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4. PROJECT DESCRIPTION

4.1 INTRODUCTION

As described in Chapter 1, July 1988 is taken as the baseline assessment year for this remedial Environmental Impact Assessment (remedial EIAR) as this is the latest date that the Environmental Impact Assessment (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 Environmental Impact Assessment (EIA) may not have been a legal requirement at that time. The assessment period for the remedial EIAR is from July 1988 to the present day.

This chapter of the remedial EIAR provides a description of:

- i. The activities employed at the Application Site from 1950 at the onset of preparation works for peat extraction (including drainage of bogs) up to July 1988 (described in Section 4.5);
- ii. The baseline environment as of July 1988 (described in Section 4.6);
- iii. Peat extraction and ancillary activities from July 1988 to the cessation of peat extraction in June 2020 at the Application Site ('Peat Extraction Phase' described in Section 4.7);
- iv. The management of the Application Site since June 2020 to present day ('Current Phase' described in Section 4.8); and,
- v. The activities intended to be carried out at the Application Site into the future ('Remedial Phase' described in Section 4.9).

Section 177E of the Planning and Development Act 2000 (as amended), allows an application for Substitute Consent for development that has been carried out where an EIA, EIA Screening and/or Appropriate Assessment (AA) was or is required.

Neither the EIA Directive (*Directive 85/337/EEC* repealed by *Directive 2011/92/EU* and codified by *Directive 2014/52/EU*) nor the Habitats Directive (*Directive 92/43/EEC*) has retrospective effect. Neither Directive imposes legal requirements to carry out prior assessments for projects that had already commenced or been completed. Therefore, there was no legal requirement for EIA, EIA Screening or AA for any project prior to the latest transposition dates of the Directives:

- The EIA Directive latest transposition date was 3 July 1988; and
- The Habitats Directive latest transposition date was 10 June 1994.

Accordingly, this application for Substitute Consent is confined to development that occurred after those dates. The baseline for assessing the environmental effects of the Project is therefore July 1988, being the earlier of the transposition dates of the relevant Directives.

However, as the Project formed part of a development which commenced many years prior to those dates, and to facilitate as complete an assessment as possible of the project since July 1988, this chapter includes a description of the Application Site and the peat extraction and ancillary activities that took place there, up to July 1988 (see Section 4.5).

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 3 July 1988 is adequately described to enable that cumulative or in-combination assessment to be completed.

The Application Site is located within the Derrygreenagh Bog Group, which is subject to Environmental Protection Agency (EPA) Integrated Pollution Control (IPC) Licence (Reg. No. P0501-01) issued to Bord na Móna Energy Limited. Appendix 4.1 includes a copy of the IPC Licence, including Amendments.

The activities described within this chapter include the peat extraction processes, the construction, operation, and maintenance of supporting infrastructure, a description of ancillary activities undertaken and decommissioning works which have been carried out to date. Current onsite activities and infrastructure as well as the likely proposed future remedial measures (see Section 4.8 and Section 4.9) which will be implemented at the Application Site in the form of draft Cutaway Bog Decommissioning and Rehabilitation Plans, subject to the agreement of the EPA, required under Condition 10 of the IPC Licence for the Derrygreenagh Bog Group (Reg. No. P0501-01), are also described.

Peat extraction at the Application Site is historic, with a considerable number of ancillary activities and site preparation works pre-dating both the commencement of the formal Irish planning system (i.e., were first carried out prior to establishment of the *Planning & Development Act 1963* (which was enacted on 1 October 1964)) as well as the EIA Directive and Habitats Directive transposition dates in 1988 and 1994, respectively. Other infrastructure such as workshops and storage was also developed prior to the commencement of the formal planning system and accordingly are not the subject of the application for substitute consent. Section 4.4.5 discusses the location of relevant ancillary structures and features in relation to the Application Site boundary, and the Planning Statement (Appendix 4.2) provides a full planning history associated with the Application Site. This infrastructure is included below and considered within the overall remedial EIAR assessment.

4.2 INFORMATION SOURCES

The following information sources were used in compiling this Chapter (refer to Appendix 4):

- Appendix 4.1: Derrygreenagh Bog Group (Reg. No. P0501-01)
- Appendix 4.2: Planning Report

- Appendix 4.3: Draft Cutaway Bog Decommissioning and Rehabilitation Plans, including:
 - Derryhinch Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026;
 - Drumman Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026;
 - Derryarkin Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026;
 - Ballybeg Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026; and
 - Toar Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026.
- Appendix 4.4: Annual Environmental Reports 2000 - 2025
- Appendix 4.5 Aerial Maps from 1973 to 2020;
- Appendix 4.6: Bord na Móna, *IPC Licence Environmental Code of Practice for Peat Energy Works*;
- Appendix 4.7: Harkins, Jim, *Silt Control Report for Peat Energy Division* (Internal Bord na Móna Report) (1991);
- Appendix 4.8: Silt Control Study No. 1 – Internal Bord na Móna Report 1983;
- Appendix 4.9: Silt Committee, Interim Report Recommended Measures 1976;
- Appendix 4.10: Silt Committee Meeting Records Derrygreenagh 1984;
- Appendix 4.11: Silt Committee, Excavator records 1984;
- Appendix 4.12: Drainage Study with Particular Reference to Pumping – Internal Bord na Móna Report 1983
- Appendix 4.13: Bord na Móna, *Environmental and Operational Procedures for the Protection of Surface Water*;
- Appendix 4.14: Industrial Cutaway Bog Land-Use Studies (Clonsast) – Internal Bord na Móna Report 1978;
- Appendix 4.15: Peco Harvester Tests – Internal Bord na Móna Report 1986;
- Appendix 4.16: Distribution and Nature of Ash Material in a Milled Peat Stockpile – Internal Bord na Móna Report 1982;
- Appendix 4.17: Regional Administration in Relation to Milled Peat Operation – Internal Bord na Móna Report 1988;
- Appendix 4.18: Bord na Móna Peat Development in Ireland 1954

Other information sources (not included in Appendix 4) include:

- Bord na Móna Annual Reports which contain information relevant to the Application Site;
- Clarke, Donal, *Brown Gold, A History of Bord na Móna and the peat industry in Ireland* (2010);
- Inspection of extraction records at Derrygreenagh Works;
- Bord na Móna, *Bord na Móna Biodiversity Action Plan 2016-2021* (2016) Brosna Press, Ferbane
- Irish Engineers Journal Supplement 1970 (p.13-15);
- Bord na Móna Living History website¹; and
- Personal communication with former Bord na Móna employees.



4.3 PROJECT DESCRIPTION

This remedial EIAR is prepared in support of an application for Substitute Consent for peat extraction and ancillary activities carried out by Bord na Móna at the Application Site since July 1988.

The Application Site forms part of the Derrygreenagh Bog Group and comprises five bog units including (from west to east):

- Toar Bog;
- Derryarkin Bog;
- Ballybeg Bog;
- Drumman Bog; and
- Derryhinch Bog.

The Application Site is located south of the M6 motorway across the Counties of Offaly, Westmeath and Meath. A description of the Application Site and individual bog units therein is provided in Section 1.7.1 of Chapter 1.

The peat extraction and ancillary activities undertaken at the Application Site which comprise the development for which Substitute Consent is being sought and the Project which this remedial EIAR is prepared, consist of the following:

- Industrial scale peat extraction (milled peat);
- Use and maintenance of pre-existing surface water drainage infrastructure (drains, silt ponds, pumps) at the Application Site to facilitate peat extraction activity from 1988 to present day;
- Use and maintenance of pre-existing railway infrastructure to facilitate peat extraction from 1988 to present day;
- Provision of 2 no. vehicular bridges, 2 no. rail bridges and 2 no. gated access points;
- Control Measures associated with the above, inclusive of the IPC Licence measures (Ref. P0501-01) which commenced from 2000 onwards to the present day; and,
- All associated site development and ancillary works.

The Application Site redline boundary is delineated by the five bog boundaries but excludes non-peat related activities located within the bogs. Non-peat related activities at the Application Site include the sand and gravel extraction activities located within Derryarkin and Drumman Bogs, which were granted planning permission by Offaly County Council and Westmeath County Council in 2001 under two planning applications which were determined concurrently (Co. Offaly planning reference 01/365 and Co. Westmeath planning reference 01444). An extension to the Drumman extraction pit was consented by Offaly County Council in 2019 (application reference 1925).

The redline boundary also excludes the consented Combined Cycle Gas Turbine and Open Cycle Gas Turbine Thermal Power Plant, Electricity Grid Connection including 2 no. substations, and associated buildings, plant, site works, service and ancillary development, known as the 'Derrygreenagh Power Project', which is located on Ballybeg, Derryarkin and Drumman Bog in County Offaly. Planning permission was granted consent by An Coimisiún Pleanála in April 2026 (ACP Ref, 319023).

The redline boundary further excludes the consented biomass facility located at Drumman Bog which was granted planning permission in 2021 by Offaly County Council (planning application reference 20329) and the consented biomass facility at Toar Bog which was granted planning permission by Westmeath County Council in 2020 (application reference 206168). The redline boundary also excludes the consented site access works at Toar Bog which was granted planning permission by Westmeath County Council in 2012 (application reference 124018).

Chapter 1 provides a full site description and site location plan (Figure 1-1). A complete list of planning applications which have been consented within the Application Site bog units is provided in Table 1-2. Section 2.9 in Chapter 2 provides a full description of the approach to the cumulative assessment.

4.3.1 Project Phases

For the purposes of this remedial EIAR, the Project is defined under three different timeframes:

- **Peat Extraction Phase:** peat extraction and ancillary activities at the Application Site from July 1988 to the cessation of peat extraction in June 2020 (July 1988 – June 2020). The Peat Extraction Phase is described in detail in Section 4.7.
- **Current Phase:** the management of the Application Site since June 2020 to present day). The Current Phase is described in detail in 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.

4.4 PEAT EXTRACTION PROCESS

4.4.1 Surveying and Drainage

A description of the surveying and drainage methodologies and machinery used across the Application Site and wider Bord na Móna bogs, is outlined on the Bord na Móna Living History website² and in the Irish Engineers Journal Supplement, 1970, p.13-15.

