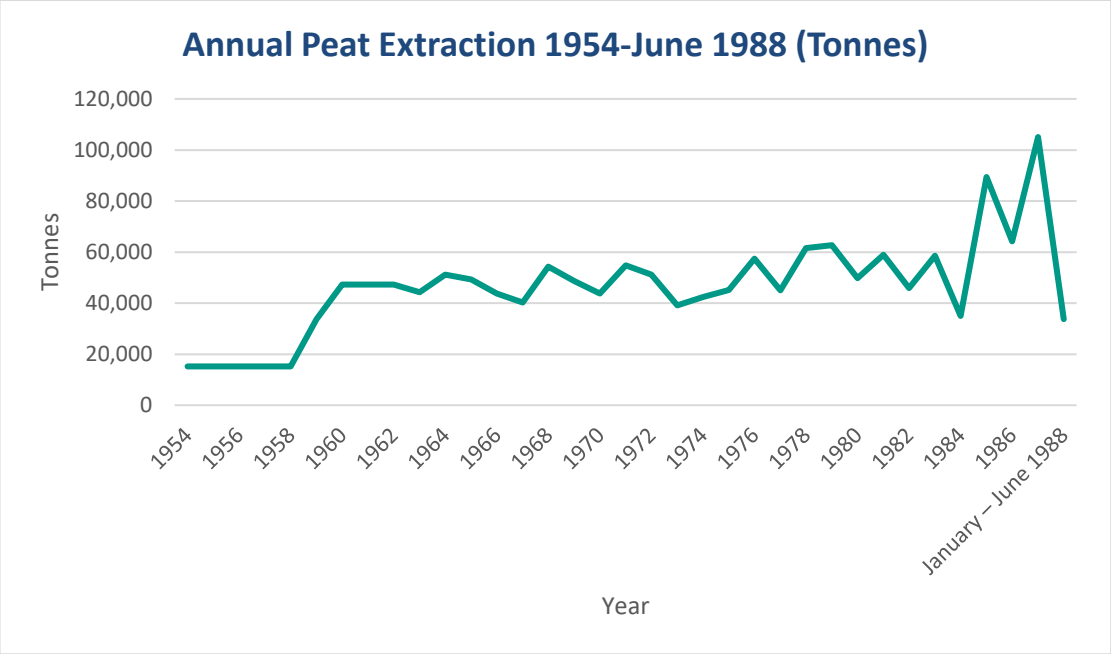

Figure 4-3 Annual Peat Extraction Volumes (Tonnes) 1954 to June1988 (peat volumes not available for 1953)

Table 4-4 Peat Extraction (Tonnes) 1954 to June 1988

Year	Tonnes	Year	Tonnes
1954	15,203	**1971**	54,805
1955	15,203	**1972**	51,113
1956	15,203	**1973**	39,135
1957	15,203	**1974**	42,435
1958	15,203	**1975**	45,145
1959	33,739	**1976**	57,372
1960	47,293	**1977**	44,980
1961	47,293	**1978**	61,526
1962	47,293	**1979**	62,698
1963	44,225	**1980**	49,815
1964	51,152	**1981**	58,898
1965	49,228	**1982**	45,855
1966	43,713	**1983**	58,496
1967	40,261	**1984**	35,044
1968	54,286	**1985**	89,356
1969	48,590	**1986**	64,142
1970	43,714	**1987**	105,060
		January – June 1988	33,721
Total Volume Extracted (tonnes)	**1,626,398**		

As outlined in Table 4-2, Ballivor bog was the first bog to come into production after a 5-year period of drainage and acrotelm removal. Ballivor bog remained the only bog in subject to peat extraction until 1957, when peat extraction commenced in Bracklin bog. This was quickly followed by Lisclogher in 1960. Peat extraction volumes were mainly influenced by the weather conditions that prevailed during the specific production seasons. Carranstown bog was brought into production in 1985 and this, combined with good weather conditions resulted in an increase in peat extraction volumes at the Application Site to a maximum of 105,060 tonnes in the 1987 season. 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 4-6 below.

Records indicate that the Derrygreenagh Bog Group, of which the Ballivor Bog Group, and thus the Application Site, is a subset, supplied peat to the Rhode ESB Power Station, Croghan Briquette Factory

and to the Kilberry and Cúil na Móna horticultural peat processing facilities when required. Information regarding which bogs supplied which specific end user, quantities of supply, frequency of travel and travel routes are not available. From 1985, peat from the Application Site was also distributed in bulk from the peat loading facility at Ballivor Works to the horticulture industry overseas via Dublin Port.

4.3.4 Drainage Design

As part of the development of Ballivor, Lisclogher and Bracklin for milled peat extraction, parallel surface water drains as per the methodology outlined in Section 4.2.2.1.1 were created by machine excavators at intervals of 15m and the strip of bog between these drains were retained to form the peat extraction 'fields'. The Application Site bogs are primarily drained via gravity with two pumps located at the margins of Ballivor Bog. By 1987 drainage ditches, outfalls and pumps were extant at Lisclogher, Bracklin and Ballivor bogs.

Ballivor Bog

Drainage works first commenced in Ballivor Bog by in 1948. The earliest available aerial photograph dating from 1973 shows Ballivor Bog to be under sod peat extraction with an area of high bog in the east and south that has already been ditched in preparation for peat extraction.

Carranstown Bog

Drainage channels were inserted at Carranstown bog in 1979 as evidenced by aerial imagery, with extraction underway only in the western portion of the bog at this time. Aerials from 1995 indicate that by this time the bog was producing milled peat in the west and east of the bog.

Bracklin Bog

Annual Reports indicate that drainage work began at Bracklin Bog in 1950. By 1973, aerials indicate that sod peat extraction in the main bog area. Aerial imagery indicates that by 1988 all of Bracklin West, excepting a small southern section of the Western portion of Bracklin Bog which only had vegetation clearance, had drainage inserted but extraction was only underway in the southern portion of this area.

Lisclogher Bog

Annual Reports indicate that drainage operations commenced at Lisclogher in the late 1950s, with the bog going into sod peat extraction in 1960.

Lisclogher West Bog

The installation of main drainage commenced in 1973, as evidenced by aerial imagery. Aerial imagery from 1988 indicated that drainage installation was ongoing by 1988. No peat extraction took place on Lisclogher West bog.

4.3.5 Control Measures pre-July 1988

With the exception of silt control (which from 1974 was subject to a formal management program as discussed in Section 4.3.5.9 below), formal documentation outlining dedicated measures referred to as control measures practised on site from 1948 - July 1988 are not available. However, based on personal communication with a retired Bord na Móna manager, 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 1999 IPC Licence application.

4.3.5.1 Peat Harvesting Machinery – Maintenance Programmes and Storage

1. All peat harvesting machinery listed above in Section 4.2.2.3 were stored at the Ballivor Works at the end of the workday;
2. All machinery were regularly inspected serviced and maintained;
3. 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. This was done to minimise dust and particle release; and,
4. Self-contained machine parts washer was located at the Workshop.

4.3.5.2 Refuelling Facilities

As discussed above, refuelling and maintenance of all vehicles was undertaken at the Works. When machinery required refuelling on the Application Site, it was done so by a bunded mobile (rail or tractor transport) fuelling unit which travelled out from the Ballivor Works to the bogs across the Application Site where the machinery was located. The following emergency action procedure was implemented at the Application Site prior to IPC licencing (pre-2000) and was recorded as part of the IPC Licence application process:

1. When a spill occurs, the General Manager must be immediately informed of the incident;
2. The spill must be assessed by the General Manager for potential risk to the health and safety of employees and the potential environmental consequences;
3. If there is a risk of explosion, all personnel in the area must be evacuated from the area;
4. The spill should be sourced, isolated and contained with polystyrene booms or dry peat (moisture content of 10%);
5. All effort should be made to prevent the spill from entering a storm drain or nearest outfall;
6. Once the spill has been contained, a suitable absorbent (dry peat) is to be used to soak the spillage;
7. All possible ignition sources such as electoral equipment, naked lights, machinery should be removed from the area. Any combustibles in the spill area should be removed;
8. Follow up action measures taken must include the implementation of appropriate remedial work to prevent such a spillage recurring in the future; and,
9. In the event of a significant spillage, the General Manager must notify the local authority.

4.3.5.3 Fire Safety

1. Annual training provided for bog fires crew and factory personnel and all general staff are provided with a minimum of 2 hours training in fire prevention;
2. Fire exits should be designated. These doors should be fitted with push-bar mechanisms only and lighted form independent sources. They shall be unobstructed inside and outside at all times and open outwards;
3. Each canteen/office equipped with a fire blanket and fire extinguisher;
4. There should be at least 1 fire point at all office premises;
5. Petrol and other oils should only be stored in designated oil stores;
6. Batteries should not be charged in working areas unless suitable protection is provided;
7. Training provided for Oxygen cylinder storage and use;

8. Fire Wagons: Designated rail wagons for fire prevention which contain: hoses, shovels, fire beaters, baskets, buckets, breathing apparatus, first aid kit, drums of foam and foam making machine, extinguishers etc.;
9. Stockpiles were covered with polythene film gauge sheets and secured in position by spreading an even layer of high moisture content milled peat. This prevented spontaneous combustion of certain peat types by excluding air as much as possible; and,
10. Fire Safety Audits undertaken at six monthly intervals along with random audits. Yearly assessments of all audits

4.3.5.4 Dust Management at Bog Boundaries and Headlands

Dust emissions were higher from the milled peat extraction process than the sod peat extraction process. Tree cover along the fringes of bogs minimised the amount of dust that would travel off-site. In 1976 Bord na Móna established a policy to preserve the vegetation and tree cover on all bog fringes and on any mineral islands. (Brown Gold 'A History of Bord na Móna and the Irish Peat Industry', 2010 Clarke, Donal, Chapter 10 Pg 206). In addition, the following measures were undertaken at a minimum to minimise dust emissions and later expanded under IPC licence.

1. Stockpiles were compacted on either side by large rollers drawn by 65H.P tractors;
2. Stockpiles were covered with polythene film gauge sheets and secured in position by spreading an even layer of high moisture content milled peat;
3. Avoid extraction during windy weather;
4. Keep headlands clean- remove loose peat;
5. Drive slow along dusty headlands; and,
6. Clean road crossing.

4.3.5.5 Internal Rail Network Maintenance

Railway tracks and railway locomotives underwent continuous inspection and maintenance to prevent de-railments, fires, accidents and fuel leaks. The locomotives were fitted with beam lighting, electric windscreen wipers and driving mirrors for both directions of travel. Wagons were also designate as fire safety wagons and were stocked with various fire safety paraphernalia including hoses, buckets, breathing apparatus, first aid kit, drums of foam and foam making machine, extinguishers.

4.3.5.6 Surface Water Management

1. Onsite water emission from workshop and hard standing areas drained via onsite surface water drainage systems implemented as part of building and hardstand construction over the decades, into adjacent peatlands surface water drainage network; and,
2. All machinery were regularly inspected, 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. This was done to minimise dust and particle release.

Formal silt control measures adopted in 1974 are outlined in Section 4.3.5.9 below.

4.3.5.7 Maintenance Programme for Internal Drains

1. Internal drains cleaned on a regular basis in suitable weather. This was necessary to remove sludge from the bottom of milled peat field ditches and dispose of it by spreading it on the adjacent field;
2. Drain maintenance was carried out using draglines and excavators;

3. These works were programmed to ensure that the drainage servicing the harvesting areas were fit for purpose; and,
4. Drain maintenance was carried out mainly prior to and post the harvesting season

4.3.5.8 Maintenance of Onsite Surface Water Pumps

1. Visual inspection of pumps daily;
2. Operational check of pumps biweekly; and,
3. Service of pumps monthly

4.3.5.9 Silt Management

As part of the Third Development Programme in the 1970s (which is discussed in further detail in Section 2.1.3.2 in Chapter 2), Bord na Móna decided in 1974 to control all effluent by means of specially designed and constructed silt ponds, thereby trapping more than 90% of the suspended solids present in the drainage water. A silt committee was set up in October 1975 to study the feasibility of removing silt from the bog effluents. Recommendations of an interim report prepared by the committee in 1975/1976 were as follows:

1. *Provision of silt ponds should be a basic feature of new bog development for milled peat and their construction should be planned for all outlet systems;*
2. *Ideally, silt ponds should be located in cutaway bog;*
3. *Sufficient area should be acquired at the initial stage to provide for silt ponds;*
4. *In production bogs, existing large catchments should be broken up into manageable proportions and ponds constructed to accord with local topography;*
5. *Revision of drainage techniques should be considered such as arranging flatter gradients in external and internal outfalls and extending their width and length in the lower reaches to encourage settlement of silt;*
6. *Initial drainage effluent should be allowed to spill over face banks (where practicable) until adequate silt ponds have been provided. This should be applied to all new bog development immediately. Similarly, growth and vegetation should not be removed from external outfalls until interference with drainage and/or complaints force us* [Bord na Móna] *to act;*
7. *It is recommended that catchments to be protected by silt ponds should not be greater than 500 acres;*
8. *Ponds should be designed for maximum run-off of 1 cubic foot per minute per acre and run-off controlled by provision of small diameter culverts, weirs or sluices;*
9. *For milled peat, 50 square foot of pond per acre of catchment. For 500 acres, 45-foot wide x 555-foot long x 7-foot deep, i.e., 6-foot maximum of silt and 1 foot minimum of water;*
10. *Ponds should be provided in pairs each sufficient for the catchment protected;*
11. *Ponds should be cleaned out at regular intervals as required but at least four times a year using dragline or Hymac retained permanently for this purpose. Investigations to be made into the suitability of pumping units;*
12. *Second parallel pond should be used during excessively large water flow (storm water); and,*
13. *The problem of discharging into the Clodiagh River at Monettia* [County Offaly] *has become difficult in view of ESBs requirement that the entire river be kept free of silt. Silt ponds will be essential and provision should be made in their layout to allow for further extension of the ponds if decantation needs to be improved further.*

A copy of a memo sent to Ballivor Works from the Bord na Móna Production Manager in March 1976 setting out the recommendations of the silt committee is included in Appendix 4-8, which directs that *"at all milled peat bogs in production, works should carry out surveys and select sites for silt ponds as recommended"*. Further Bord na Móna records show that silt pond measures were introduced across all Bord na Móna bogs in the early to mid-1980s in response to the 1977 *Water Pollution Act*.