The key approach and outputs of the surveying works were the following:

- 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. 91 m) intervals or closer along parallel section lines 250 yards (approx. 228 m) 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 1 m. The leading tube was provided with a special rotating head which enabled a 0.5 m 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. 3 m) to over 40 foot (approx. 12 m) – the bulk of the soundings lying in the range 15 foot (approx. 4.5 m) to 25 foot (approx. 7.5 m); and,

² Available at: <https://www.bordnamonalivinghistory.ie/>

- 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 the site deemed suitable for peat extraction, drainage works across the 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 Application Site was typical, would have had a moisture content of over 94% and 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 (approximately ½ to 1 mile per hour (0.8 km/h – 1.6 km/h)); and,
 - The drain depth at the plough stage was 20" (0.51 m). Drains had a trapezoidal section with a top width of approximately 30" (0.76 m) and a bottom width of 12" (0.3 m) 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. 180-550 m/hour);
 - Rotating disc machines could deepen the drains to a maximum depth of approximately 60" (approximately 1.5 m), with a bottom width of approximately 12" (approximately 0.3 m); and
 - 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.

Once drained, the upper acrotelm layer (which comprises the biologically active component of the bog) was removed to facilitate peat extraction and the drying of peat. The acrotelm is one of two distinct layers in undisturbed peat bogs and 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 4.4.2.

4.4.2 Drainage and Bog Preparation Machinery

This section details the machinery that was commonly used on the bogs to enable the bog drainage system from 1958 onwards.

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

The dragline and shovel excavator machines excavated the main outfalls for the bog drainage system in the early development stages and maintained main outfalls during the extraction 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 peat 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 shows the dragline / shovel excavator 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 extraction 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.

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 was operated from inside a cab.

Plate 4-2 shows the drainage machine 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/Ditcher

The purpose of the ditching attachment was to cut the drains separating the peat fields in development bogs and deepen existing drains in bogs subject to peat extraction. 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 blades and a stationary shield which deflected the flying spoil away from the machine and spread it evenly over the adjacent field.

Plate 4-3 shows the ditching attachment operating on a Bord na Móna bog.



Plate 4-3: Ditching Attachment/Ditcher

Drain Cutting Attachment – Cross Drain

The purpose of the drain cutting 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 4-4 shows a drain cutting attachment operating on a Bord na Móna bog.



Plate 4-4: 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 4-5 shows a drain cleaner screw operating on a Bord na Móna bog.



Plate 4-5: 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 clutch, a 'V' rope drive, a special worm and spur gear reduction box, and chain drives. The machine offered six forward speeds, selectable using change sprockets.

Plate 4-6 shows the stripping machine in operation on a Bord na Móna bog.



Plate 4-6: Stripping Machine (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/stripping-machine/>)

Levelling Machine Type – Scraper

The purpose of the scraper 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 at the front. As the machine advanced on its long tracks, the boom cut away high areas and deposited the spoil into hollows.

The tractor unit had a rigid main frame supported on caterpillar type, power driven tracks and was powered by a diesel engine with standard gear transmission. The boom featured a light framework made of standard steel sections, around which two conveyor-type chains ran on sprockets at each end and in guides along the bottom and top. Across these chains, arms were fitted, projecting beyond the front of the boom. Each projecting arm carried a cutting knife and scraper palm. The boom's height and level were controlled by hydraulic rams.

Plate 4-7 shows a levelling machine operating on a Bord na Móna bog.



Plate 4-7: Levelling Machine Type – Scraper

(source:<https://www.bordnamonalivinghistory.ie/equipment-detail/levelling-machine/>)

4.4.3 Peat Extraction Process

Milled peat was extracted from the Application Site. In the late 1960s, a trial of Fóidín peat extraction was undertaken at the Application Site. Fóidín peat was a form small sod peat product produced from milled peat bogs. This trial was not sufficiently productive, and the practice ceased shortly after its commencement. However, for completeness, a description of the Fóidín machine is provided in section 4.4.6. A description of the machinery used for milled peat extraction at the Application Site is provided in Section 4.4.3.

Milled Peat Extraction

From 1958 to 2020 milled peat was extracted at the Application Site. A full list of the end destinations where peat from the Application Site was transported from 1988 is provided in Section 4.7.5.

The methods by which milled peat was extracted are described in detail below.

For the extraction of milled peat, parallel open drains were cut at 50 ft. (approx. 15.2 m) centres which divided the peat extraction area into fields 45 ft. (13.7 m) wide. Typically, the field drains were from 800 to 2,000 yards (approx. 700 to 1,800 m) 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 30 m) wide which ran parallel to the piped outfall to enable extraction machines to turn from one field into another. When fully developed, the open field drains had a depth of approx. 4' 6" (approx. 1.4 m) and a top width of approx. 5' 0" (approx. 1.52 m). 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 extraction requires good solar and wind drying conditions. Extraction commenced from mid-April onwards, and usually ran until mid-August, once suitable drying conditions prevailed. Following drainage, there were four stages to the extraction of milled peat outlined as follows:

- **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 (Plate 4-8). This layer of crumbed or milled peat/moss is called a crop and would have had a moisture content of about 80% when milled;
- **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 towed behind an agricultural tractor (Plate 4-9). These spoons were fitted with special base plates designed to prevent scraping wet particles from beneath the milled peat layer. Harrowing was usually required two to five times per peat crop, depending on several factors:
 - Drying conditions;
 - Water table level in the peat extraction fields;
 - Initial moisture content of the peat at milling; and
 - Peat quality.

If rainfall interrupted the drying process, additional harrowing was often required.

- **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 (Plate 4-10 and Plate 4-11);
- **Harvesting** - Harvesting was the final stage of the 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 large ridge formed the final lift into the peat storage stockpile (Plate 4-12 and Plate 4-13).

Typically, every 11th field served as a stockpile area for peat collected from the output of five adjacent fields on either side. This approach, known as the *Peco Method*, allowed the peat in these stockpiles to be efficiently removed by rail and was used on the Application Site. Weather permitting, the miller followed the harvester and the production cycle recommenced in the emptied fields. This extraction-stockpiling cycle is referred to as a 'harvest', with each group of ten fields generally producing 12 harvests per year. Peat was stored in these Peco stockpiles (up to 25 m wide, 10-15 m high) until required for use.

A further method of peat stockpiling, known as the *Haku Method*, was used on the Application Site, which involved transporting the milled peat via trailer to large, centralised stockpiles, where peat was stored until it was required for use. When the peat extraction season was over,



the stockpiles were covered to keep the peat dry unless the peat was scheduled for immediate transportation from the site.

Stockpiles were rolled covered with polythene sheeting. The purpose of the polythene covering was to keep stock dry, to protect it against wind erosion, and to inhibit spontaneous combustion in certain types of peat by the exclusion of as much air as possible. A reel of polythene sheeting would be mounted on a single bale spike-type attachment on an excavator. The excavator would drive alongside the stockpile, and the polythene would be unrolled across it. There were generally eight workers on the ground outside the excavator to undertake the work of unrolling the polythene and laying it across the stockpile (four workers each side of the stockpile). Once the polythene sheet was laid in place, a layer of high-moisture-content milled peat was distributed over the polythene to fix it in place. This was done in three passes along a stockpile by a milled peat harvester; on the first pass, a milled peat harvester which was fitted with a split cowl at the end of the elevator distributed an even layer of peat across the top and sides of the stockpile (the split cowl allowed for both faces of the surface of the stockpile to be covered in the one pass). The second and third passes of the milled peat harvester facilitated the deposition of peat along the bottom edges of the stockpile, effectively anchoring the polythene sheeting to the ground, preventing the lifting of the edges in the wind.

When it was decided to move a milled peat stockpile, the polythene sheet covering the stockpile was removed. A trained staff member would walk along the apex of the milled peat stockpile and bisect the polythene sheet at the peak of the apex with a blade. Starting at the end of the stockpile, one side of the bisected polythene sheet was fed into the eye of an implement known as a polywrapper, which was mounted on the three-point linkage of a tractor. The eye of the polywrapper was attached to a pendulous swivel arm, which, as the tractor moved forward, oscillated from left to right to ensure that the polythene being collected was being dispensed evenly across a metal shaft on the polywrapper. This ensured an even spool of polythene was collected. Once the spool was at capacity, one side of the polywrapper was opened, which allowed the metal shaft to be removed and replaced with a plastic one. The entire spool was then removed and sent for appropriate disposal/recycling. The metal shaft was reinserted into the polywrapper, the side closed, and the process began again until the stockpile was fully uncovered and all polythene collected.

A permanent 3 ft. gauge railway serviced all bog areas and facilitated connectivity to the various works centres, workshops, and fuel depots across the Application Site and wider Bord na Móna landbank.

Figure 4-1 shows a flow chart of the sod and milled peat extraction process, produced by the Applicant.