Silt ponds were installed to trap and reduce the emission of suspended solids to surface water bodies originating from activities associated with peat extraction, such as suspended peat particles generated

from the production fields and collected in the bog drainage network as well as run-off from workshop areas.

Silt ponds were designed and constructed, primarily, with a width of 8m, however, in some cases, silt ponds of up to 12m in width were constructed. The larger silt ponds up to 12m wide are only provided in areas where access is available to both sides of the silt ponds for cleaning. The length of the silt pond varies depending on the capacity required (i.e., the length is proportional to the area of catchment being drained). In some locations, baffles (i.e., obstructing panels or vanes) have been installed within the ponds to reduce the energy in the flow and elongate the pond thereby increasing residence time and aiding settlement. Silt ponds are generally excavated to a depth of 1.5m below the pipe invert level, however in some locations, due to restricted space, the silt pond depth is greater than this. Low-velocity flow through the silt pond is generally controlled by inlet and outlet pipes at the silt ponds or upstream of the silt pond. These pipes control the velocity of the flow into and out of the silt ponds so that the velocity within the silt pond itself is less than 0.1 m/sec. This slow flow through the pond allows suspended sediment (mainly peat) particles to fall out of suspension and build up on the base of the pond, thereby reducing the sediment loading of the outflow from the pond. The principle behind the design of the silt ponds is an application of Stoke's Law. Stokes' Law describes how small solid particles move through a viscous fluid, stating that the drag force on these particles is directly proportional to their size, velocity, and the fluid's viscosity. The silt ponds are cleaned twice a year and are all located hydraulically upgradient of discharge/outfall points to the adjacent surface watercourse. Access to the silt ponds is via headlands and machine passes which were created to facilitate vehicle movements within the site. Figure 4-4 below presents the typical silt pond design of those that were implemented on the Application Site.

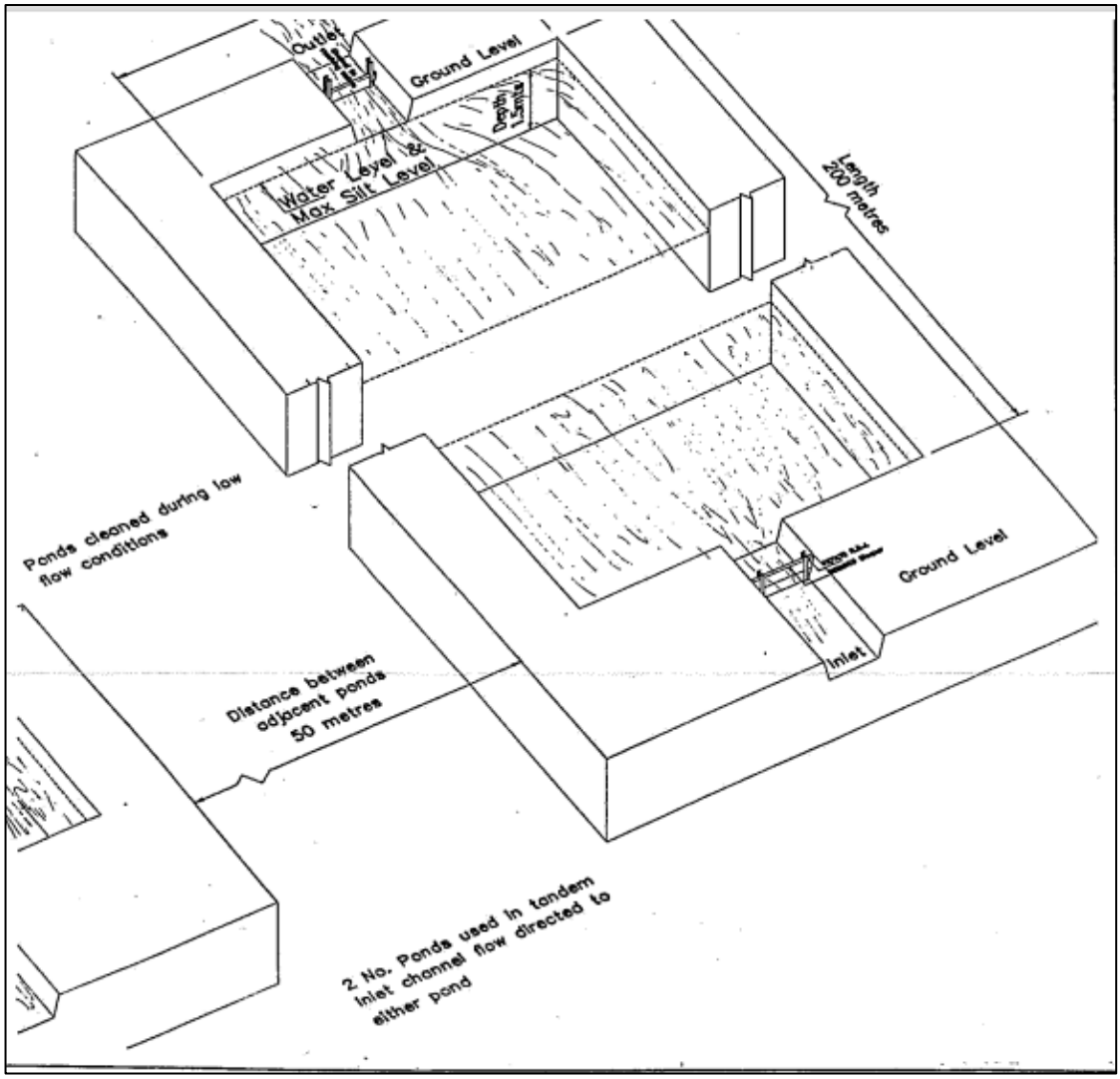

Figure 4-4 Typical Silt Pond Design Implemented at the Application Site. Source IPC Licence Application to EPA 1999

Other records of Silt Committee meetings in April 1984 (which are included in Appendix 4-8) set out acceptable standards of effluent and note a decision from ABP on a licence for effluent from the Littleton Briquette Factory in County Tipperary, which set an upper limit of 100mg/l for suspended solids. The records note that *"although the legalities regarding obligation to treat bog effluent and briquette factory effluent may be dissimilar the waste involved is similar. It would, therefore, seem reasonable to assume that a target value of 100mg/l in the case of bog effluent would satisfy potential complainants whose complaints are based on genuine dissatisfaction with the present standard of our* [Bord na Móna] *effluents"*.

These records are evidence of early control measures implemented across the Bord na Móna landbank, including the Application Site, to control sediment levels in effluent.

4.3.5.10 Waste Management

1. Waste oils and break fluids drained from machinery during servicing were collected in drums and emptied to a designated waste oil storage tank;
2. Waste oil storage tank contents transported off-site by a licenced waste disposal contractor.
3. Oil and fuel filters changed at vehicle service intervals;
4. Spent filters collected and disposed thorough a waste disposal contractor;

5. Used batteries are collected by battery collection contractor;
6. Off-washings form the self-contained machine parts washer was collected within a sludge tank at the Works;
7. Ash from the onsite boiler was stored in a skip onsite and collected by a licenced contractor and taken to landfill;
8. Waste polythene removed from stockpiles was collected at the roadside by plastic recycling company; and,
9. Workshop waste and general refuse from canteens/offices were historically burned on site or disposed into waste disposal areas at the Works. This practise changed to the use of skips which were then collected by licenced contractors.

4.3.5.11 Archaeological Disturbance

1. As part of peat processing training, all bog employees must read and adhere to the recommendations 'Ancient Objects in Irish Bogs and Farmlands: A Guide for Finders' Department of Education 1942; and,
2. All bog workers must stop all works and report to the Bog Manager if archaeological finds are encountered. If materials thought to be of archaeological interest are encountered, the Bog Manager must report the findings to the Garda Síochána within 7 days who will then contact the Commissioner of Public Works.

4.4 July 1988 - rEIAR Baseline

As described in Chapter 1 and in Section 4.1, the application for substitute consent, and therefore this rEIAR covers the period from July 1988,[7] the timeframe for when the EIA Directive was required to be transposed into Irish Law, to present day.

As such the activities carried out as of July 1988 form the initial baseline date for the description of the existing Application Site and combined with the activities from July 1988 onwards, form the Project. The remedial impact assessments are presented in the subsequent specialist chapters.

Table 4-5 details the operations and activities carried out on the Application Site in each quarter of the 1988 calendar year. Figure 4-5 below illustrates the areas drained, undrained and undergoing peat extraction in 1988.

As detailed in Section 4.3.3 above, the 1988 July – December 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 first half of the year 1988 (i.e January to June) is identified in Table 4-4 above. The total tonnage of peat extracted at the Application Site from July-December 1988 was 33,721 tonnes. The total tonnage of peat extracted for January-December 1988 is 67,442 tonnes. This is below the annual average for the 1988 to 2020 period which would indicate that it was not a particularly good year for peat extraction. For comparison, the following year (1989), a record level of 117,755 tonnes of peat was extracted at the Application Site. The estimated topography of the Application Site in July 1988 is based on an average depth of milled peat extraction of 0.1m 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.

[7] *Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment*

4.4.1 Site and Activity Description - July 1988 rEIAR Baseline

By July 1988, land use at the Application Site was well established as industrial peat extraction. Apart from Lisclogher West, all bogs were fully drained, sod and milled peat extraction were underway in certain locations and railway infrastructure was in place. The main entrance points to the Application Site were located north and south off the Ballivor-Raharney (R156) road. and the machine pass/rail crossings between Brackiln and Lisclogher bog. The Ballivor Works, which comprised a peat processing plant, canteen, storage sheds, and maintenance buildings, was located in the north of Ballivor Bog, where it is still located in present day. The following ancillary infrastructure was established at the site by July 1988:

- Railway infrastructure (all bogs within the Application Site except Lisclogher West);
- Internal machine passes/tracks (all bogs within the Application Site except Lisclogher West);
- Bulk Loading Facility at the Works of R156 in Ballivor Bog (Planning Grant 1983);
- Workshop and extension at the Works of R156 in Ballivor Bog (Planning Grant 1977);
- Covered Loading Bay at the Works off R156 in Ballivor Bog (Planning Grant 1972);
- Silt ponds and drains (all bogs (apart from Lisclogher West) within the Application Site); and,
- Two pumps at Ballivor Bog and one pump at Lisclogher Bog (Decommissioned by 2000).

4.4.1.1 Ballivor Bog July 1988

Satellite imagery and annual reports indicate that by July 1988, approx. 473ha of Ballivor Bog were undergoing sod and milled peat extraction. Thus, the main landcover type at this time was cutover peat. Several small areas measuring approx. 165ha of remnant uncut raised bog were located predominantly at the edges of the bog. Drainage was already installed, predominantly in a northwest-southeast orientation and two pumps were in operation. Railway infrastructure was laid in the bog (since the 1950s), terminating at the Works building located in the north of Ballivor Bog, just off the Ballivor-Raharney (R156) road. The Works area housed several peat processing buildings, canteen and welfare facilities, waste storage areas, carparking facilities and a refuelling area. Ballivor Bog included 7 no. artificial silt ponds, and 7 no. surface water emission points which remain *in situ* today. The Clondalee More stream flows out from the southwest of the bog. The main access point to Ballivor Bog was off the Ballivor-Raharney (R156) road adjacent to the Works area. The topography of Ballivor Bog is estimated to have been approx. 74m – 82mOD by July 1988.

4.4.1.2 Carranstown Bog July 1988

Aerial imagery from 1988 indicates that drainage was in place and extraction of milled peat was underway on approx. 80ha in the western portion of Carranstown Bog. A total of 117ha were drained but not subject to peat extraction. Carranstown bog was linked via railway infrastructure to Ballivor Bog to the south, and to Bracklin Bog to the north-west. The bog included 5 no. artificial silt ponds, and 4 no. surface water emission points which remain *in situ* today. Areas of remnant uncut raised bog remained intact (approx. 187ha), predominantly at the edges of the bog. The Killaconnigan River runs along the southern boundary of Carranstown Bog. The main access point to the Carranstown Bog was to the south of the Application Site via the Ballivor-Raharney (R156) road, which remains the main access point today. The topography of this bog is estimated to have been approx. 72 – 78mOD by July 1988.

4.4.1.3 Bracklin Bog July 1988

By July 1988, peat extraction was underway across most of Bracklin Bog, (approx. 351ha). Areas of remnant uncut raised bog remained intact across Bracklin Bog (approx. 363ha), predominantly at the edges, with approx. 58ha of Bracklin Bog drained but not yet subject to peat extraction. Drainage for both milled and sod peat extraction was already installed, and railway infrastructure, which was laid throughout the 1950s and 1960s, connected Bracklin Bog to Carranstown Bog (to the south) and Lisclogher Bog (to the north). Bracklin Bog included 6 no. artificial silt ponds, and 5 no. surface water emission points which remain *in situ* today. The main access point to Bracklin Bog is off a local road at the northeast of the bog or internally from the south through Carranstown Bog. The topography of Bracklin Bog is estimated to have been approx. 75m – 89mOD by July 1988.

4.4.1.4 Lisclogher July 1988

By July 1988 Lisclogher bog had been drained and sod peat extraction was underway across 378ha of the bog, with an estimated 101ha of raised remnant intact bog remaining. Railway infrastructure was also *in situ*, connecting Lisclogher Bog to Bracklin Bog to the southwest. Access to the Lisclogher Bog in 1988 was via the local road to the west of the bog to the machine pass adjacent to the rail crossing, and this remains the main access point at present day. This local road, which runs in a southeast-northwest orientation, defines the western boundary of Lisclogher Bog and separates Lisclogher Bog from Lisclogher-West. The topography of Lisclogher Bog is estimated to have been approx. 73 – 79mOD by July 1988.

4.4.1.5 Lisclogher West July 1988

Drainage infrastructure was installed in Lisclogher West Bog during 1988 and subsequent years across an area of approx. 22ha, as deduced from available aerial imagery. This area was never subject to peat extraction. An area of 106ha of Lisclogher West Bog was never subject to drainage or peat extraction works and therefore, the landcover in 1988 comprised mainly natural raised bog with raised bog features such as high bog, wet flush areas and bog woodland particularly at the bog borders. The bog includes 6 no. silt ponds and 2 no. surface water emission points. The Cartenstown stream flows in a west-to-east direction through the bog and the Bolandstown stream flows west-to-east along the southern boundary of the bog. Access to Lisclogher West Bog was and remains via a local road which runs through the bog in an east-to-west direction, or via a local road which defines the eastern boundary of Lisclogher West bog and separates Lisclogher West Bog from Lisclogher Bog to the east. The topography of the bog is estimated to have been approx. 77 – 82mOD by July 1988. An esker runs east-west adjacent to the along the northern bog boundary.

N

Lisclogher West

Lisclogher

Bracklin

Carranstown

Ballivor

Legend

Application Boundary

1988 Peat Production

Subject to Peat Extraction

Drained - Not Subject to Peat Extraction

Neither Drained nor Subject to Peat Extraction

0 0.5 1 2 Kilometres

Bord na Móna

Ballivor Substitute Consent
1988 Peat Extraction Activities

DRWG No:	Scale:	Drawn by:	Date:	Figure No:
BNM-PG-20-01-26_v4	1:30,000	JG	09/07/2024	4-5

4.4.2 1988 Peat Extraction Activities

Table 4-5 describes the general activities within the Application Site (with the exception of Lisclogher West bog, which was drained but not subject to peat extraction) over a calendar year during each of the four quarters in 1988. Some drain maintenance was carried out during the full year, but it was mainly restricted to outside the peat extraction season. Fuel handling and refuelling would have increased significantly during the peat extraction season due the activity of the peat extraction machinery. Records indicate that the Derrygreenagh Bog Group, of which the Ballivor Bog Group is a subset and the Application Site is located, supplied peat to the Rhode ESB Power Station, Croghan Briquette Factory, Kilberry and Cúil na Móna when required. Information regarding which bogs supplied which specific end user, quantities of supply, frequency of travel and travel routes are not available. From 1985, peat from the Application Site was also distributed in bulk from the peat loading facility at Ballivor Works to the horticulture industry overseas via Dublin Port.

Table 4-5 1988 Peat Extraction Activities

Calendar Quarter	Activities
January to March	Drain/Machinery/Pump maintenance, stockpile removal, peat transportation
April to June	Peat extraction, stockpile creation/removal, peat transportation
July to September	Peat extraction, stockpile creation/removal, peat transportation
October to December	Drain/Machinery/Pump maintenance, stockpile removal, peat transportation

4.4.3 July 1988 to 2020 (Drainage, Peat Extraction & Associated Activities)

As demonstrated above, by July 1988 peat extraction was well established at Lisclogher, Bracklin and Ballivor bogs and underway in the western portion of Carranstown bog. Peat extraction was never commenced at Lisclogher West bog. Drainage was installed in all bogs and railway infrastructure was laid on all bogs as required.

Drainage construction methodologies are described above in Section 4.2.2.1.1.

4.4.3.1 Ballivor

Extraction in the northwestern and southwestern part of Ballivor bog ceased by 1995 and these areas have since become revegetated predominantly with dry heath and Birch scrub, with some localised wetter areas where field drainage was not maintained and has broken down and become partially blocked. These areas have developed embryonic bog communities with abundant Sphagnum cover. Bare peat areas within the older cutaway areas are reducing. Natural re-colonisation of the cutaway so far has been quite effective. Other parts of the bog are naturally colonising for more than 10 years and are developing a mosaic of cutaway habitats. Aerial photographs from 1995 indicate that Ballivor Bog was still undergoing sod and milled peat extraction. The east, northeast and south of the bog was undergoing milled peat extraction while part of the centre was undergoing sod peat extraction. By 2000, the western portion of the bog was no longer subject to peat extraction. The remaining areas of the bog

remained in active peat extraction until 2020 and these areas are dominated largely by bare peat. The bog includes 7 no. artificial silt ponds, and 7 no. surface water emission points which remain *in situ* today. The 2 no. on-site pumps have been decommissioned. The topography of the bog today ranges from approx. 70 – 79 mOD.

4.4.3.2 Carranstown

Between 1989 and 1995, portions of Carranstown east were cleared and under milled extraction. as indicated in aerial imagery. There were 5 no. silt ponds and 4 no. surface water emission points installed. Today, the bog still retains a dome shape though much of the section was developed for milled peat extraction and a large proportion of the bog comprises bare peat due to continued extraction until 2020. Small areas to the east and west, which were initially developed for milled peat extraction but never fully put into production have since revegetated with Birch and pine scrub and dense bracken covering significant areas presently. Two mineral islands are also located within the bog dominated by hazel, Birch and oak woodland. Birch dominated woodland and remnant raised bogs are also present to the south-east and east of Carranstown. The topography of the bog today ranges from approx. 68 - 75m OD.

4.4.3.3 Bracklin

By 1989 extraction was underway across Bracklin West. By 1995 largescale extraction in the main Bracklin bog area ceased and since then, the majority of the main Bracklin Bog area has since heavily revegetated with typical cutaway habitats. The remnant peat left on site is relatively deep and has allowed acidic vegetation communities to develop including abundant Sphagnum cover in specific areas where drainage is impeded. Despite this overall Sphagnum cover remains low. Bracklin contains a relatively large area of remnant raised bog at its southern margin and a large section of cutover bog currently developing into Birch woodland. Bare peat areas within the older cutaway areas are reducing. Natural re-colonisation of the cutaway so far has been quite effective. Other parts of the bog (younger cutaway) are naturally colonising for more than 10 years and are developing a mosaic of cutaway habitats. Natural re-colonisation of the cutaway so far has been quite effective. An area of marginal raised bog remnant (19 ha) was restored at Bracklin Bog in 2016, as part of the Bord na Móna Raised Bog Restoration Programme. The bog includes 6 no. artificial silt ponds, and 5 no. surface water emission points which remain *in situ* today. The topography of the bog today ranges from approx. 71—86 mOD.

4.4.3.4 Lisclogher

By 1995 milled peat extraction was well underway at Lisclogher. This process ceased in 2003. Since this period, the bog has been out of production except for third-party extraction in areas covering approx. 70ha and some sod production in the northeast. Since 2003, recolonisation of vegetation has taken form. Overall, the site has begun to become colonised with cutaway vegetation such as pioneer fen and Birch scrub. Some of this is quite well established with habitats stabilising. The old rail lines are still clearly visible on the bog as narrow, high ridges that contain habitats such as pioneer poor fen and Birch scrub. The former production fields are lower than most of the Application Site and contain open water in the wettest places with Common Bog Cotton having developed in the majority of the old production fields. Drainage on the Application Site had begun to break down with many old drains having become blocked and full of water, some drains contained *Sphagnum cuspidatum* while other drains contained Reedmace, Bog Cotton and rushes (mainly Soft Rush). As discussed above, habitats present in 1988 at the bog edges remain the same today. Access to the bog is via the local road to the west which separates it from Lisclogher-West. The bog includes 1 no. artificial silt pond and 1 no. surface water emission points which remain *in situ* today. The topography of the bog today ranges from approx. 69 - 76mOD.

4.4.3.5 Lisclogher West

Remaining drainage elements were installed between 1988 and 1995, as deduced from available aerial imagery. However, as mentioned previously, Lisclogher West bog never underwent peat extraction and therefore, the landcover in 1988 comprised mainly natural raised bog with raised bog features such as high bog, wet flush areas and bog woodland particularly at the bog borders. An esker runs east- west adjacent to the along the northern bog boundary.

Most of the margins have been abandoned or unmanaged for some time and extensive Birch woodland and mixed conifer woodland has developed. Some of this Birch woodland is particularly well-developed and Scot's pine is a prominent feature of much of the woodland around the bog. The 2nd edition OSI 6-inch map illustrates most of the margins as conifer woodland, indicating that this woodland may not have developed naturally but was probably planted at some stage. This map also indicates that woodland or wooded sections on the high bog were more extensive in the past and some areas have been cleared or reverted to high bog, indicating that there has been a relatively long history of forestry around this bog. The topography of the bog today ranges from 77- 82m OD. As the bog was not brought into peat extraction it is assumed that the existing topography is representative of the topography in 1988. The Cartenstown stream flows in a west-to-east direction through the bog and the Bolandstown stream flows west-to-east along the southern boundary of the bog. Access to the bog was and remains via a local road which runs through the bog in an east-to-west direction or via a local road which separates Lisclogher West bog from Lisclogher bog.

Since July 1988, 6 no. silt ponds and 6 no. surface water emission point were inserted into Lisclogher West bog. The absence of production has meant that Lisclogher-West has retained many of its natural raised bog features (raised bog, cutover bog, conifer plantation, birch woodland, mixed broadleaf woodland, scrub, poor fen and flush). It can be inferred that if the other four bogs were never brought into production, similar habitats at these bogs would be present today.

4.5 Peat Extraction

Peat extraction, under the same processes described in Section 4.2.2 above, continued at the Application Site from July 1988 until June 2020 when peat extraction ceased across the Application Site. Improvements and modernisation of machinery occurred between 1988 and 2020 which increased the efficiency and speed of operations over this time period. There were significant developments in diesel-powered engines which would have resulted in the use of more fuel-efficient tractors on the bogs with significantly cleaner exhaust emissions compared to the baseline year of 1988 or pre-1988.

For the Peat Extraction Phase, i.e from July 1988 to June 2020, peat extraction gradually slowed down and then ceased permanently in June 2020 across the Application Site with the related reduction in fuel handling/refuelling, machinery maintenance and stockpile development. Stockpile removal was completed in 2023, and drainage/silt pond maintenance is currently ongoing.

Peat extraction maps for the years 1995, 2004 and 2020 are presented in Figures 4-6 to 4-8 and illustrate the activity on the Application Site over time and the increasing areas of lands which were no longer subject to peat extraction. Figure 4-8 shows that most areas were out of production in 2020. Aerial images for the years 1995, 2000, 2004, 2015 and 2018 are included in Appendix 4-4 where the Application Site boundary has been overlain and natural regeneration of land cover can be seen on the areas of the bogs which were not in production.