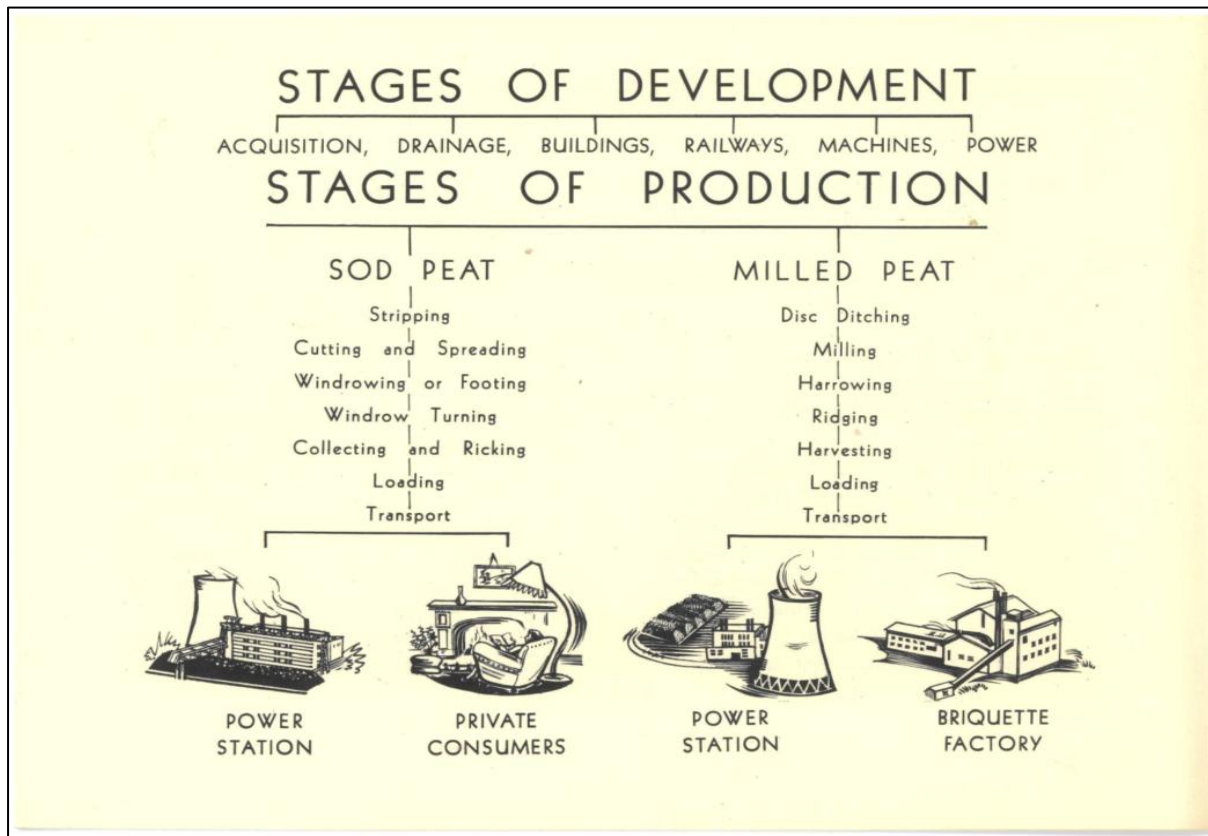


Figure 4-1: Flow chart of the sod and milled peat extraction process produced by Bord na Móna in 1954



Plate 4-8: Milling process (source: Bord na Móna)



Plate 4-9: Harrowing process (source: Bord na Móna)



Plate 4-10: Ridging process (source: Bord na Móna)



Plate 4-11: Ridging process (source: Bord na Móna)



Plate 4-12: Harvesting - Peco Method (source: Bord na Móna)



Plate 4-13: Harvesting – Peco method (source: Bord na Móna)



Plate 4-14: Polythene covering of stockpiles



Plate 4-15: Process of Stock Protection, showing a layer of milled peat being spread over polythene sheeting to anchor the sheeting in place (source: Bord na Móna)

4.4.4 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, and operator preference.

Tractors

A variety of tractors have been used throughout the history of peat extraction and ancillary activities on the Application Site. As with all machinery used during peat extraction and ancillary activities, the choice of tractor used for any given activity would have been and is still based on availability, bog conditions, and activity type which would dictate the requirements of the tractor. 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 extracting 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 were 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 4-16 shows a HD Tractor II operating on a Bord na Móna bog.



Plate 4-16: H.D. Tractor II (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/h-d-tractor-ii-2/>)

LHT Tractor II

This tractor was designed to operate miller and ridger attachments as part of the Peco system for harvesting milled peat. It featured a simple main frame mounted on caterpillar-type tracks with front steering rollers. Power was provided by a diesel engine equipped with an automotive-type clutch.

The transmission comprised a special speed-change gearbox with a 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.

The main frame accommodated either of two engines, with the size depending on the attachment used with the tractor. Steering was manual, operated by a 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 provide steering adhesion.

Plate 4-17: shows the LHT Tractor II operating on a Bord na Móna bog.



Plate 4-17: LHT Tractor II (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/lht-tractor/>)

LHT Tractor III

This tractor, fitted with an attachment, was used for ridging the milled peat into the centre of the field. It was a half-track type with front steering rollers. The main frame was fabricated from standard steel angle and channel sections.

The tracks were single chain cast link type with timber swamp shoes bolted on, running on cast sprockets and intermediate supporting rollers. The front steering rollers were spoked, with fabricated steel rims and cast-iron hubs, mounted on stub axles on a pivoted axle beam that swung in the vertical plane. Steering was manual, operated through a worm reduction gearbox, drag link, and track rod.

The tractor was powered by a water-cooled diesel engine fitted with an automotive-type clutch. The transmission consisted of:

- A speed step-up primary gearbox of special design
- A standard agricultural tractor change-speed gearbox and differential assembly
- A chain reduction final drive between the standard transmission unit half-shaft and the track sprockets.

Since this tractor was used only for ridging operations during daylight hours, no electric generator was fitted, and the engine was hand-started. A hydraulic pump assembly was incorporated in the standard agricultural transmission unit, which actuated the attachment's hydraulic system.

Ridger Tractor (LHT IV)

This tractor was 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 was fabricated from standard rolled steel sections mounted on half-tracks incorporating manganese track links and sprockets with intermediate support rollers. Timber swamp shoes were bolted to the track links.

The power unit was a diesel engine with automotive-type clutch, driving through a heavy-duty automotive gearbox and cardan shaft to the differential unit of a standard heavy-duty truck back axle. Epicyclic gear reduction was provided between the half-shaft and wheel hubs, with the track sprockets bolted directly to the axle hubs.

The tractor was supported on large front rollers mounted on stub axles, and steering was hydraulically powered. The engine was fitted with two hydraulic pumps – one for power steering and the other for the attachment hydraulic system.

The attachment consisted of double blades, similar to the single ridger attachment, positioned on either side of the tractor and converging at the rear. The blades were supported by sturdy spars radiating from the tractor chassis, with adjustment provided for the sole plate relative to these spars. The attachment was raised and lowered hydraulically via a multi-guy rope system over the top of a central mast on the tractor.

Plate 4-18: shows the Ridger Tractor operating on a Bord na Móna bog.



Plate 4-18: 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 had a rated engine power of approximately 37 horsepower (hp). The MF 35 was available in both 2WD and 4WD configurations. The tractor was powered by a diesel engine. It was commonly equipped with a 6-speed or 12-speed gearbox, depending on the model and design and had a hydraulic system with a variable capacity.

Ford TW15

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

Landini 5830

The Landini 5830 was used from the 1980s. It had approximately 50 hp, with a PTO output of approximately 42 hp. The 5830 was available in both 2WD and 4WD configurations. The tractor was powered by a diesel engine and had a hydraulic system with a variable capacity.

Ford F4630

The Ford F4630 was used from the 1990s. It had approximately 60hp, with a PTO output of approximately 56 hp. The F4630 was available in both 2WD and 4WD configurations. The tractor was powered by a diesel engine and had a hydraulic system with a variable capacity.

New Holland TL70/TL70a

The New Holland TL70 was used from the late 1990s. It had approximately 65 hp, with a PTO output of approximately 56hp. The TL70 was available in both 2WD and 4WD configurations. The tractor was powered by a diesel engine and had a hydraulic system with a variable capacity.

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 approximately 70 hp and was powered by a diesel engine.

New Holland TM150

The New Holland TM150 was used from the late 1990s/early 2000s. It had a rated engine power of approximately 150 hp, with a PTO output of approximately 120 hp. The TM150 was available in both 2WD and 4WD configurations and was powered by a diesel engine.

New Holland TM165

The New Holland TM165 was used from the late 1990s/early 2000s. It had approximately 165 hp, with a PTO output of approximately 135 hp. The TM165 was available in both 2WD and 4WD configurations and was powered by a diesel engine.

New Holland TM140

The New Holland TM140 was used from the early 2000s. It had approximately 140 hp, with a PTO output of approximately 115 hp. The TM140 was available in both 2WD and 4WD configurations and was powered by a diesel engine.

John Deere 5070M

The John Deere 5070M was used from approximately 2010. It had a rated engine power of approximately 140hp, with an independent PTO. The 5070M was available in both 2WD and 4WD configurations and was powered by a diesel engine.

4.4.5 Milled Peat Machinery

Miller Attachments

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 approximately 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 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 4-19: shows the single miller attachment operating on a Bord na Móna bog.



Plate 4-19: Single miller attachment (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/miller-attachment/>)

Triple Miller Attachment

The triple miller attachment operated in much the same way as the single miller attachment, but with a higher output.

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 4-20: shows the triple miller attachment operating on a Bord na Móna bog.



Plate 4-20: 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 extraction bogs.

Plate 4-21: shows the Offset Miller Attachment operating on a Bord na Móna bog.



Plate 4-21: 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 in line with the towing points of the rear frames and were free to move laterally to facilitate turning.

Plate 4-22: shows the harrow operating on a Bord na Móna bog.



Plate 4-22: Harrow (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/harrow/>)

Harvester

The purpose of this machine was to extract milled peat from the bog fields in 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 revolutions per minute (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 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 partially constructed on the structural framework connecting the spiral unit and tractor unit, incorporating the conveyor drive pulley. Another section was mounted on the tractor unit, while the remaining portion formed the jib, which projected outward from the machine. Flat carrying idlers were used at the receiving end of the belt, whereas flexible shaft-type troughing idlers were employed along the articulated section. Conventional troughing idlers were fitted 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 4-23: shows the harvester operating on a Bord na Móna bog.



Plate 4-23: Harvester (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/harvester/>)

Milled Peat Loading Machine

This machine was designed to load milled peat from stockpiles into railway wagons. It consisted of a tractor unit fitted with a ground spiral at the front. Extending from 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 peat onto a rubber belt conveyor, which delivered the material into the railway wagons.

Plate 4-24: shows the milled peat loading machine in operation on a Bord na Móna bog.



Plate 4-24: Milled Peat Loading Machine (source: www.bordnamonalivinghistory.ie/equipment-detail/loading-machine/)

Polywrapper

As described above, a polywrapper was used in the uncovering of milled peat stockpiles. The polywrapper was mounted on the three-point linkage of a tractor (refer to Plate 4-25 and Plate 4-26). The eye of the polywrapper was attached to a pendulous swivel arm, which, as the tractor moved forward, oscillated from left to right to ensure that the polythene being collected was being dispensed evenly across a metal shaft on the polywrapper. This ensured an even spool of polythene was collected. Once the spool was at capacity, one side of the polywrapper was opened, which allowed the metal shaft to be removed and replaced with a plastic one. The entire spool was then removed and sent for appropriate disposal/recycling. The metal shaft was reinserted into the polywrapper, the side closed, and the process began again until the stockpile was fully uncovered, and all the polythene collected.