N

Lisclogher West

Lisclogher

Bracklin

Carranstown

Ballivor

Legend

Application Boundary

1995 Peat Production

Subject to Peat Extraction

Drained - Not Subject to Peat Extraction

0 0.5 1 2 Kilometres

Bord na Móna

Ballivor Substitute Consent
1995 Peat Extraction Activities

DRWG No:	Scale:	Drawn by:	Date:	Figure No:
BNM-PG-20-01-27_v4	1:30,000	JG	09/07/2024	4-6

N

Lisclogher West

Lisclogher

Bracklin

Carranstown

Ballivor

Legend

Application Boundary

2004 Peat Production

Subject to Peat Extraction

Drained - Not Subject to Peat Extraction

0 0.5 1 2 Kilometres

Bord na Móna

Ballivor Substitute Consent
2004 Peat Extraction Activities

DRWG No:	Scale:	Drawn by:	Date:	Figure No:
BNM-PG-20-01-28_v3	1:30,000	JG	09/07/2024	4-7

N

Lisclogher West

Lisclogher

Bracklin

Carranstown

Ballivor

Legend

Application Boundary

2020 Peat Production

Drained - Not Subject to Peat Extraction

Subject to Peat Extraction

0 0.5 1 2 Kilometres

Bord na Móna

Ballivor Substitute Consent 2020 Peat Extraction Activities

DRWG No:	Scale:	Drawn by:	Date:	Figure No:
BNM-PG-20-01-29_v3	1:30,000	JG	09/07/2024	4-8

4.5.1.1 Peat Extraction Volumes July 1988-June 2020

The volumes of peat removed from the Application Site varied from year to year and were mainly weather dependent. The tonnages of peat extracted are outlined in Figure 4-9 and Table 4-6 below:

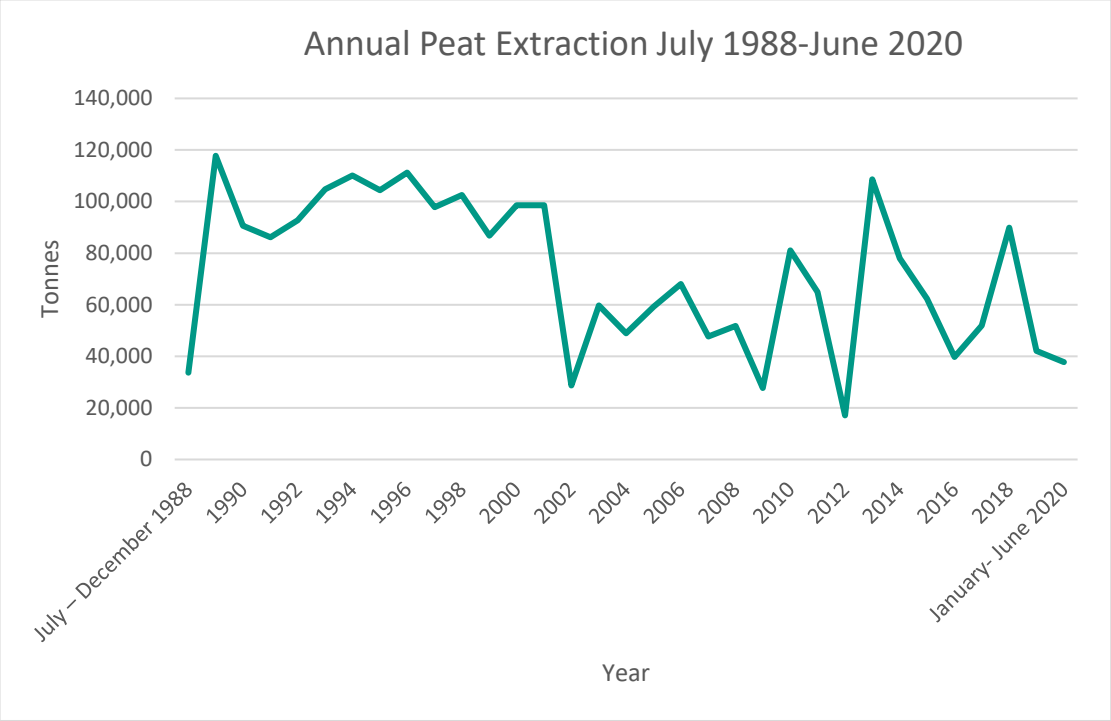

Figure 4-9 Annual Peat Extraction Volumes July 1988- June 2020

Table 4-6 Peat Extraction July 1988- June 2020 (Tonnes)

Year	Tonnes	Year	Tonnes
July – December 1988	33,721	2005	59,251
1989	117,755	2006	68,069
1990	90,583	2007	47,637
1991	86,190	2008	51,829
1992	92,744	2009	27,721
1993	104,742	2010	81,062
1994	110,074	2011	64,951
1995	104,384	2012	17,095
1996	111,260	2013	108,605
1997	97,800	2014	77,968
1998	102,495	2015	62,267

Year	Tonnes	Year	Tonnes
1999	86,749	**2016**	39,730
2000	98,610	**2017**	51,844
2001	98,610	**2018**	89,839
2002	28,640	**2019**	42,115
2003	59,737	**January- June 2020**	37,782
2004	48,956		
Total Volume Extracted (tonnes)	**2,400,815**		

Bord na Móna records indicate that from July 1988 and until 1999 inclusive, on average 1,138,497 tonnes of peat (sod and milled) were extracted from Ballivor, Brackin, Lisclogher and Carranstown bogs. There are no peat extraction records for the period 2000 to 2001 inclusive. In determining the overall peat extraction volumes from July 1988 until June 2020, an average of the 1990 to 1999 extraction figures was used for the 2000 and 2001 seasons (i.e. 98,610 tonnes). Records indicate that on average, 58,058 tonnes of peat were extracted each year from 2002 to 2020. The total volume of peat extracted from July 1988 to 2020 is estimated to be 2,400,815 tonnes.

In 2020, 37,782 tonnes of peat were extracted all the bogs within the overall P0501-01 IPC Licence area. The Application Site form a subset of the IPC Licenced bogs, and therefore the actual volumes produced at the Application Site were significantly less than this figure. This drop was due to the fact that peat extraction both commenced and ended in the month of June 2020 for the whole Derrygreenagh Bog Group, of which the Ballivor Bog Group is a subset, and thus the Application Site is located.

Until June 2020, peat was supplied to Kilberry Horticultural Works, Derrinlough Briquette Factory, West Offaly Power Station and Edenderry Power Plant in Co. Offaly, and Lough Ree Power Station in Co. Longford. Since June 2020, peat from the remaining onsite stockpiles has been supplied to Kilberry Horticultural Works, Edenderry Power Station and Derrinlough Briquette Factory only.

The above figures do not include third party peat extraction volumes, which are referenced in Section 4.5.4 below.

4.5.2 Drainage Systems July 1988 – June 2020

After July 1988, peat extraction activities and all ancillary works were well underway at the Application Site. The deepening and maintenance of the drains continued beyond 1988, up until the cessation of peat harvesting in June 2020. As the areas in active production from July 1988 to June 2020 reduced in their extent (refer to Figures 4-5 to 4-8, and Appendix 4-4) and the depth of peat available was reducing after each harvest, the extent and number of drains requiring deepening and maintenance reduced accordingly.

Machinery used for drainage works would have been largely the same as that described in Section 4.2.2.1.1 with ever-improving engine efficiency in tractors and excavators.

Silt Ponds

A number of existing silt ponds at the Application Site were in place prior to July 1988 as described in Section 4.3.5.9.

A total of 25 no. silt ponds are currently in place across the five bogs: 7 at Ballivor, 6 at Bracklin, 5 at Carranstown 1 at Lisclogher, and 6 at Lisclogher West. Upgrades to silt ponds were undertaken at the Application Site following a 1990 survey undertaken by Bord na Móna which involved a daily sampling and analysis programme at different locations in the Bord na Móna landholdings over a full calendar year to determine the quantity of silt within the runoff from bogs (Harkins Report Appendix 4-9). The study determined that an average of 50m^3 of sludge per hectare was typically discharged. Following this, the silt ponds were designed to cater for the settling of sufficient amounts of silt providing the ponds were de-sludged at least twice per annum. A second pond was installed adjacent to the first to facilitate de-sludging (i.e., used as a backup when the first pond reached silt storage capacity and underwent de-sludging).

Condition 6 of the IPC Licence details the requirements for Bord na Móna to implement a programme to ensure all drainage water from all boglands is discharged into an appropriately designed silt pond treatment arrangement, an operational procedure for desilting was prepared and desilting is carried out twice per year. Please see Appendix 4-1 for details. The silt arising from these de-silting operations was either stockpiled a distance from drains and the silt pond or placed back out onto the peat extraction fields. Up until the cessation of peat extraction, this material would then have been incorporated into the subsequent harvests.

4.5.3 Annual Peat Extraction Activities July 1988- June 2020

Table 4-7 below describes the primary activities within the bog group over a calendar year during each of the four quarters.

Table 4-7 Annual Peat Extraction Activities July 1988 – June 2020

Calendar Quarter	Activities
January to March	Drain/Machinery/Pump/Silt Pond maintenance, Stockpile removal, peat transportation
April to June	Peat extraction, Stockpile development/removal, peat transportation

Calendar Quarter	Activities
July to September	Peat extraction, Stockpile development/removal, peat transportation
October to December	Drain/Machinery/Pump/Silt Pond maintenance, Stockpile removal, peat transportation

Some drain maintenance was carried out during the full year, but it was mainly restricted to outside the peat extraction season. Fuel handling and refuelling would have increased significantly during the peat extraction season due the increased activity of the peat extraction machinery. During the Peat Extraction Phase, peat extraction volumes gradually reduced across the Application Site, before ceasing in June 2020. During the period of gradual decline in peat extraction volumes, a corresponding decline in fuel handling/refuelling, machinery maintenance and stockpile development was observed. Stockpile removal was completed in 2023, with the maintenance of drainage infrastructure ongoing at present. Further detail on this is provided in Section 4.8 below which details the Current Phase of the Project.

4.5.4 Third-Party Peat Extraction Activities

With the establishment of the Turf Development Act of 1981 (which amended and extended the rights of the Turf Development Act 1946-1980), Bord na Móna oversaw a private turf development scheme which provided grants to private bog developers. At the Application Site, this third-party peat extraction occurred in Lisclogher Bog only. Third-party sod peat extraction began at Lisclogher Bog in the 1990s and continued until 2020. Over the course of the years, it is estimated that approx. 1,200 tonnes of peat were extracted by third parties from Lisclogher Bog. Milled peat was extracted by Bord na Móna from this bog also during this period. Please see Figure 4-10 for third party peat extraction locations in Lisclogher Bog at the time of cessation.

Figure 4-10 Third Party Peat Extraction Locations

4.5.5 Ancillary Services and Infrastructure

4.5.5.1 Railway Infrastructure

As discussed above, peat extraction areas were served by a dynamic network of narrow-gauge rail tracks, laid down by 1973 in all bogs except Lisclogher West. The temporary railway infrastructure was moved around using the methods described in Section 4.2.3.7 as areas of bog came in and out of production.

The railway line segments in the townland of Grange More, Co. Westmeath, which covers portions of Ballivor and Carranstown Bogs, was given a Protected Structure status (Reference 021-008) in the adopted 2014-2020 and Westmeath County Development Plan 2021 – 2027. Please see Table 4-8 below for further details. This same portion of railway was added to the National Inventory of Architectural Heritage (NIAH) in 2004 and designated as a Protected Structure after this period as the first step to protected structure status is to enter the NIAH record first. Please see Chapter 13 Archaeological, Architectural and Cultural Heritage for more details.

Table 4-8 RPS appraisal of Railway Infrastructure in Grange More Townland, Co. Westmeath

Structure	RPS	Address	Description	Appraisal	NIAH	Rating
Permanent narrow gauge Bord na Móna railway line	021-008	Grange More Townland, Co. Westmeath	Permanent narrow gauge Bord na Móna railway line, erected c.1952, for transporting turf to the Ballivor Processing Plant, Co Meath. Now only used to transport carriages brought in for servicing. Constructed of steel I beams.	*Bord na Móna narrow gauge railways and ancillary structures are an important element of the twentieth century industrial and economic heritage of Ireland. They are a common feature of the landscapes of the Bog of Allen, particularly in Co Westmeath.*	15402102	Regional

The majority of railway infrastructure across the entire Application Site is still present today. The railway lines are regularly maintained. As discussed, the Application Site activities fell under IPC Licence from 2000 onwards. Condition 9.1.15 of this IPC Licence requires biannual inspection and maintenance of the railcars to ensure no damage, leaks, or flaws in that could result in accidental fuel spillage.

4.5.5.2 Machine/Wheel Wash Facilities

Machine washings generated due to the cleaning of various plant machinery (using a power steam wash system when machinery left the bogs) at wash bays drained into the adjacent peatlands drainage system.

4.5.5.3 Refuelling Activities

The two refuelling methods described in Section 4.3.5.2 continued throughout the Peat Extraction Phase. However, all tank and drum storage areas have been modernised and bunds have been integrity tested bi-annually since 2000 in line with the IPC Licence requirements. Please see Condition 9.1.15 of the IPC Licence for details.

4.5.5.4 Environmental Monitoring

Since April 2000, control and monitoring measures (such as noise, dust, surface water), have been in operation at the application site in accordance with the IPC Licence conditions. These conditions are discussed further in Section 4.7.1.1 below. A copy of the licence is provided in Appendix 4-1. Background to the IPC application and implementation at the Ballivor Bog group can be found in Section 2.2 of Chapter 2 Background.

4.5.5.5 Welfare Facility

The Welfare Facility comprises an 18m by 6m building with 3m by 9m strip foundations, covering approx. 108m^2, adjoining existing Works buildings, in Ballivor Bog, in the townland of Grange More, Co. Westmeath (Reference 88/14).

Available details on the construction materials of the Welfare Facility are as follows:

- ***Roof:*** *33mm profile composite steel panels with polyurethane infill insulation*
- ***Walls:*** *external- 225mm thickness solid block below DPC; Internal 225mm thickness cavity block above DPC ;Partition for kitchen area: 100mm studded partition; external finish: scud and render with nap finish, 300mm high plinth all round.*
- ***Floor:*** *150mm thickness concrete on 2000 visqueen on 25mm consolidated hardcore with anti-crack mesh; approved 12mm thick non slip tiles.*
- ***Windows:*** *7 no high white PVC double glazed*
- ***Foundations:*** *300*900mm strip foundation, 3*12mm bars, 50mm cover*

The building was connected to an existing bored well water supply by this time however there are no construction details available on this well. Conditions attached to the Welfare facility construction and operation pertain to fire safety and ensuring its use for the purpose outlined only.

4.5.5.6 Storage Facilities Extension

The Applicant received permission for a 510m^2 extension to the storage facilities at the Works in 1990 (Reference 90/554). The building measures 70m x 50m area with a 7m elevation. The extension was constructed in 1990 and connected to an existing water supply at the works. The extension is adjacent to the existing bulk storage building.

Available details on the construction materials of the bulk loading facility are as follows:

- ***Roof:*** *Galvanised stell sheeting, PVC finish*
- ***Roof Lighting:*** *Translucent sheeting*
- ***Walls:*** *Galvanised stell sheeting, PVC external face*
- ***Floor:*** *200mm concrete floor laid on 2000 visqueen on consolidated hardcore*
- ***Foundations:*** *stanchion bases 1200mmx 1200mm x 600mm depth at 300mm below ground level reinforced with 20mm diameter HYS bars.*

Conditions attached to the storage facility pertain to fire safety, colour of external finish of building and that surface water from the development was to be discharged into soak pits on the Application Site and not allowed to flow to the public road in the interest of traffic safety.

4.5.5.7 10/20kV ESB Substation

Permission was granted in 2005 for a 10/20kV substation to serve Ballivor Works (Reference 05/2348). The total floor area of the development measures 23.15m^2 with a plaster finish to all external walls. No tree removal was required for its construction. The stated drainage method is roof water to open drain. No water supply or wastewater management is required. Conditions attached to the planning

permission pertain to ensuring the development is constructed in accordance with ESB standards and as per the plans and particulars submitted. Please see Chapter 14 Material Assets for details.

4.5.6 Non-Peat Related Activities

4.5.6.1 Commercial Forestry Activities

Bord na Móna landholdings at the Application Site include approx. 10ha of conifer forestry (approx. 8.76ha in Lisclogher-West Bog and 1.78ha in Ballivor Bog) that is managed exclusively by Coillte. These pockets do not fall within the peat extraction bogs and do not form part of the Substitute Consent application but will form part of the cumulative assessment within the following impact assessment chapters rEIAR.

4.5.6.2 Model Aircraft grass take-off and landing strip

The application for, and subsequent operation of two intersecting grass strips for the take-off and landing of model aircraft was undertaken by a third party at Lisclogher West, under lease agreement of the site with Bord na Móna. No intrusive ground works or connection to services were/are required to establish or operate this hobbyist activity at the site.

4.5.6.3 Wind Monitoring Mast

The Applicant was granted a five-year permission for a 100-metre-tall guyed meteorological wind mast to be erected at Lisclogher Bog in 2016 (Westmeath Planning Reference 156135; 166259) for the purposes of assessing the site for potential future wind energy development. A three-year retention permission for the mast was granted by Westmeath County Council in January of 2022 (Planning Reference 21620). Further details on this can be found in Section 4.10.1.

4.6 Control Measures July 1988 to June 2000

Post- July 1988 but prior to the implementation of the IPC Licence at the Application Site in 2000, the environmental management measures set out in Section 4.3.5 were in place across the Application Site. In addition, as evidenced in the 1991 Harkins Report, Appendix 4-9, silt control measures in the form of silt ponds were in place prior to 1988, with Bord na Móna carrying out further studies and surveys throughout the 1980s and 1990s to make improvements to how silt ponds operated so that suspended solids emissions in surface run-off were reduced. This included the construction of new ponds (as described in Section 4.3.5.9) to maintain treatment of run-off while cleaning of existing ponds was in progress.

4.6.1 Archaeological Code of Practice

Bord na Móna has a long history of co-operation with the National Museum of Ireland, the National Monuments Service and the relevant governmental departments overseeing heritage at the time, in relation to the cultural and archaeological importance of wetlands as well as the potential for, and handling of, archaeology discovered in bogs. After the discovery and subsequent preservation of trackways at Corlea Bog, Co. Longford by Bord na Móna employees in the 1980s, a new programme for peatland archaeology was established. Since 1991 an annual programme of archaeological survey, initially funded by the National Monuments Service, has been conducted in Bord na Móna Bogs, with the results being forwarded for inclusion in the Sites and Monuments Record.

Since 1998, Bord na Móna has a statutory duty under the Turf Development Act 1998 (Section 56) to afford appropriate protection for the environment and the archaeological heritage.

Section 56.- *The Company and each subsidiary shall ensure that its activities are so conducted as to afford appropriate protection for the environment and the archaeological heritage.*

The 1998 Act was in accord with the development of an *Agreed Principles for the Protection of Wetlands Archaeology in Bord na Móna Bogs* (1998) between the Minister for Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna. The Agreed Principles set out 10 standards within which archaeology in the Bord na Móna peatlands were managed. Five Archaeological Liaison Officers were spread across the Bord nan Móna Bog Groups and received training on how to deal with and report finds. Since 1998, all archaeological surveys were funded by Bord na Móna. The surveys have been accompanied by an annual programme of selective archaeological excavation and paleo-environmental analysis. By 2013, 64,000 of the c. 80,000-hectare land holdings of Bord na Móna had been subject to archaeological survey.[8]

A Code of Practice between the Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna was established in 2012.[9] This Code superseded the Agreed Principles. The Code provided a framework within existing legislation, policy and practice to enable Bord na Móna to progress with peat extraction activities and all ancillary works and simultaneously ensure archaeological control measures are in place. The measures Bord na Móna are responsible for are listed below:

Bord na Móna will:

1. *Engage a Project Archaeologist*
2. *Maintain the network of Archaeological Liaison Officers.*
3. *Disseminate a set of Archaeological Protection Procedures*
4. *Ensure that any monuments or archaeological objects discovered during peat extraction are protected in an appropriate manner by following the Archaeological Protection Procedures.*
5. *Ensure that any newly discovered monuments on Bord na Móna lands are reported in a timely manner to the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht.*
6. *Ensure that any archaeological objects discovered on Bord na Móna lands are reported immediately to the Duty Officer of the National Museum of Ireland.*
7. *Prioritise monuments for investigation taking account of monument vulnerability, contractual obligations and peat production targets.*
8. *Prepare tenders for archaeological mitigation of impacts on monuments, to include excavation and recording, in consultation with the Project Archaeologist and the Minister.*
9. *Engage professional Consultant Archaeologists to carry out mitigation of monuments, including the required palaeo-environmental assessment and post-excavation studies.*
10. *Provide the necessary finance to fulfil the post-excavation requirements of the Minister and the Director including the conservation of archaeological objects and the provision of scientific analyses and dating, as well as the production of reports on all archaeological work, to a standard which will meet the approval of the Minister.*

[8] *Department of the Arts, Heritage and the Gaeltacht 2013 Review of Archaeological Survey and Mitigation Policy relating to Bord na Móna Peatlands since 1990. https://www.archaeology.ie/sites/default/files/media/pdf/bnm-peatland-review-final-report-20-06-2013.pdf*
[9] *2012 Code of Practice between the Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Mónahttps://www.archaeology.ie/sites/default/files/media/publications/cop-bord-na-mona-en.pdf*

4.7 Control Measures 2000 to Present Day (Post-IPC Licence)

4.7.1.1 Environmental Monitoring and Conditions under IPC Licence

Bord na Móna were granted an IPC Licence (P0501-01) for the Derrygreenagh Bog Group (which encompasses the Ballivor Bog Group, and therefore the Application Site) in April 2000. Following this grant, the control measures listed in Section 4.6 above have been updated and expanded. The background to the IPC application and implementation at the Ballivor Bog group can be found in Chapter 2 Background and a copy of the licence is provided in Appendix 4-1. The licence application is publicly available and can be viewed on request at EPA headquarters PO Box 3000 Johnstown Castle Estate County Wexford Y35 W821. The EPA licencing inspectors' reports can be viewed at the following webpage: https://epawebapp.epa.ie/terminalfour/ippc/ippc-view-filter.jsp?regno=P0501-01&filter=c&docfilter=go

Furthermore, Bord na Móna staff underwent an EPA IPC training programme following the grant of the IPC Licence in 2000, which resulted in the development of an environmental management system. This system addresses emissions to water and air, noise, vibration and odour emissions, waste management, use of natural resources, visual effects and the natural environment and eco-system. Please see Appendix 4-5 for the Bord na Móna IPC training programme.

The conditions of the IPC Licence are intended for the protection of the environment and apply from the time of grant of the IPC Licence. The EPA has undertaken Technical Amendments of the IPC Licence for the purpose of aligning the conditions of the IPC Licence to the objectives of national and European environmental protection legislation enacted over the lifetime of the IPC Licence. The IPC Licence was subject to a Technical Amendment for the purpose of the European Communities Environmental Objectives (Surface Water) Regulations, 2009 and it now contains an objective to 'maintain' or 'restore' the water surface water quality to the defined 'Good Status'. With the implementation of conditions listed in the IPC Licence, the potential environmental effects of peat extraction activities and all ancillary works on water quality (such as the release of elevated concentrations of suspended sediments, and by association on aquatic ecosystems and protected species), have and continue to reduce through the implementation of IPC Licence conditions. Please see Chapter 8 Hydrology and Hydrogeology of this rEIAR and the Annual Environmental Reports (AER) included as Appendix 4-3 for details.

The IPC Licence is subject to 14. No conditions pertaining to the ongoing monitoring and maintenance to ensure any emissions from site activities will comply with and not contravene, any of the requirements of Section 83(3) of the Environmental Protection Agency Act, 1992 outlined below:

(3) The Agency shall not grant a licence or revised licence for an activity unless it is satisfied that—

> *(a) any emissions from the activity will not result in the contravention of any relevant air quality standard specified under section 50 of the Air Pollution Act, 1987, and will comply with any relevant emission limit value specified under section 51 of the Air Pollution Act, 1987,*
>
> *(b) any emissions from the activity will comply with, or will not result in the contravention of, any relevant quality standard for waters, trade effluents and sewage effluents and standards in relation to treatment of such effluents prescribed under section 26 of the Local Government (Water Pollution) Act, 1977,*
>
> *(c) any emissions from the activity or any premises, plant, methods, processes, operating procedures or other factors which affect such emissions will comply with, or will not result in the contravention of, any relevant standard including any standard for an environmental*

medium prescribed under regulations made under the European Communities Act, 1972, or under any other enactment,

(d) any noise from the activity will comply with, or will not result in the contravention of, any regulations under section 106,

(e) any emissions from the activity will not cause significant environmental pollution, and

(f) the best available technology not entailing excessive costs will be used to prevent or eliminate or, where that is not practicable, to limit, abate or reduce an emission from the activity,

and, where appropriate, the Agency shall attach conditions relating to the matters specified in the foregoing paragraphs to the licence or revised licence.

Conditions 1 to 4 of the licence outlined the Scope, Management, Interpretation and Notification procedures required by the Applicant, respectively. Conditions 11 to 14 detail the Monitoring (equipment use), Recording and Reporting, Emergency Response and Financial Provisions duties of the Applicant. Conditions 5 to 10 pertain to environmental monitoring and management:

- Condition 5 Emissions to Atmosphere
- Condition 6 Emissions to Water
- Condition 7 Waste Management
- Condition 8 Noise
- Condition 9 Water Protection
- Condition 10 Decommissioning and Cutaway Bog Rehabilitation

In compliance with Condition 5, the Applicant must undertake annual tests on boiler combustion efficiency and dust monitoring. Please see Chapter 9 Air Quality for further details. Condition 6 ensures the Applicant establishes a surface water discharge monitoring programme which is reviewed annually and a report submitted to the EPA quarterly. The Applicant is also required to submit water sample results annually, implement and maintain silt ponds. Condition 9 pertains to the 'Water Protection' and outlines the daily, weekly, monthly, quarterly, and annual inspections Bord na Móna must carry out to provide for the protection of surface and groundwater. There are currently silt pond inspections and maintenance including quarterly grab sampling ongoing at the application site. Please see Chapter 8 Hydrology and Hydrogeology for further details. Condition 7 compels the Applicant to correctly dispose of waste to licenced facilities. Please see Chapter 14 Material Assets for details. Condition 8 ensures that any on site activities do not give rise to noise exceedances at noise sensitive locations. Please see Chapter 11 Noise and Vibration for further details. Condition 10 pertains to site decommissioning followed by peatland rehabilitation and is detailed in Section 4.9 below which details the Remedial Phase, and Chapter 6 Biodiversity. It is the intention of the of the Applicant to continue implementing and practising the mitigation and monitoring measures as listed in the Licence after the site is decommissioned, where applicable.