Plate 4-25: Polywrapper



Plate 4-26: Polywrapper with the frame opened to allow access to the collected bale of polythene

4.4.6 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 extraction was suspended in most areas in 1972 and was abruptly terminated in 1973 due to several reasons, including:

- Insignificant yields produced from the fóidín system compared to milled peat;
- Complications burning crushed sods at ESB stations due to the higher calorific content of fóidín peat;
- The cost extraction 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 were sold as scrap.

Plate 4-27 shows the fóidín machine operating on a Bord na Móna bog.



Plate 4-27: Fóidín Machine

4.4.7 Ancillary Infrastructure

There are several ancillary structures and features associated with peat extraction and ancillary activities at the Application Site. These include:

- Workshops;
- Works offices;
- Welfare Facilities;
- Vehicular and rail bridges;
- Local holding areas; and
- Railway infrastructure.

With the exception of most railway infrastructure, vehicular and rail bridges, and local holding areas, 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, to provide as detailed a description as possible of the Project, all of the ancillary infrastructure is described below.

Workshops

Derrygreenagh Works, (also referred to as ‘the Works’), provided a central location for support services to the Application Site and other adjacent bogs within the Derrygreenagh Bog Group, and includes workshops, offices and welfare facilities such as toilets and a canteen. The Works are located on the eastern side of the R400, approximately 3.8 km southeast of Rochfortbridge, Co. Westmeath. The location of the Derrygreenagh Works is shown in figure 4-2, outside the Application Site boundary.

Staff parking is provided at Derrygreenagh Works, and it remains the central location for management of the activities within the Application Site. The workshops and offices at Derrygreenagh Works were originally constructed in 1955, prior to the enactment of the *Planning and Development Act 1963* (i.e. 1 October 1964) and are therefore not included as part of this Substitute Consent application (as detailed in Section 4.1 and Chapter 1 of this remedial EIAR).

Derrygreenagh Works is still used as a satellite works location for machinery repair and material storage for the bogs within the Derrygreenagh Bog Group. Other smaller local holding areas were situated in various locations across the Application Site, which were used as temporary storage and repair facilities, convenient for the workers.

Rail and vehicular bridges facilitate connectivity between the bogs within the Derrygreenagh Bog Group, as well as connectivity to Derrygreenagh Works. A description of the rail and vehicular bridges within the Application Site is provided below.

During the Peat Extraction Phase, the majority of workers at the Application Site would arrive to Derrygreenagh Works prior to mobilising machinery stored at the Works site and navigating to the required location within the Application Site. Machinery was parked at the Works or at local holding areas when not in use and refuelling of machinery was carried out from dedicated refuelling areas at fixed fuel tanks located in the yards, although in some circumstances where machinery could not be tracked back to the Works buildings, refuelling was also carried out on the bogs at the Application Site at designated areas, away from drains or rivers. Concrete bunds and oil interceptors were provided at the Works 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 at the Works. 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 extraction areas.

Machine and wheel wash facility are also located at Derrygreenagh Works. Machine washings generated from cleaning various plant machinery (using a power steam wash system when machinery returned from the bogs) were discharged from the wash bays into the adjacent peatland drainage system.

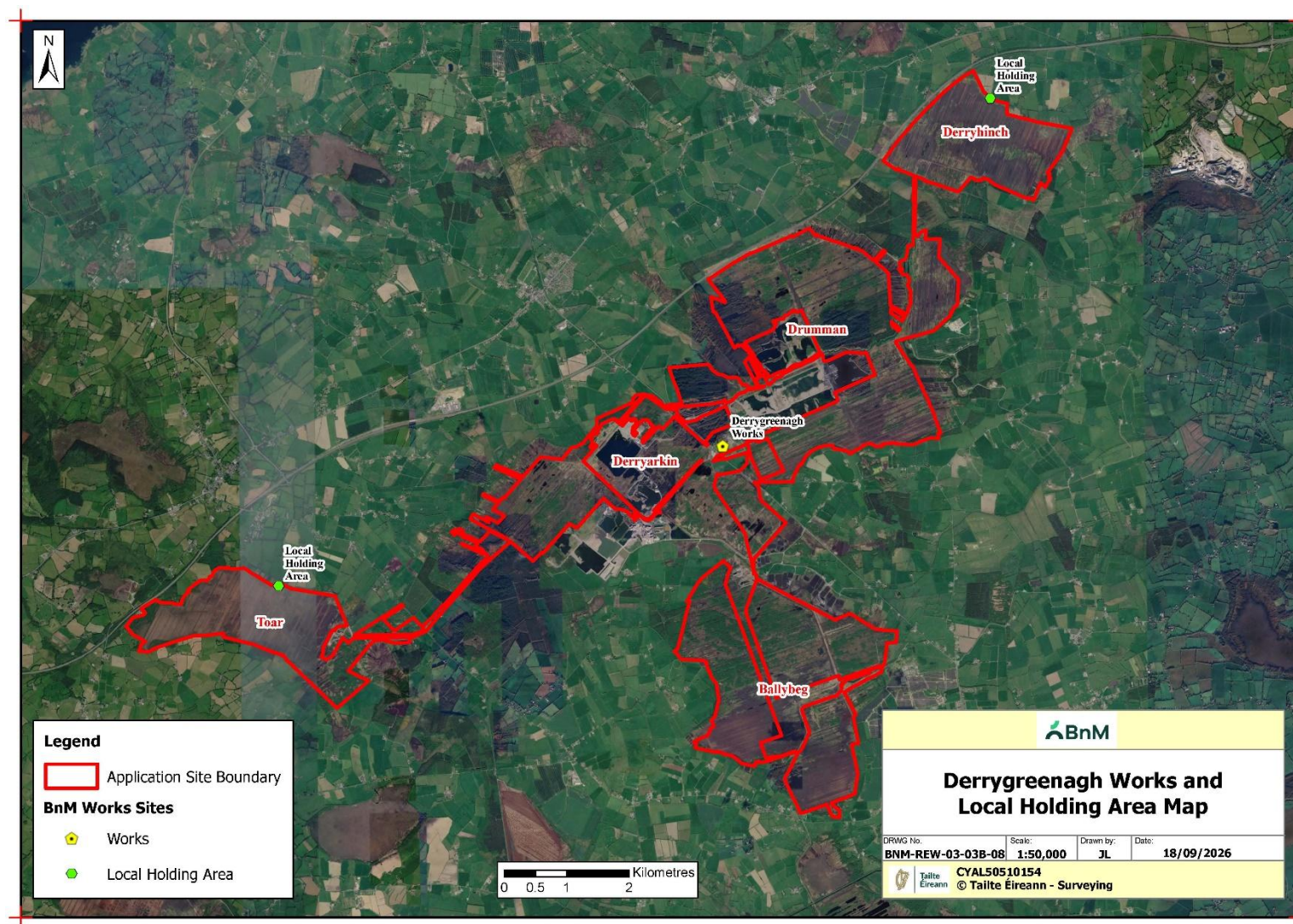


Figure 4-2: Location of Derrygreenagh Works, sand and gravel workshop piles in relation to the boundary of the Application Site

Administration Offices

The offices at Derrygreenagh Works provided an administration centre for the Application Site and other bogs within the Derrygreenagh Bog Group. Permanent administration staff were employed throughout the Peat Extraction Phase from the time of construction of these buildings in the 1950s.

The office buildings also provided welfare facilities such as toilets and a canteen to serve employees and staff at Derrygreenagh Works buildings and within the Application Site. Figure 4-2 shows the location of the offices associated with peat extraction and ancillary activities at Derrygreenagh Works, which are outside the Application Site.

Welfare Facilities

Welfare facilities associated with peat extraction are also located across the Application Site. These typically took the form of 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 Derrygreenagh 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.

Fuel Storage

Fuel was, and still is, stored within above bunded ground tanks at Derrygreenagh Works in compliance with IPC Licence Condition 9. The fuel tanks are bunded to contain any potential fuel spills or leaks. Refuelling procedures were upgraded to standard bunding specifications to comply with IPC Licence requirements in 2000 (refer to Section 4.7.6 for details).

The filling of tanks from the fuel supplier took place at the main fixed tanks at Derrygreenagh Works. Refuelling of vehicles and machinery was carried out at the Derrygreenagh 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, in compliance with IPC Licence Condition 9.1.13. Service trains/railcars with a bunded fuel dispensing unit, travelled from the Works to the designated bog area to refuel the machine in question. The service trains and railcars were filled from the main tanks at Derrygreenagh Works and travelled by rail to refuel the plant machinery on the bog.

Refuelling occurred at a frequency of up to three times a week during peak times during the Peat Extraction Phase. This frequency was significantly reduced outside of the peat extraction season (i.e. October to March). The practice of bunding at the Works and for mobile refuelling units was introduced in the 1970s.

Railway Infrastructure

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

The total length of permanent track laid within the Application Site was approximately 18.56 km and facilitated the movement of extracted peat within the Application Site from the 1960s until 2021 when stockpile removal finished. In addition, temporary track was also laid across the Application Site as required (i.e. lifts were done on the basis of stockpile size). When it was decided to sell a stockpile, a temporary railway track was laid alongside the stockpile to connect to the permanent railway line and allow for ease of transport from the Application Site to the various end destinations. On completion of removal of a stockpile, the temporary track was lifted and re-laid along another stockpile. To date, 3.71 km of permanent rail track has been removed across the Application Site.

The gauge of the track used was 36-inches (0.91 m). The rail, in general, weighs 30 lbs (13.6 kg) or 35 lbs (15.6 kg) per yard, mounted on steel sleepers, 6-foot (1.8m) in length and 2.5-foot (0.76 m) apart to which the rail is attached by steel clips. In certain positions, notably on lines external to the bogs, rail track of 45 lbs to 60 lbs (20 kg to 27 kg) per yard on creosoted pine or redwood sleepers was used. The length of a standard section of temporary track was 30-foot (9.2 m) and the weight was approximately 1200 lbs (544 kg), when complete. The section was lifted and laid by Bord na Móna tractors with special lifting equipment or by a dragline. The standard turnout also had a length of 30-foot (9.2 m) and was in two sections for ease of movement.