4.7.2 Standard Operation Procedures

To facilitate the production of AERs, Bord na Móna produced an *Environmental and Operational Procedures for Protection of Surface Water* document which comprises a suite of Standard Operation Procedures (SOPs) which have the overall aim of promoting and maintaining environmental integrity throughout all Bord na Móna activities. The document includes SPS for drainage planning and implementation, silt pond and outfall maintenance, waste management, peat extraction methods, and general bog housekeeping. The SOPs also set out emergency preparedness and response procedures, how to deal with complains, effective communication with Bord na Móna operatives, the local community and local authorities. Please see Appendix 4-11 Environmental and Operational Procedures for Protection of Surface Water for details.

4.8 Current Phase - June 2020 to Present Day

4.8.1 Decommissioning Process

In January 2021, Bord na Móna formally announced that peat extraction across all bogs within its landholding had ceased, although peat extraction had ceased at the Application Site prior to this in June 2020. The Application Site still operates under the requirements of IPC Licence 0501-01, and any decommissioning works undertaken with respect to peat extraction activities and all ancillary works are in accordance with Condition 10 of the IPC Licence, which states that that:

> '***10.1*** *following termination of use or involvement of all or part of the site in the licenced activity, the licensee shall:*
>
> > ***10.1.1*** *Decommission, render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.*

In compliance with Condition 10.1 of the IPC Licence, it is a requirement to decommission the Application Site by removing/disposing/recovering buildings, equipment, waste etc from the Application Site. The main success criteria pertaining to successfully complying with this condition is ensuring that no environmental liability remains from this infrastructure and material and that the bog can be deemed suitable for surrender of the license under Section 95 of the EPA Act. This is achieved by Bord na Móna identifying and quantifying any mechanical and infrastructural resources that were installed in the bog to enable the development and production operation at the Application Site. This list is then refined to identify any items that would be deemed as possibly resulting in environmental pollution, should they not be removed.

Typically, these items/infrastructures would be any remaining, unconsolidated plant, equipment and attachments, waste materials, unused raw materials such as land drainage pipes, remaining peat stockpiles, stockpile covering, pumps, septic tanks and fuel tanks. To date, the only decommissioning underway at the Application Site was the removal of remaining peat stockpiles from the bogs. This was completed by the end of 2023. Infrastructure to be decommissioned at the Application Site is listed in Table 4-9 below. It should be noted that no extant buildings will be demolished as part of the decommissioning programme. The decommissioning programme and activities are detailed in the Cutaway Bog and Decommissioning and Rehabilitation Plan for each bog which can be found in Appendix 4-2.

From mid-2020 to mid-2021 the operations at the Application Site reduced to transferring stockpiled peat to the Ballivor Works for processing prior to transportation to Kilberry Horticulture Works in Co. Kildare the Edenderry Power Plant and Derrinlough Briquette Factory, both in Co. Offaly. The Ballivor Works ceased operation mid-2021. From mid-2021, stockpiles of peat were removed from across the Application Site, transferred to a conveyor via tipple trucks and subsequent transport to either Kilberry Horticulture Works, Edenderry Power Plant, and/or the Derrinlough Briquette Factory. Final stockpiles at Ballivor Bog were removed in June 2022 and the last of the stockpiles at Bracklin, Lisclogher and Carranstown bogs were removed by the end of 2023.

Table 4-9 Infrastructure Decommissioning List for each bog

Item	Description	Application Site Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Relevant to Ballivor, Bracklin and Carranstown
2	Clean silt ponds	All bogs
3	Decommission peat stockpiles	Complete
4	Decommission or remove buildings and compounds	N/A
5	Decommission fuel tanks and associated facilities	Relevant to Ballivor
6	Decommission and removal of septic tanks	Relevant to Ballivor
7	Decommissioning and removal of Bog pumps	Completed at Lisclogher post cessation of extraction. Not relevant at other bogs

In relation to waste management, Condition 7 of the IPC Licence requires these now defined waste items to be disposed of or recovered as follows:

"Condition 7.1: Disposal or recovery of waste shall take place only as specified in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery of this licence and in accordance with the appropriate National and European legislation and protocols. No other waste shall be disposed of/recovered either on-site or off-site without prior notice to, and prior written agreement of, the Agency.

Condition 7.2: Waste sent off-site for recovery or disposal shall only be conveyed to a waste contractor, as agreed by the Agency, and only transported from the site of the activity to the site of recovery/disposal in a manner which will not adversely affect the environment.

Condition 7.3: A full record, which shall be open to inspection by authorized persons of the Agency at all times, shall be kept by the licensee on matters relating to the waste management operations and practices at this site. This record shall as a minimum contain details of the following:

7.3.1: The names of the agent and transporter of the waste.
7.3.2: The name of the persons responsible for the ultimate disposal/recovery of the waste.
7.3.3: The ultimate destination of the waste.
Condition 7.3.4: Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.
7.3.5: The tonnages and EWC Code for the waste materials listed in Schedule 2(i) Hazardous Wastes for Disposal/Recovery and Schedule 2(ii) Other Wastes for Disposal/Recovery sent off-site for disposal/recovery.
7.3.6: Details of any rejected consignments.

A copy of this Waste Management record shall be submitted to the Agency as part of the AER for the site."

As required by the Licence, waste items are and will continue to be removed for recycling or disposal, using external contractors with the required waste collection permits, approved under Condition 7.2, and waste records are and will continue to be maintained as required under Condition 7.3.

Where possible, Bord na Móna will target preferred waste treatment methods from the waste hierarchy to identify waste that can reused or recycled in lieu of recovery or disposal.

The validation of the success of compliance with Condition 10.1 of the IPC Licence is carried out through an Independent Closure Audit (ICA) which is followed by an EPA Exit Audit (EA) and the eventual partial or full surrender of the licence.

4.8.2 Peatland Climate Action Scheme

The Peatland Climate Action Scheme (PCAS) is a programme of enhanced peatland rehabilitation measures with the primary aim of optimising climate action benefits of rewetting former industrial peat extraction areas by creating soggy peatland conditions that will allow compatible peatland habitats to redevelop. These measures are separate to those defined by the IPC Licence. This programme has been developed to optimise ecosystem service benefits of peatland rehabilitation and restoration, particularly carbon storage and reducing carbon emissions. In addition, this will also benefit biodiversity and water (water quality and catchment management), as well as providing space for local communities and people to enjoy the outdoors. The scheme is supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan administered by the Department of Environment, Climate and Communications (DECC). Please see https://www.bnmpcas.ie/ for details. The National Parks and Wildlife Service (NPWS) acts as the Scheme regulator and there is ongoing engagement with the EPA. This scheme is in addition to the IPC licence requirements and therefore does not form part of this Substitute Consent application and is being applied at specific locations across the Bord na Móna landbank that are identified as suitable for the prescribed enhancement measures e.g., bogs such as Carranstown East, Lisclogher West and Bracklin West where PCAS is currently underway.

The scope of proposed rehabilitation measures for the three bogs that are currently active under the PCAS programme include the following, which is directly taken from Section 8 of each relevant Bog report included in Appendix 4-2 Cutaway Bog and Decommissioning and Rehabilitation Plan:

Carranstown East:

- *Deep Peat measures including field re-profiling, bunding and drain-blocking, resulting in bunded wetlands suitable for Sphagnum inoculation, on deeper peat;*
- *Intensive drain blocking around shallow peat areas / modelled depressions on little or no peat to create/promote the spread of wetland habitats,*
- *Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls;*
- *Regular drain blocking (3/100) on dry cutaway along with the blocking of outfalls and management of water levels;*
- *Intensive drain blocking (7/100) in areas to develop wetlands in areas of shallow peat.*
- *Measures include the blocking of outfalls, management of water levels and transplanting reeds and other rhizomes;*
- *Berms and field re-profiling (45m x 60m cell) in deep peat areas, along with blocking outfalls and managing overflows with a controlled weir outfall, includes drainage channels for excess water and Sphagnum inoculation;*
- *Targeted fertiliser applications to accelerate vegetation establishment on areas of bare peat on headlands and high fields, and within certain areas of dry cutaway. Areas where vegetation has established do not need fertiliser application.*
- *Seeding of vegetation and inoculation of Sphagnum will be undertaken where required.*

Lisclogher West

- *Raised bog restoration measures including intensive drain-blocking (7/100 m);*
- *Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls;*
- *Regular drain blocking (3/100) on dry cutaway along with the blocking of outfalls and management of water levels;*
- *Re-wetting the deep peat in the cutover areas of the bog using berms and peat dams. This enhanced measure seeks to create large (c. 45m x 60m) flat areas or cells of shallow (levels at peat surface +/- 10 cm) water conditions on bare areas and vegetated areas of cutover bog;*
- *Removal of conifer forestry from the high bog (Forest to Bog restoration). A small part of the high bog was planted with conifer forestry. It is proposed to remove this forestry to support raised bog restoration.*
- *Trees will be felled and removed, conifer stumps will be "flipped", the bog surface will be reprofiled (smoothed) and the drains will be blocked to encourage the redevelopment of bog vegetation. This requires engagement and agreement with Coillte and with the Forest Service. This enhanced bog restoration measure is proposed to be carried out as a trial at Lisclogher West to learn new techniques and to inform the feasibility and potential to use these new techniques at other sites to remove conifers (See Appendix XIV).*
- *Removal of feral self-sown conifer trees from the high bog (TCT1). Conifers from adjacent plantations have colonised the bog. These trees will be felled to waste to support raise bog restoration.*
- *Silt control measures will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase silt ponds and silt control measures will be continually inspected and Bord na Móna Lisclogher West Draft Decommissioning and Rehabilitation Plan 2023 maintained, where appropriate. When it is deemed that silt ponds are not required, as the bog has been successfully stabilised and water quality parameters meet targets the condition of the silt ponds will be reviewed. Silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).*

Bracklin West:

- *A widespread drain-blocking programme will be implemented across the cutaway bog, where possible.*
- *In general, field drains will be blocked where possible to re-wet cutaway and re-wet to the optimum water-level. More intensive measures will be targeted towards the bare peat.*
- *In areas of deeper peat, berms and field reprofiling will be carried out to create 45m x 60m cells. These will be carried out in deep peat areas where water has potential to be retained within the cell. Measures will also entail blocking outfalls, managing overflows, creating drainage channels for excess water and carrying out Sphagnum inoculation.*
- *Less intensive measures (targeted drain-blocking) will be used in areas where habitats have already established.*
- *Measures will include drain blocking (3/100 m), modifying outfalls and managing water levels with overflow pipes;*
- *Wetland measures including drain blocking, blocking outfalls and managing water levels with overflow pipes.*

4.9 Remedial Phase

4.9.1 Peatland Rehabilitation Plans

It is also a requirement of '*Condition 10 Cutaway Bog Rehabilitation'* of the IPC Licence that following the above decommissioning of use of all or part of their bogs, Bord na Móna, prepares (to the satisfaction of the EPA) and implements a Cutaway Bog Rehabilitation Plan.

***10.2** Cutaway Bog Rehabilitation Plan:*

> ***10.2.1** The licensee shall prepare, to the satisfaction of the Agency, a fully detailed and costed plan for permanent rehabilitation of the cutaway boglands within the licensed area. This plan shall be submitted to the Agency for agreement within eighteen months of the date of grant of this licence.*
> ***10.2.2** The plan shall be reviewed every two years and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the written agreement of the Agency.*

***10.3** The Rehabilitation Plan shall include as a minimum, the following:*

> ***10.3.1** A scope statement for the plan, to include outcome of consultations with relevant Agencies, Authorities and affected parties (to be identified by the licensee).*
> ***10.3.2** The criteria which define the successful rehabilitation of the activity or part thereof, which ensures minimum impact to the environment.*
> ***10.3.3** A programme to achieve the stated criteria.*
> ***10.3.4** Where relevant, a test programme to demonstrate the successful implementation of the rehabilitation plan.*
> ***10.3.5** A programme for aftercare and maintenance.*

***10.4** A final validation report to include a certificate of completion for the Rehabilitation Plan, for all or part of the site as necessary, shall be submitted to the Agency within six months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment.*

Reason: To make provision for the proper closure of the activity ensuring protection of the environment.'