Permanent rail bed construction on the bog surface depended primarily on good drainage. The rail bed was formed of dry milled peat or of mould and sods placed in position by machine to a depth of 2- to 3-foot (0.6 to 0.9 m) and well rolled/compacted. Subsequently, the beds of permanent lines were ballasted, preferably with 9-inch (0.22 m) depth of sand or fine gravel.

Several level crossings were installed around the Application Site. Planning permission was granted by Westmeath County Council in 1983 (application reference 83474) for a level crossing gate located over the L1019 Derrycoffey Road, which is located between Derryarkin Bog and Toar Bog. Accordingly, these level crossings are not part of the development for which Substitute Consent is being sought. The gates at level crossings were of single leaf with spans varying from 25 to 40-foot (7.6 to 12.1 m). Light mesh was suspended from a hollow top boom of steel. Standard disc and warning lamps complete the level crossing gates.

The railway wagons were pulled by diesel powered locomotives, examples of which are shown in Plate 4-30.

The network of railway lines also connected to the yard at the Derrygreenagh Works where maintenance was carried out on the locomotives and wagons as required.

Vehicular Bridges

A total of two vehicular bridges were installed within the Application Site to facilitate vehicular access to Derryhinch Bog and Drumman Bog. The vehicular bridges cross over the Miltown River near Derryhinch Bog, and Mongagh River near Drumman Bog. The installation date of the vehicle bridges is unknown although it is likely that the majority were in place prior to the commencement of the formal planning system. Due to the lack of records confirming this, they have been included as part of the development for which substitute consent is being sought. The bridges comprised steel-framed structures supported on piled foundations consisting of timber piles with reinforced concrete capping beams. The bridge superstructure incorporated primary longitudinal steel beams, with intermediate transverse steel struts positioned perpendicular to

the main beams at approximately quarter-span locations to provide additional structural support and load distribution (see the Application Planning Drawings for further details).

Railway Bridges

There are two railway bridges located within the Application Site which cross over the Milltown River and Mongagh River, near the vehicular bridges. The railway bridges facilitate the narrow-gauge railway network that provided access to various areas of the Application Site, crossing rivers and drainage channels where necessary. The installation date of the railway bridges is unknown in reality it is likely that the majority were in place prior to the commencement of the formal planning system however due to the lack of records confirming this, they have been included as part of the development for which substitute consent is being sought. The structures comprised steel-framed bridges supported on concrete abutments. The bridge decks carried the rail tracks, with the primary longitudinal steel beams positioned beneath the tracks and secondary cross beams spanning perpendicular to the main beams to provide structural support to the deck (see the Application Planning Drawings for further details).

Gated Access Points

There are also two gated access points located along the R400 providing access between Drumman and Derryarkin Bogs. The Planning Drawings include elevations of the gated access points.

A map of the railway network, rail and vehicular bridges and site barrier entrance located at the Application Site is presented in 4-3.

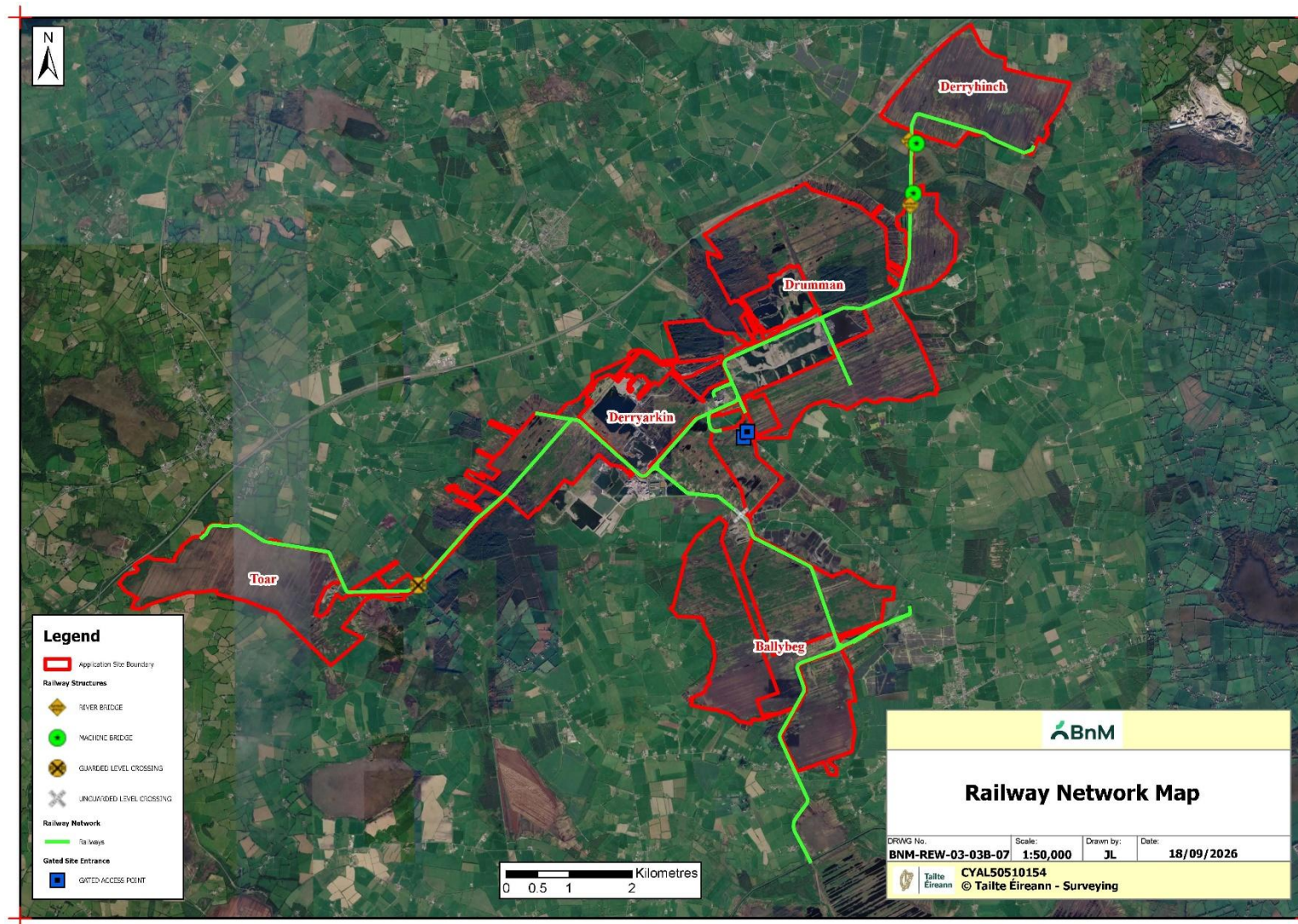


Figure 4-3: Map of the railway network located at the Application Site

4.4.8 Railway Equipment

Extracted peat was transported from stockpiles on the Application Site via a series of permanent and temporary railway tracks. 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.

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 bogies³ 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 six sections were built on the bolster bogies, they were hauled away by a locomotive.

Plate 4-28: shows a rail shifter operating on a Bord na Móna bog.



Plate 4-28: rail shifter (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/rail-shifter/>)

³ A bolster bogie is a type of rail wagon designed to carry long, heavy loads such as rails or timber. It typically consists of two bogies (wheel assemblies) connected by a central bolster beam, which provides flexibility and stability when transporting lengthy materials. This design allows the load to be supported across its length while navigating curves and uneven track.

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 4-29: shows the rail moving attachment operating on a Bord na Móna bog.



Plate 4-29: Rail moving attachment to lift and lay temporary railway track, along sod peat ricks and milled peat piles. (source: www.bordnamonalivinghistory.ie/equipment-detail/rail-moving-attachment/)

Locomotive 80HP (Wagonmaster)

The locomotive 80 HP hauled peat from the stockpiles across the Application Site to the required end destination. 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. 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 4-30: shows the locomotive on a Bord na Móna bog.



Plate 4-30: 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 managers to undertake site inspections of the bogs. Rail cars were equipped with first-aid equipment and 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 4-31 shows a rail car used to access Bord na Móna bogs.



Plate 4-31: Rail Car (source: <https://www.bordnamonalivinghistory.ie/equipment-detail/rail-car>)

4.4.9 Site Services

Water consumption across the Application Site is primarily at the Derrygreenagh Works for domestic use. The water supply at Derrygreenagh Works is not supplied by a mains water connection, but by a well. This well is not recorded in the GSI's national Well Database (GSI, 2023). Wastewater from the welfare facilities at Derrygreenagh 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 Derrygreenagh Works buildings and workshops, and to the drainage pump stations were powered by mains electricity from the national grid.

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

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

4.5 PEAT EXTRACTION ACTIVITIES 1950 - 1988 (PRE- EIA DIRECTIVE)

Prior to the commencement of drainage, which first occurred on the Application Site in 1950, the Application Site was covered by an active raised bog. The surface was wet, acidic and nutrient poor, supporting open Sphagnum-dominated vegetation.

Raised bogs are deep accumulations of acid peat, typically ranging from 3 to 12 m in depth. The term “raised bog” refers to the elevated dome that forms as peat accumulates over time. Before peat extraction began, the Application Site’s topography is estimated to have ranged between 82– 97.5 mOD, based on point data derived from 6-inch OSI maps (see Section 8.3.2 of Chapter 8).

Before development, water in a raised bog was continuously circulating, leaving the Application Site nutrient-poor and waterlogged at the surface. The primary water source was rainfall. Water was lost mainly from surface water runoff, particularly during winter when the bog’s storage exceeded capacity due to increased precipitation. Additional losses may have occurred through the lower peat layers, especially where the bog was underlain by permeable gravels or sands without an impermeable lacustrine clay layer. The pre-development water table was likely very stable, with only minor fluctuations and remaining within a few centimetres of the bog surface.

4.5.1 Peat Extraction Activities from 1950

The primary land-use change associated with the peat extraction and ancillary activities 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 and welfare facilities.

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 and ancillary activities. While peat extraction was ongoing it was not possible to rehabilitate the underlying peatland.

The timing of the installation of drainage and initiation of peat extraction varied across the Application Site. Clearance and drainage work across the Application Site began in 1950, and the land bank would have experienced a relatively abrupt change in land cover with the commencement of peat extraction in 1958.

The earliest aerial imagery available (1973) confirms that at that time, drainage to facilitate peat extraction was already inserted. Figure 4-4 presents the extent of peat extraction at the Application Site across the five Bogs in 1973. All aerial imagery available for the Application Site is included in Appendix 4.5.

The primary and greatest land-use change associated with the peat extraction and ancillary activities on the Application Site occurred during the initial drainage and vegetation removal at the bogs in advance of peat extraction commencing. This impact would have occurred in advance of 1988 at the Application Site. A photographic accompaniment illustrating the types of activities described below can be found in Appendix 4-18 *Bord na Móna: Peat Development in Ireland 1954*.

Table 4-1: Operational History of the Application Site (source: Bord na Móna Annual Reports)

Bog Unit	Commencement of Site Preparation Works (vegetation clearance and drainage insertion)	Extraction Commenced	Extraction Ceased
Derryhinch Bog	1950	1958	2017
Drumman Bog	1950	1958	2018
Derryarkin Bog	1950	1958	Between 1988 and 1991
Toar Bog	1950	1958	2018
Ballybeg Bog	1950	1958	2020

Table 4-2 describes the general activities within the Application Site over a year during each of the four quarters from 1958, when peat extraction 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 4-2: Annual peat extraction activities at the Application Site 1958 – July 1988

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

4.5.2 Drainage Design since 1950

As part of the development of the Application Site for peat extraction, parallel surface water drains as per the methodology outlined in Section 4.4.3 were created by machine excavators at specific intervals. The strips of bog between these drains were retained to form peat extraction fields. By 1988 drainage channels, silt ponds, outfalls and pumps were extant at the Application Site. Appendix 4.19 contains the Planning Drawing Pack which shows the detailed drainage across the Application Site.

Ballybeg Bog

Drainage works first commenced in Ballybeg Bog in 1950 according to Bord na Móna Annual Reports from that time. The earliest available aerial photograph dating from 1973 shows Ballybeg Bog to be subject to milled peat extraction. There were no pumps installed in Ballybeg Bog by 1973. In 1973, there were 6 silt ponds at Ballybeg Bog.

Derryhinch Bog

Drainage works first commenced in Derryhinch Bog in 1950 according to Bord na Móna Annual Reports from that time. The earliest available aerial photograph dating from 1973 shows Derryhinch Bog to be subject to milled peat extraction. There were no pumps installed in Derryhinch Bog by 1973. In 1973, four silt ponds were located at Derryhinch Bog.

Drumman Bog

Drainage works first commenced at Drumman Bog in 1950, according to Bord na Móna Annual Reports from that time. The earliest available aerial photograph dating from 1973 shows Drumman Bog to be subject to milled peat extraction. No pumps were installed in Drumman Bog by 1973. In 1973, there were six silt ponds located at Drumman Bog.

Derryarkin Bog

Drainage works first commenced in Derryarkin Bog in 1950, according to Bord na Móna Annual Reports from that time. The earliest available aerial photograph, dating from 1973, shows Derryarkin Bog to be subject to milled peat extraction. No pumps had been installed within Derryarkin Bog by 1973. The 1973 aerial imagery does not identify any silt ponds within the Bog unit.

Toar Bog

Drainage works first commenced in Toar Bog in 1950 according to Bord na Móna Annual Reports from that time. The earliest available aerial photograph dating from 1973 shows Toar Bog to be subject to milled peat extraction. There were no pumps installed in Toar Bog by 1973. In 1973, there were six silt ponds in total at Toar Bog.

4.5.3 Peat Extraction pre-1988

The decision to commence peat extraction at the Application Site was closely linked to the decision of the Electricity Supply Board (ESB) to construct the 80 MW Rhode Power Station, located southeast of the Application Site. Croghan Briquette Factory was also constructed near the Application Site in 1960 which consisted of a large-scale industrial facility designed to process milled peat into solid fuel briquettes.

Rhode Power Station

The construction of Rhode Power Station was planned and constructed on the basis of an agreement between ESB and Bord na Móna that the station would be fuelled with peat supplied exclusively by Bord na Móna, which was to be extracted from bogs in the surrounding area, including the Application Site. Rhode Power Station was completed in two separate developments, Station A commissioned in 1960 and Station B in 1963. Station A comprised of two 190,000 pounds of steam per hour boilers, driving two 20MW turbo-alternator units. Station B comprised of a boiler with an output of 380,000 pounds of steam per hour and a 40MW turbo-alternator set were further commissioned in 1963. Rhode Power Station was powered by milled peat, which had been extracted from the Application Site. Additionally, a small amount of sod peat was extracted at Derrygreenagh, using the "Fóidín" system of production (i.e. the production of peat in small sod form from the surface of milled peat fields) with a view to supplementing milled peat production was tested on a production basis in 1967. Ultimately, Rhode Power Station was decommissioned in 2003, and peat exports were transported to other end users, as described in section 4.7.6.

Croghan Briquette Factory

Croghan Briquette Factory was commissioned in 1961 and had an input of approximately 1,000 tonnes of milled peat per day, which was provided from bogs including, but not limited to, those of the Application Site.

For the purposes of briquette manufacture, milled peat was dried using a system known as the 'Peco drying process'. This system (which is not related to the method of Peco stockpiling employed on the Application Site) involved indirectly drying milled peat using hot water and steam while the peat was pneumatically conveyed. Peat tailings were used as boiler fuel, generating steam which powered a turbine-alternator, which generated the factory's electricity supply, and provided low-pressure steam to dry peat. Once dried, the milled peat was packed and pressed into briquettes.

Croghan Briquette Factory was closed in 2000 and demolished in 2021.

Milled Peat Extraction 1958 to 1988

Milled peat extraction commenced at the Application Site in 1958. From 1960, milled peat from the Application Site was sent to Rhode Power Station to supply the newly commissioned milled peat-fired power station. The processes and machinery associated with milled peat extraction are described in Section 4.4.3.

During the period from 1958 to 1988 milled peat was the predominant form of peat extraction ongoing throughout the Application Site, excluding a brief trial of the Fóidín system in 1967. Figure 4-4 shows a map of the areas that were subject to active peat extraction in 1973.



Appendix 4.5 includes available aerial imagery from all of the Application Site. Labels are added to the imagery to identify the five bogs (Derryhinch, Drumman, Derryarkin, Ballybeg and Toar Bogs) which are located within the Application Site.

Milled peat was transferred from the stockpiles into railway wagons by a loading machine or excavator and transported by rail to Rhode Power Station and Croghan Briquette Factory exclusively from 1960 and 1961, up to 2003 and 2000 respectively, when these developments ceased operations.

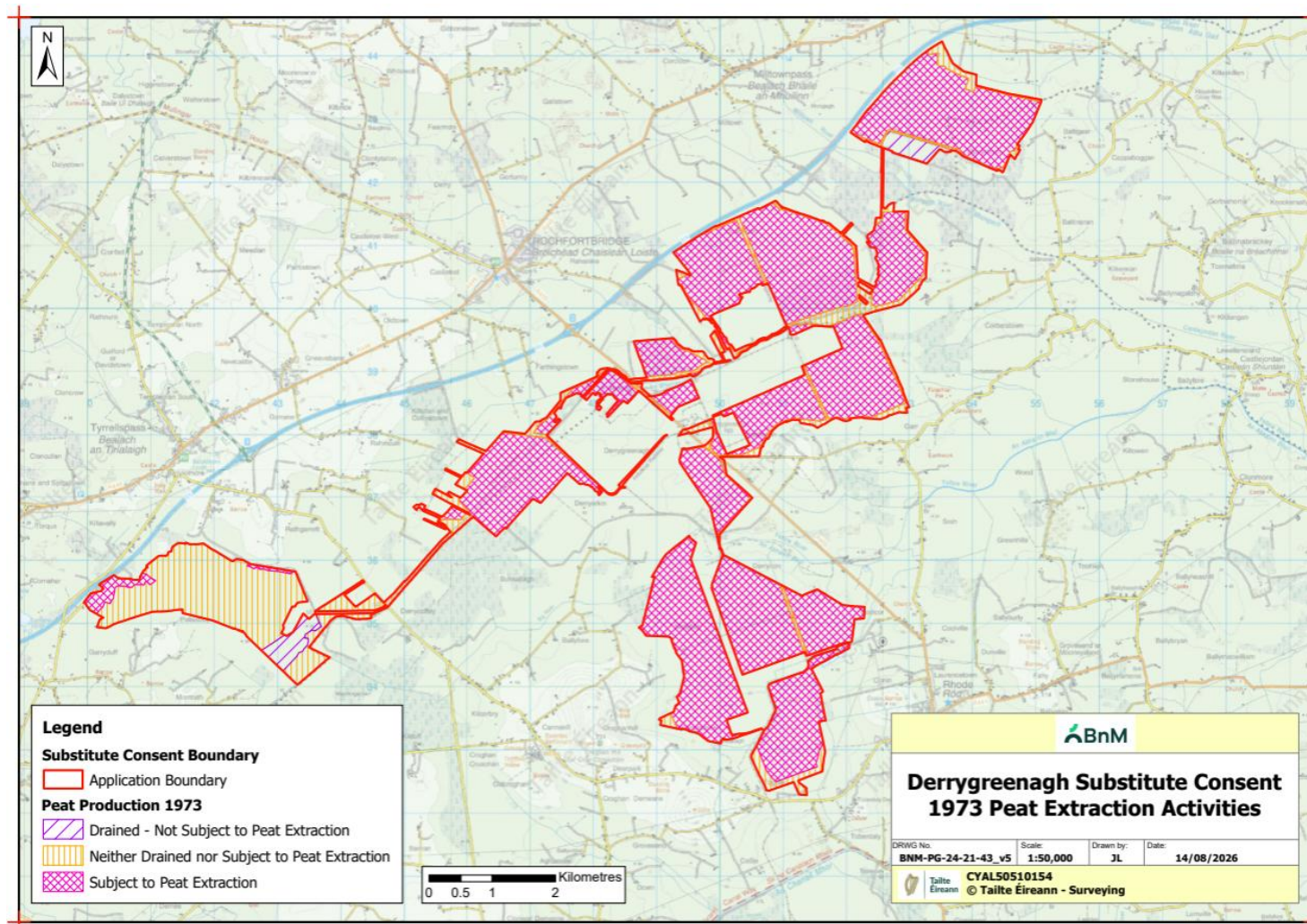


Figure 4-4: Derrygreenagh 1973 Peat Extraction Activities

Peat Extraction Volumes 1958 – 1988

It is estimated that approximately 892,308 tonnes of milled peat was extracted annually at the Application Site between 1958 and July 1988, with deliveries of stockpiled peat to Rhode Power Station and Croghan Briquette Factory occurring from 1960 and 1961, respectively. While Rhode Power Station and Croghan Briquette Factory commenced production of electricity and briquettes in 1960 and 1961 respectively, milled peat extraction started earlier in 1958 to ensure that there was sufficient supply in stockpiles in the event of future bad harvests due to weather. Moreover, the Fóidín system had been trialled briefly in 1967.