Bord na Móna have produced a draft Cutaway Bog Decommissioning and Rehabilitation Plan for all 5 no. bogs of the Application Site, and it is the intention of Bord na Móna to rehabilitate the bogs in a phased approach under IPC Licence. Please see Appendix 4-2 for details. The rehabilitation plans were developed from a combination of the following:

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016);
- Significant international engagement during this period with other counties in relation to best-practice regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gannet al., 2019);
- Ongoing consultation and engagement with internal and external stakeholders regarding rehabilitation, biodiversity and other general issues over the years about Ballivor- bog group;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and LIDAR data;
- Previous research studies on site, and;

- Hydrological modelling.

The draft plans also take cognisance of the EPA Guidance on the Process of Preparing and Implementing a Bog Rehabilitation Plan (2020). Each draft plan contains within a detailed ecological report and GIS mapping pack. The key objective of Bord na Móna peatland rehabilitation is environmental stabilisation. The rehabilitation of the Bog Group will support biodiversity e.g., plants, insects, bird and mammals, and the formation of wetland habitats. In addition, peatland rehabilitation will bring a range of benefits to the local community via improvements in the local landscape and it is also complying with national policies and strategies regarding the reduction of carbon emissions, supporting biodiversity and enhancing water quality. It is anticipated it will take up to 30 years for naturally functioning wetland and peatland ecosystems to fully re-establish.

To inform the final draft rehabilitation plan for each bog, both national and local stakeholders, including neighbours whose land adjoins the relevant bog units and local representatives of national bodies (such as Regional National Parks and Wildlife Service staff) and relevant offices in County Councils (such as the Heritage or Environmental Offices) will be contacted. Any identified local interest groups will be sought and informed of the opportunity to engage with this rehabilitation plan, and when identified invited to submit their comments or observations in relation to the proposed rehabilitation. All correspondence received will be acknowledged and evaluated against the rehabilitation work proposed and the final draft of plans will contain a review of the consultation.

Prior to the finalisation of and submission of the 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. Draft rehabilitation plans for each bog which outline the proposed rehabilitation for the Application Site have been prepared and are detailed below. Table 4-10 outlines a high-level overview of the actions proposed for each bog and Table 4-11 gives a programme overview of when these works will be undertaken. Further details can be found in the draft plans in Appendix 4-2.

Table 4-10 Types of and areas for rehabilitation measures at Bog Group. Note that the types of rehabilitation and specific areas of rehabilitation may vary in response to stakeholder consultation and refinement of the rehabilitation measures.

Bog	Type*	Description	Area (Ha)
Lisclogher	Deep Peat Cutover Bog	Regular drain blocking (3/100 m) and blocking outfalls and managing water levels with overflow pipes	305.7
	Dry Cutaway	Blocking outfalls and managing water levels with overflow pipes	148.7
	Marginal Land	No Work Required	65.5
	Other	Silt Ponds	0.36
Carranstown	Deep peat	More intensive drain blocking (max 7/100), blocking outfalls and Sphagnum inoculation. Berms and field re-profiling (45x60m cell), blocking outfalls and managing overflows & drainage channels for excess water & Sphagnum Inoculation	159.72
	Dry Cutaway 2	Regular drain blocking (3/100m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	17.57

Bog	Type*	Description	Area (Ha)
	Wetland	More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes	4.28
	Marginal Land	No Work Required	34.55
	Other	Silt Ponds, Other Constraints (ROW)	90.12
Lisclogher West	Deep peat	More intensive drain blocking (max 7/100), modifying outfalls Berms and field re-profiling (45m X 60m cell), modifying outfalls and managing overflows, drainage channels for excess water, Sphagnum inoculation	124.71
	Additional Works	Targeted Drain Blocking, where possible	29.06
	Conifer removal	Removal of self-seeded feral conifers from high bog. Fell to waste. This overlaps with the deep peat (intensive drain blocking) footprint	119.24**
	Forest to bog	Agreement with Coillte and Forest Service, felling of conifers, removal of felled material, where possible, reprofiling the planting area (stump-flipping and surface-smoothing), Drain-blocking	6.98
	Marginal Land	No Work Required	47.54
	Other	Silt ponds, constrained areas	30.11
Ballivor	Deep Peat Cutover Bog	Regular drain blocking (3/100 m) and blocking outfalls and managing water levels with overflow pipes	398
	Dry Cutaway	Blocking outfalls and managing water levels with overflow pipes	39
	Marginal Land	No Work Required	65
	Other	Silt ponds, constrained areas	143
Bracklin	Deep Peat Cutover Bog	Regular drain blocking (3/100 m) and blocking outfalls and managing water levels with overflow pipes	223
	Dry Cutaway	Modifying outfalls and managing water levels with overflow pipes	116
	Wetland	Modifying outfalls and managing water levels with overflow pipes	5

Bog	Type*	Description	Area (Ha)
	Marginal Land	No Work Required	171

*Note that the types of rehabilitation and areas of rehabilitation may change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures

**Note that this is not an additional area. This area overlaps the deep peat footprint (More intensive drain blocking (max 7/100), modifying outfalls) footprint. Targeted conifer removal will take place in this area.

Table 4-11 Application Site Rehabilitation Programme. Please see Appendix 4-2 for more details.

Bog	Completed & Ongoing	Short-term planning actions 0-1 years	Short-term practical actions (0-2 years)	Long-term (>3 years)
Lisclogher (referred to as Lisclogher East in respective Rehabilitation Plan), Ballivor, Bracklin (referred to as Bracklin and Bracklin West in respective Rehabilitation Plans)	Significant areas of the site have already re-vegetated, with pioneer vegetation maturing and developing a mosaic of typical cutaway peatland habitats with Birch woodland predominating. Bare peat areas within the older cutaway areas are reducing. Natural re-colonisation of the cutaway areas so far has been quite effective. Other parts of the site (younger cutaway) are naturally colonising for more than 10 years and are developing a mosaic of cutaway habitats. An area of marginal raised bog remnant (19 ha) was restored at Bracklin Bog in 2016, as part of the Bord na Móna Raised Bog Restoration Programme	Seek formal approval of the decommissioning and rehabilitation plans from the EPA. Develop a detailed site plan outlining how the various rehabilitation methodologies will be applied to the bogs. This will take account of peat depths, topography, drainage and hydrological modelling. A drainage management assessment of the proposed enhanced rehabilitation measures will be carried out and any issues identified resolved and the rehabilitation plan adapted. A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out at Bracklin Bog. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible. A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out. A review of remaining peat stock to be carried out at Ballivor Bog. An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of	Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions. Carry out the proposed monitoring, as outlined. Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential suspended solids run-off from the site during the rehabilitation phase. Carry out proposed measures as per the detailed site plan. This will include intensive drain blocking and targeted hydrological management prescriptions in the cutaway around and between the proposed windfarm infrastructure. All rehabilitation will be carried out with regard to best practice environmental control measures. (See Plans Appendix III for details).	Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary. Decommissioning of silt-ponds will be assessed and carried out, where required. Reporting to the EPA will continue until the IPC License is surrendered. Delivery of a monitoring, aftercare and maintenance programme

Bog	Completed & Ongoing	Short-term planning actions 0-1 years	Short-term practical actions (0-2 years)	Long-term (>3 years)
		sensitive ground-nesting bird breeding species (e.g., breeding waders) is to be carried out. The scheduling of rehabilitation operations will be adapted, where required. Carry out Appropriate Assessment (AA) of the Rehabilitation Plan. Incorporate any required mitigation measures from the AA in the plan for the delivery of rehabilitation and decommissioning across the site. Ensure all activities comply with the environmental protection requirements of the IPC Licence. Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures and other environmental control measures during the implantation of the rehabilitation plan.		
Carranstown	N/A	Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the Scheme does not materialise, from the EPA. Agree an *ex-ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator. Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (PCAS measures) will be applied to Carranstown Bog. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an	Carry out proposed measures as per the detailed site plan. This will include a combination of drain blocking, and fertiliser applications targeting bare peat areas of headlands, high fields and other areas (where required) in addition to wetland creation and management prescriptions. All rehabilitation will be carried out with regard to best practice environmental control measures. Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions. Carry out the proposed monitoring, as outlined.	Evaluate success of short-term rehabilitation measures undertaken to date and remediate where necessary. Delivery of a monitoring, aftercare and maintenance programme Decommissioning of silt-ponds will be assessed and carried out, where required. Reporting to the EPA will continue until the IPC License is surrendered

Bog	Completed & Ongoing	Short-term planning actions 0-1 years	Short-term practical actions (0-2 years)	Long-term (>3 years)
		indicative view of the application of different rehabilitation methodologies). A drainage management assessment of the proposed enhanced rehabilitation measures will be carried out and any issues identified resolved and the rehabilitation plan adapted. A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible. A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out. There is some known turbary on this bog A review of remaining milled peat stocks has been carried out. Remaining peat stocks on the bog will be removed prior to rehabilitation. An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g., breeding waders) will be carried out. The scheduling of rehabilitation operations will be adapted, where required. An Appropriate Assessment of the Rehabilitation Plan has been carried out. (Note that the	While natural colonisation is expected to have commenced as soon as extraction ceased in 2020, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*. Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential suspended solids run-off from the site during the rehabilitation phase. Submit an *ex-post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex-ante* estimate for year 2 of the Scheme; and so on for each year of the Scheme.	

Bog	Completed & Ongoing	Short-term planning actions 0-1 years	Short-term practical actions (0-2 years)	Long-term (>3 years)
		rehabilitation plan for Carranstown Bog screened out at the Stage I.) Ensure all activities comply with the environmental protection requirements of the IPC Licence. Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures and other environmental control measures during the implantation of the rehabilitation plan.		
Lisclogher-West	N/A As Lisclogher West was never brought into peat production, rehabilitation measures have not been necessary at this bog to date.	Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the Scheme does not materialise, from the EPA. Agree an *ex-ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator. Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (PCAS measures) will be applied to Lisclogher West Bog. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies). A drainage management assessment of the proposed enhanced rehabilitation measures will	Carry out proposed measures as per the detailed site plan. This will include intensive drain blocking and targeted hydrological management prescriptions. All rehabilitation will be carried out with regard to best practice environmental control measures (See Appendix IV of Plan). Carry out actions to remove conifer forestry from the high bog, including tree-felling, removal of biomass (where possible), stump-flipping, surface smoothing and drain-blocking Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions. Carry out the proposed monitoring, as outlined. Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential suspended solids	Evaluate success of short-term rehabilitation measures undertaken to date and remediate where necessary. Delivery of a monitoring, aftercare and maintenance programme Decommissioning of silt-ponds will be assessed and carried out, where required. Reporting to the EPA will continue until the IPC License is surrendered

Bog	Completed & Ongoing	Short-term planning actions 0-1 years	Short-term practical actions (0-2 years)	Long-term (>3 years)
		be carried out and any issues identified resolved and the rehabilitation plan adapted. A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible. A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out. An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g., breeding waders) is to be carried out. The scheduling of rehabilitation operations will be adapted, where required. Ensure all activities comply with the environmental protection requirements of the IPC Licence. Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan. Carry out Appropriate Assessment (AA) of the Rehabilitation Plan.	run-off from the site during the rehabilitation phase. Submit an *ex-post* report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an *ex-ante* estimate for year 2 of the Scheme; and so on for each year of the Scheme.	

Bog	Completed & Ongoing	Short-term planning actions 0-1 years	Short-term practical actions (0-2 years)	Long-term (>3 years)
		Engage with Coillte and the Forest Service regarding the feasibility of removing conifer plantations from the high bog at Lisclogher West.		

4.9.1.1 Description of Proposed Rehabilitation Measures

Some rehabilitation works have commenced on the Application Site already as described in the Cutaway Bog and Decommissioning and Rehabilitation Plans (Appendix 4-2) and in Table 4-11 above. Further rehabilitation work will commence immediately following the decommissioning of the Application Site. The Cutaway Bog and Decommissioning and Rehabilitation Plans included provides a description of the five bogs and their ecology. It also provides a framework and outline of the works that will be undertaken to achieve the aims of successful rehabilitation (the criteria for which are defined in the plan) and a timescale for when the various elements of the plan will be implemented.

The details necessary to achieve the aims set out in the Cutaway Bog and Decommissioning and Rehabilitation Plans (and shown on the potential Future Habitats map) will include the exact locations of the drains to be blocked and bunds to be constructed etc. These details are based on the existing habitats present and the topography of the Application Site. This level of detail will only be available and will be included in the final rehabilitation plan once the Application Site has been fully decommissioned which is estimated to be 2024. The remedial measures to be undertaken will follow proven and standard procedures that have been successfully applied by Bord na Móna and known to be effective as detailed below.

Drain Blocking

Drains will be blocked using a number of methods depending on the size and type of drain. Methods will include:

- Peat dams within small drainage channels on the cutover bog;
- Trench blocking using plastic sheet piles on larger drains (see Plate 4-38); and
- Removal or blocking of drainage pipes where required.