It is estimated that between the commencement of peat extraction at the Application Site in 1958 and July 1988, approximately 21,551,625 tonnes of milled peat was extracted.

4.5.4 Control Measures Pre-1988

Except for silt control (which from 1974 was subject to a formal management program as discussed in Section 4.5.6.9), no formal documentation outlining dedicated control measures implemented on site between 1950 and July 1988 is available. However, based on anecdotal evidence with a retired Bord na Móna manager, the following measures were reportedly enacted at the Application Site as part of daily, monthly, and annual bog management and operations. These measures were later outlined in the IPC Licence application submitted to the EPA in 1999.

Peat Extraction Machinery – Maintenance Programmes and Storage

All peat extraction machinery listed in Section 4.4.4 were stored at the Derrygreenagh Works at the end of the workday and the machinery was regularly inspected, serviced and maintained. The machinery was regularly cleaned via power steam wash system at a wash bay which drained into a fuel/oil interceptor unit and associated gravel soak pit. The interceptor unit facilitated the removal of any oil and grease components to minimise dust and particle release. A self-contained machine parts washer was located at the Derrygreenagh Works.

Refuelling Facilities

Refuelling and maintenance of all vehicles were undertaken at the Derrygreenagh Works. When machinery required refuelling on the Application Site, it was carried out by a mobile (rail or tractor-transported) fuelling unit which travelled out from the Derrygreenagh Works to the bogs where the machinery was located. Refuelling procedures were upgraded to standard bunding specifications to comply with IPC Licence requirements in 2000 (refer to Section 4.4.5.4 for details).

The following emergency action procedure was implemented at the Application Site prior to IPC Licencing (i.e., pre-2000):

1. When a spill occurred, the General Manager was immediately informed of the incident;
2. The spill was required to be assessed by the General Manager for potential risk to the health and safety of employees and the potential environmental consequences;
3. If there was a risk of explosion, all personnel were required to be evacuated from the area;
4. The spill was sourced, isolated and contained with polystyrene booms or dry peat (moisture content of 10%);
5. All efforts were made to prevent the spill from entering a storm drain or nearest outfall;

6. Once the spill had been contained, a suitable absorbent (e.g., dry peat) was to be used to soak the spillage;
7. All possible ignition sources such as electoral equipment, naked lights, machinery were removed from the area. Any combustibles in the spill area were removed;
8. Follow up action measures taken includes 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 was required to notify the local authority.

Fire Safety

With respect to Fire Safety, the following emergency action procedure was implemented at the Application Site prior to IPC Licencing (i.e., pre-2000):

- Annual training provided for bog fires crew and factory personnel and all general staff was provided with a minimum of two hours training in fire prevention;
- All fire exits were designated. These doors were required to be fitted with push-bar mechanisms only and lighted from independent sources. They were required to be unobstructed inside and outside at all times, and open outwards;
- Each canteen/office were required to be equipped with a fire blanket and fire extinguisher;
- There were required to be at least one fire point at all office premises;
- Petrol and other oils were required to be stored in designated oil stores;
- Batteries were not charged in working areas unless suitable protection was provided;
- Training was provided for oxygen cylinder storage and use;
- Fire Wagons: Designated rail wagons were provided for fire prevention which contained: hoses, shovels, fire beaters, baskets, buckets, breathing apparatus, first aid kit, drums of foam and foam making machine, extinguishers etc.
- 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,
- Fire Safety Audits were undertaken at six monthly intervals along with random audits. Yearly assessments were undertaken of all audits completed.

Dust Management at Bog Boundaries and Headlands

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 islands⁴. In addition, the following measures were undertaken at a minimum to minimise dust emissions and later expanded under IPC Licence:

- Stockpiles were compacted on either side by large rollers drawn by tractors;
- Stockpiles were covered with polythene film gauge sheets and secured in position by spreading an even layer of high moisture content milled peat;
- Peat extraction during windy weather was to be avoided;
- The headlands were to be kept clean and loose peat removed;
- Drivers were required to drive slow along dusty headlands; and,
- All road crossing points were to be maintained clean.

⁴ Brown Gold 'A History of Bord na Móna and the Irish Peat Industry', 2010 Clarke, Donal, Chapter 10 Pg 206

Internal Rail Network Maintenance

Railway tracks and railway locomotives underwent continuous inspection and maintenance to prevent derailments, fires, accidents and fuel leaks. The locomotives were fitted with beam lighting, electric windscreen wipers and driving mirrors for both directions of travel.

Surface Water Management

Surface water run-off from the Derrygreenagh Works and hard standing areas drained via onsite surface water drainage systems, which were installed as part of the construction of buildings and hardstand areas over the decades, into the adjacent peatland surface water drainage network.

All machinery was regularly inspected and serviced. All machinery was regularly cleaned via power steam wash system at a wash bay which drained into an interceptor unit and associated gravel soak pit. There were two interceptor units which facilitated the removal of any oil/grease components. This was done to minimise dust and particle release.

Formal silt control measures adopted in 1974 are outlined below.

Maintenance Programme for Internal Drains

The internal drains were cleaned on a regular basis in suitable weather, mainly prior to and post the peat extraction season (i.e. between October and March). This was necessary to remove sludge from the bottom of drains and dispose of it by spreading it on the adjacent field. Drain maintenance was carried out using ditchers. These works were programmed to ensure that the drains servicing the peat extraction areas were fit for purpose. Drain maintenance was carried out mainly prior to and post the peat extraction season (i.e. between October and March).

Maintenance of On-site Surface Water Pumps

The following procedure was followed with respect to ensuring that the onsite pumps at Ballybeg were maintained in good working order:

- Visual inspection of pumps daily;
- Operational check of pumps biweekly; and,
- Service of pumps monthly.

Silt Management

As part of the Third Development Programme in the 1970s, Bord na Móna decided to control all effluent by means of specially designed and constructed silt ponds in 1974, 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).*
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 Derrygreenagh Works from the Bord na Móna Production Manager in March 1976 setting out the recommendations of the silt committee is included in Appendix 4.9. It is understood that this memo was sent to the Managers of all Bord na Móna Works sites including Derrygreenagh Works as the memo directs that “*At all milled peat bogs in production, works should carry out surveys and select sites for silt ponds as recommended*”. It is therefore assumed that Derrygreenagh works would have commenced the selection of sites for the establishment of silt ponds at the bogs around this time. Furthermore, Bord na Móna records show that silt pond measures were introduced across all Bord na Móna bogs in the early to mid-1980’s in response to the 1977 *Water Pollution Act*. A number of silt ponds were installed at the Application Site pre-1988 to reduce sediment discharge from the extraction works. 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 extraction 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 8 m, however, in some cases, silt ponds of up to 12 m in width were constructed. The larger silt ponds up to 12 m 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). The silt pond design, as submitted to the EPA with the IPC Licence Application in 1999, is shown in Figure 4-5.

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 1.5 m 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.

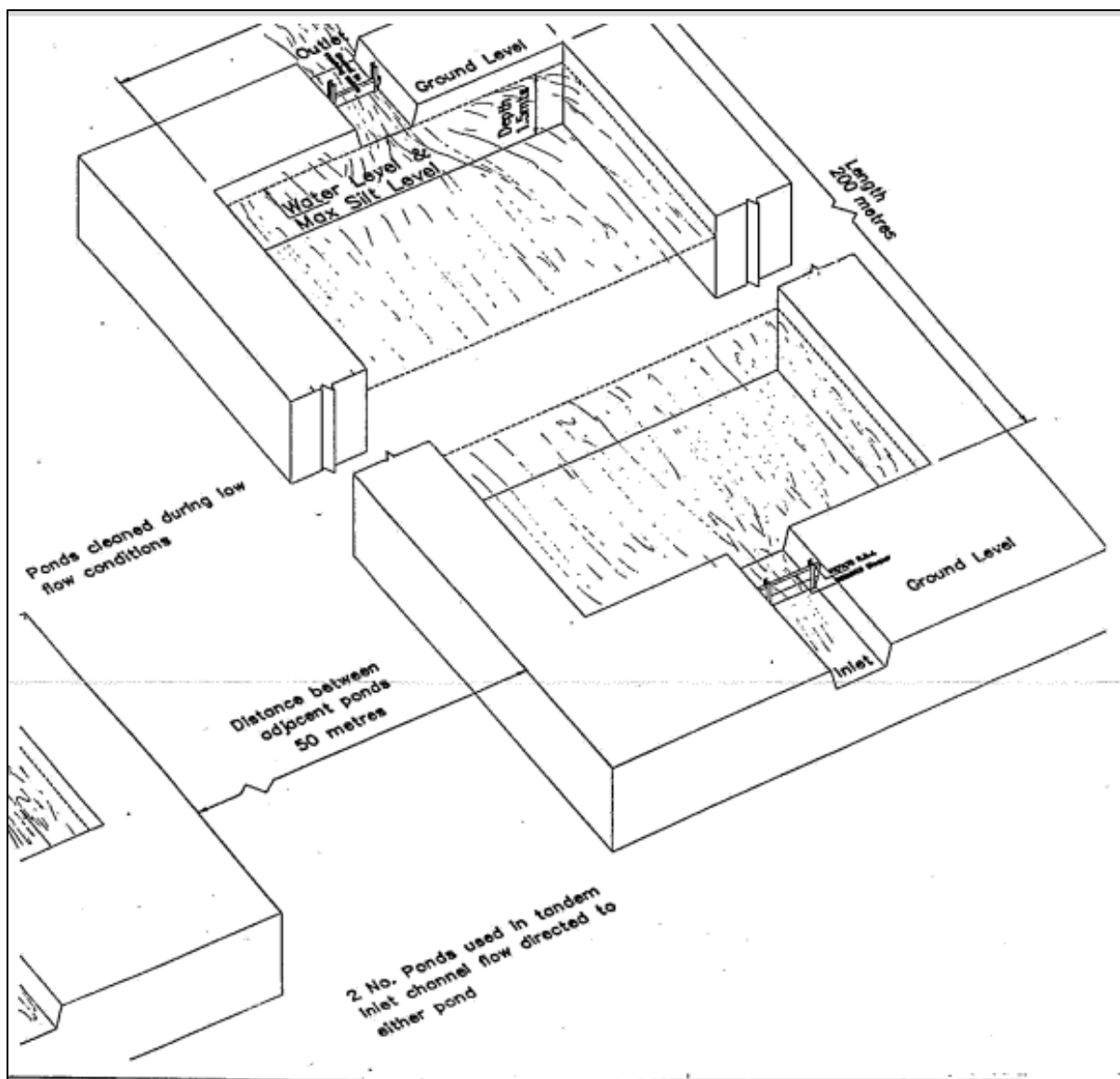


Figure 4-5: Silt Pond design implemented at the Derrygreenagh Bog Group (Source: Bord na Móna IPC Licence Application submitted to the EPA in 1999)