These methods are fully described in the Irish Wildlife Manual *'Best Practice in raised bog restoration in Ireland'* (Mackin et al, 2017). Plate 4-38 below shows a partially blocked drain, with level of blocking determined by driving plastic piles in the centre of the drain further into the peat (Source: NPWS, 2017). Such measures will ensure a rise in the water table while not creating open waterbodies.

Plate 4-38 Partially blocked drain, with level of blocking determined by driving plastic piles in the centre of the drain further into the peat (Source: NPWS, 2017). Such measures will ensure a rise in the water table while not creating open waterbodies.

Cell Bunding

Another option to re-wet cutaway bog and maintain suitable hydrology to encourage the establishment of vegetation is cell-bunding. This technique has been trialled on several peatland restoration LIFE projects in the UK to maintain wetness on peat with minor slopes (Anon, 2016). Bord na Móna used this technique during the Oweninny rehabilitation programme (Bord na Móna 2002, Farrell and Doyle, 2003) and it has also been recently trialled at Lodge Bog and at Longfordpass Bog. The Bord na Móna experience at Oweninny found that this technique worked best where ground was relatively flat and where water-levels were already close to the bog surface. Such conditions occur within the proposed rewetting areas at Ballivor as identified in the Future Habitats map within the Cutaway Bog and Decommissioning and Rehabilitation Plans.

As part of the Ballivor Bog Group peatland rehabilitation, Bord na Móna will carry out a cell-bunding trial at Bracklin West, Carranstown and Lisclogher West. Cell-bunding will be carried out in selected areas that have potential to re-establish water levels at the bog surface, as well as in somewhat drier areas where Heather has become established. The objective here utilising this technique will enhance the re-wetting of drier peat more quickly than drain-blocking on its own. The methodology will follow techniques used by Natural England (Anon, 2016)[10] which are listed below.

Re-wetting consisted of constructing bunded cells (20 x 10 m to 30 x 30 m), by:

a) Digging a trench through the degraded surface layer of peat (around 20-50cm deep). Any cracks along the line of the trench are 'squished' shut using the surrounding undried, undamaged 'plastic' undried peat. All tree roots are dug out along the line of the trench;
b) Filling the trench with good 'plastic' peat (from an adjacent 'borrow pit') to ground level, and then raised by another 10 cm above ground;

[10] *Nature England 2016 Bog Life: Bringing Lowland Raised Bogs to Life. Available at: https://www.humberheadpeatlands.org.uk/wp-content/uploads/2016/07/BogLIFE-newsletter-Issue2-May-2016.pdf*

c) Linking bunds together to create four-sided cells to hold water within the bunds, keeping the water table at the surface. The size and shape of cells depends on slope and terrain. The steeper the slope the longer and thinner the cells become; and
d) Covering bunds with turf or brash to prevent them from drying out.

The application of this technique is innovative and positive in the context of applying new techniques and methodology to re-wet bog and develop peat-forming conditions. The locations where this cell bunding trial will be undertaken will be determined following the initial drain blocking exercises and will be overseen by Bord na Móna ecologists.

Monitoring

Prior to the commencement of drain blocking works, permanent vegetation monitoring plots will be established along transects within the rewetted areas. The monitoring plot locations will be selected using stratified random sampling. This will allow the monitoring plots to be representative of microtopography and vegetation cover, sampling areas from the wettest, intermediate and driest parts of the Application Site. Monitoring plots will be surveyed and classified using the relevé method as per the National Survey of Upland Habitats with plot sizes being 2m x 2m. Biotic and abiotic parameters that form baseline indicators of ecological and hydrological condition of the bog will be recorded. Monitoring plots will be marked out permanently using fencing posts and their location recorded using GIS. The number of monitoring plots will be determined by the level of plant community heterogeneity identified during the baseline survey which will be carried once the site has been fully decommissioned. However, it is envisaged that a minimum of fifteen 2m x 2m monitoring plots will be established in the enhanced area. Monitoring plots will be surveyed once annually during the first five years and at 5-year intervals.

Results will be analysed by Bord na Móna and a report of the findings will be produced. The rehabilitation plan will be regularly reviewed and amended if necessary, during its implementation to improve the efficacy of the enhancement work. The number of monitoring plots may change depending on the results of the initial surveys.

The monitoring survey design will take into consideration the following:

- Vegetation Description and Data Analysis: A Practical Approach, 2nd Edition (Kent, 2011);
- Detailed habitat and ecotype classification based on The National Survey of Upland Habitats (Perrin et al., 2014);
- A Manual for the Production of Grazing Impact Assessments in Upland and Peatland Habitats (NPWS and DAFM, 1999);
- Blanket Bog, Heath and Upland Grassland Exclosures, Baseline Surveys and Monitoring Methodologies (Dunne, 2000);
- Peatland Restoration (Lunt et al. 2010); and
- Revegetation of Areas that Cannot be Rewetted

In areas that cannot be re-wetted, i.e., areas that are higher due to the nature of the peat extraction process, underlying geology and identified in the rehabilitation plans, these areas will be revegetated using the following two management options:

1. *The establishment of grassland habitat through a formalised management regime and mowing.*
2. *Encourage the establishment of birch dominated scrub through the use of fertiliser where mowing is not practical.*

Grassland Establishment

In higher areas where rewetting measures will not result in sufficient elevation in the local water table to promote natural revegetation, it may be more advantageous to speed up re-vegetation with the use of fertilisers, lime and nursery crops [sheeps fescue (*Festuca ovina*), red fescue (*Festuca rubra*) or bent species (Agrostis spp.)] to speed-up natural colonisation. The use of a one-off fertiliser treatment can be very effective in enhancing natural colonisation as one of the key limiting factors is poor nutrient status, particularly the lack of Phosphorus (Renou-Wilson 2008). Seed sources are generally not a constraint once fertiliser is applied. Trials by the Bord na Móna Ecology Team have found that the use of green hay on bare peat can also be an effective aid to natural colonisation (Kilmacshane green hay trial).

At the Application Site, the drier raised areas of milled peat will be enhanced for pollinating insects as part of the environmental stabilisation. Re-vegetation will be facilitated through the establishment of semi-natural grassland using a wildflower pollinator-friendly seed mix and/or by using 'Green Hay' in combination with fertiliser and/or lime and a nursery crop.

The species mix will comprise of a variety of plant species that will grow on peatland habitats found in the Application Site and contribute to an enhancement in biodiversity. The use of wildflower/native species that are also locally common will be incorporated into the seed mixes. The management of the habitat in these areas in this way will be beneficial for other wildlife, particularly pollinators (bees, butterflies and other invertebrates) by providing more wildflowers, food and space. Such measures will also tie in with the objectives of the Lepidoptera Management Plan for the enhancement and creation of marsh fritillary supporting habitat.

Where conditions allow, sensitive wildflower meadow management will be employed along some of the new verges that will be created along access tracks. A combination of a suitable wildflower seed mix and a sensitive mowing regime could be used to manage portions of the site verges as pollinator friendly verges.

A similar approach has been used before by Bord na Móna at Lough Boora Discovery Park carpark, using a bespoke wildflower seed mix during the landscaping of the former cutaway bog site. The landscaped areas within the carpark have now stablished to a sward dominated by ox-eye daisy. A bespoke seed mix was used for the carpark landscaping. The seed mix was developed in consideration of the specific environment of the landscaping area. This was relatively dry, with shallow fen peat and significant sub-soil influence meaning a relatively higher pH. This type of environment was suitable for the development of a calcareous grassland type seed mix (which would be suitable in some areas within Ballivor).

The management undertaken will vary across the Application Site and will be tailored to the requirements of the varying habitats and the specific on-site environment where there will be a variety of peat depths, hydrological conditions and nutrient status. Management (e.g., mowing) will not be uniform. Where mowing is possible (and required to prevent the establishment of scrub on these grassland areas), nonannual (e.g., 3-5 year) mowing cycle will be implemented. This will ensure a suitably diverse sward is maintained as well as avoiding significant disturbance to invertebrate lifecycles. Different actions in different places will enhance the natural diversity of habitats already developing on site.

Bord na Móna will oversee the design, implementation and monitoring of the reseeding and stabilisation works following the installation of the development footprint. The management of these areas will be monitored along with the monitoring of the rewetting and habitat enhancement annually for the first five years and on a five yearly basis thereafter.

Establishment of Birch Dominated Scrub

The establishment of birch dominated scrub using fertiliser, as described above, where mowing is not practical will speed up the revegetation of these drier areas within the Application Site. Such promotion of the establishment of scrub within the Application Site will result in the formation of a mosaic of habitats while also ensuring that extensive areas of open water do not form.

4.10 Potential Future Land Use

4.10.1 Proposed Ballivor Wind Farm

The Ballivor Bog Group, and in particular therein, the Application Site, is an important natural asset and has the potential to play a strategic role in meeting national climate action targets, which have become all the more significant in light of the Climate Action and Low Carbon Development (Amendment) Act 2021, the Climate Action Plan 2024, the Climate Change Performance Index 2024, and the Climate Change Advisory Council's Annual Review 2024. These reports provide an updated assessment of both global climate change and climate change in the context of Ireland and identify the increasingly discernible impacts climate change is having on both the environment and society. In line with the Applicant's vision to assist in achieving a climate neutral Ireland by 2050, it is intended to utilise the Ballivor Bog Group and in particular therein, the Application Site, for both peatland rehabilitation and wind energy infrastructure, and to facilitate environmental stabilisation of the bog group and the optimisation of climate action benefits.

In April 2023, Bord na Móna Powergen Ltd lodged a planning application to An Bord Pleanála (Ref. PA25M.316212) for a development consisting of 26 no. wind turbines and associated works at the Ballivor Bog Group, known as Ballivor Wind Farm (https://www.ballivorwindfarm.ie/). The proposed wind farm is located on Ballivor bog, Carranstown bog, Bracklin bog, Lisclogher bog and agricultural land adjacent to Bracklin bog. This application was made directly to An Bord Pleanála as 'Strategic Infrastructure Development' (SID) under the provisions of Section 37E of the Planning and Development Act 2000, as amended (the Act). This position was confirmed by An Bord Pleanála in correspondence to the Applicant dated 5th April 2022 following pre-application consultations with the Board under Section 37B of the Act (ABP-307471-20). A separate EIAR and accompanying NIS was undertaken for the proposed wind farm development. At the time of writing, a decision has not yet been made by An Bord Pleanála with regards this application.

The overall permanent footprint of the proposed wind farm will be less than 1.4% of the total area of the Bog Group, or approx. 1.8% of the Wind Farm Application Site, and therefore does not impact or change the overall goals and outcomes of the proposed rehabilitation plans. As such, it is the intention of the Applicant to integrate the peatland remedial 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 wind farm infrastructure. The EIAR for the proposed Ballivor Wind Farm development details issues related to peat management during wind farm construction. In summary, during construction for access tracks, hardstands and other areas, peat is excavated from the cutaway, moved to the side, graded into berms not more than 1 m and allowed to naturally re-vegetate. This has proven successful during construction of Mountlucas and Cloncreen Wind Farms. In the event that natural re-vegetation was unsuccessful, then other measures such as re-seeding would be considered.

The draft Rehabilitation Plans which accompany the wind farm application detail how the Bog Group will be rehabilitated along with the construction and operation of the proposed wind farm; on the assumption the wind farm will be granted. Further details of this proposed wind farm development can be obtained at the project website (https://www.ballivorwindfarm.ie/). As mentioned, the wind farm footprint comprises less than 1.8% of the Wind Farm Application Site and the wind farm application includes proposals to rehabilitation the site to support wetland habitats. This would offset any potential

loss of cutover and revegetating peatland because of the wind farm construction by a factor of 115 and facilitates the undertaking of a robust environmental assessment.

Both the remedial measures and the proposed Ballivor Wind Farm (Planning Reference 316212) are cumulatively assessed with the future remedial measures that will be carried at the Application Site.

4.10.2 Ongoing and Future Enhanced Rehabilitation Measures (PCAS)

As discussed in Section 4.8 part of Condition 10 of the IPC Licence (P0501-01), decommissioning and rehabilitation will be carried out as standard remedial measures associated with peat extraction activities and all ancillary works at the Application Site. In line with Bord na Móna's accelerated decarbonisation strategy, and the availability of government funding, the company has also committed to ambitious enhanced peatland decommissioning, rehabilitation and restoration measures, targeting circa 33,000 ha in over 80 no. Bord na Móna bogs.

This strategy has been developed to optimise ecosystem service benefits of peatland rehabilitation and restoration, particularly carbon storage and reducing carbon emissions. In addition, this will also benefit biodiversity and water (water quality and catchment management), as well as providing space for local communities and people to enjoy the outdoors.

In the event that future PCAS plans are not implemented or prepared, the Application Site will be rehabilitated in line with the rehabilitation plans outlined in Section 4.8 and Section 4.9 above and included in Appendix 4-2.

Both the enhanced rehabilitation measures (PCAS) and the proposed wind farm are cumulatively assessed in this rEIAR with the future remedial measures (described in Section 4.8, 4.9 and Section 4.10 above) that will be carried out at the Application Site a part of the IPC Licence requirements under Condition 10 of the Licence.