Other records of Silt Committee meetings (April 1984 included in Appendix 4.10), attended by the Manager from the Derrygreenagh Bog Group, set out acceptable standards of effluent and note that a decision from ABP on a licence for effluent from the Littleton Briquette Factory in County Tipperary set an upper limit of 100 mg/l for suspended solids. The records note *“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.

Waste Management

The following measures were carried out with respect to management of waste:

- Waste oils and brake fluids drained from machinery during servicing were collected in drums and emptied to a designated waste oil storage tank;
- Waste oil storage tank contents were transported off-site by a licenced waste disposal contractor;
- Oil and fuel filters were changed at vehicle service intervals;
- Spent filters were collected and disposed of by a licensed waste disposal contractor;
- Used batteries were collected by licensed battery collection contractor;
- Off-washings from the self-contained machine parts washer were collected within a sludge tank at the workshops;
- Ash from the onsite boiler was stored in a skip onsite and collected by a licenced waste contractor and taken to a landfill for disposal;
- Waste polythene removed from stockpiles was collected at the roadside by a plastic recycling company; and
- Workshop waste and general refuse from canteens/offices were historically burned on site or disposed of into waste disposal areas at the workshops. This practise changed to the use of skips which were then collected by licenced waste contractors.

Archaeological Disturbance

As part of peat extraction training, all employees hired to work on the bogs were required to read and adhere to the recommendations set out in the Department of Education publication entitled, *Ancient Objects in Irish Bogs and Farmlands: A Guide for Finders* (1942).

Workers were required to stop all works and report to the Bog Manager if archaeological finds were encountered. If materials thought to be of archaeological interest were encountered, the Bog Manager was required to report the findings to the Garda Síochána within seven days. The Gardai would then contact the Commissioner of Public Works. A record of archaeological finds and observations within the Application Site can be found in Chapter 13: Cultural Heritage of this remedial EIAR.

4.6 BASELINE ENVIRONMENT AS OF JULY 1988

As described in Chapter 1 and Section 4.1, this remedial EIAR assesses the period from July 1988, the timeframe for when the EIA Directive was required to be transposed into Irish Law, to present day.



As such, 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. The activities carried out as of July 1988, combined with the activities from July 1988 onwards, form the Project. The remedial impact assessments are presented in the subsequent specialist chapters.

4.6.1 Site and Activity Description – 1988 remedial EIAR Baseline

By 1988, land use at the Application Site was well-established as industrial milled peat extraction, there was extensive drainage infrastructure installed on the site, with the Application Site drained close to its maximum extent. There was limited drainage inserted on a further c. 20.8ha (i.e. 0.79% of the Application Site area) between 1988 and 2004, with the area subject to drainage remaining the same until the cessation of peat extraction in 2020. Although drainage infrastructure had been installed across substantial areas of the Application Site by 1988, some areas remained neither drained nor subject to peat extraction. The following ancillary infrastructure was established at the site by July 1988:

- Railway infrastructure (all bogs within the Application Site);
- Rail and vehicular bridges (Derryhinch and Drumman Bog);
- Gates site access (Drumman and Derryarkin);
- Silt ponds and drains (all bogs within the Application Site); and
- Pumping stations (at Ballybeg Bog).

Figure 4-6 shows the extent of peat extraction across the Application Site in 1988.

Drain deepening and maintenance would have continued at the Application Site in 1988. As stated in Section 4.5.3, drainage channels were in place prior to 1988 as well as several silt ponds, outfalls, and two pumps in Ballybeg.

The total tonnage of peat extracted at the Application Site between July 1988 and December 1988 was 468,137.5 tonnes. The estimated topography of the Application Site in as of July 1988 is based on an average depth of milled peat extraction of 0.1 m per year over a 31-year period, which has been worked back from the 2020 topography (refer to Table 8.4 Section 8.3.2 of Chapter 8).

4.6.2 1988 Peat Extraction Activities

Table 4-3 describes the general activities within the Application Site during each of the four quarters of the calendar year in 1988. Some drain maintenance was carried out during the full year, but it was mainly restricted to outside the peat extraction season (i.e. from October to March). Fuel handling and refuelling would have increased significantly during the peat extraction season due the activity of the peat extraction machinery. Rail network maintenance continued in 1988 with temporary rail tracks added and removed alongside peat stockpiles as required.

Peat extraction activities at the Application Site took place between 08:00 and 21:00 during the summer months, with transportation of the peat between the hours of 06:00 and 11:00. Office hours and workshop hours remained as 08:00 to 16:30 all year round.

Table 4-3: 1988 Peat Extraction Activities

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

There are no detailed records for peat extraction volumes for 1988, therefore data for the years 1975 to 1987 (refer to Section 4.7.2 and Table 4-4 therein) have been selected as a representative sample from which an average value has been calculated to represent peat extraction volumes in 1988. This calculated average volume was then halved as the baseline year began in July 1988. Based on this methodology, it is estimated that approximately 468,137.5 tonnes of milled peat would have been extracted from the Application Site between July and December 1988.

4.7 PEAT EXTRACTION PHASE JULY 1988 – JUNE 2020

4.7.1 Drainage Design

During the Peat Extraction Phase, the deepening and maintenance of drainage channels continued beyond 1988 and remained ongoing at each bog until peat extraction ceased. As the areas subject to peat extraction gradually decreased in extent over time, and as the available peat depth correspondingly reduced, the number and extent of drains requiring deepening and maintenance also reduced over time.

Machinery used for drainage works would have been largely the same as that described in Section 4.4.2 with ever-improving engine efficiency in tractors and excavators.

Drainage construction methodologies are described in Sections 4-4.

A summary of the drainage design at each of the five bogs (Derryhinch, Drumman, Derryarkin, Ballybeg and Toar) is listed below.

Derryhinch Bog

Drainage was fully inserted in Derryhinch Bog by 1988.

In 1988, there were four silt ponds and no pumps installed on Derryhinch Bog. The drainage features remained the same until peat extraction ceased at Derryhinch Bog in 2017.

Drumman Bog

Drainage had been fully inserted in Drumman Bog by 1988.

In 1988, there were six silt ponds and no pumps installed on Drumman Bog. These drainage features remained the same until peat extraction ceased at Drumman Bog in 2018.

Derryarkin Bog

In 1988, drainage had been fully inserted in Derryarkin Bog.

In 1988, there were no silt ponds, and no pumps installed on Derryarkin Bog. Peat extraction in Derryarkin Bog ceased between 1988 and 1991 and the number of drainage features remained the same at Derryarkin Bog up until the peat extraction ceased.

Toar Bog

Drainage had been fully inserted in Toar Bog by 1988.

In 1988, there were six silt ponds and no pumps installed on Toar Bog. The number of drainage features on site remained the same until peat extraction ceased at Toar Bog in 2018.

Ballybeg Bog

Drainage had been fully inserted into Ballybeg Bog by 1988.

Verbal communication from a former employee confirmed that there was one pumping station installed in 1987 at Ballybeg Bog comprising two screw pumps. These screw pumps were later replaced by a submersible cofferdam pump around the year 2000.

In 1988, there were six silt ponds at Ballybeg Bog. Peat extraction ceased at Ballybeg Bog in 2020.

4.7.2 Silt Ponds

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 (including the Derrygreenagh Bog Group) over a full calendar year to determine the quantity of silt within the run-off from bogs. The study (a copy of which is included in Appendix 4.7) determined that an average of 50 m³ of sludge per hectare (20 m³ per acre) 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 (which is included in Appendix 4.1) details the requirements for Bord na Móna to implement a programme to ensure all drainage water from all boglands is discharged via an appropriately designed silt pond treatment arrangement, that an operational procedure for de-silting was prepared and that de-silting is carried out twice per year. The silt arising from the de-silting operations was either stockpiled a distance from drains and the silt pond or placed back out onto the extraction fields. Up until the cessation of peat extraction, this material would then have been incorporated into the subsequent extraction.

4.7.3 Peat Extraction

Milled peat extraction, following the same processes described in section 4.4.3, continued across the five bogs within the Application Site from 1988 until their respective cessation dates. Extraction activity ceased at each bog at different times, (refer to Table 4-1) with Ballybeg Bog being the final bog within the Application Site on which peat extraction ceased in 2020.

Between 1988 and 2020, improvements and modernisation increased the efficiency and speed of extraction operations. Advances in diesel-powered engines also resulted in the use of more fuel-efficient tractors.

During the latter part of the assessment period (from the late 1990s/early 2000s onwards), peat extraction slowed across the Application Site as individual bogs reached the end of their extractable peat resources. This gradual reduction in activity resulted in corresponding decreases in fuel handling and refuelling operations, machinery maintenance and stockpile development. Peat extraction ceased permanently at the Application Site in 2020.

Peat extraction maps for the years 1988, 1995, 2004 and 2020 are presented in the Figures below and illustrate the extent of extraction activity at the Application Site over time, including at the point of the cessation of peat extraction in 2020. Corresponding aerial images for the years 1988, 1995, 2004, and 2020 are included in Appendix 4.5.

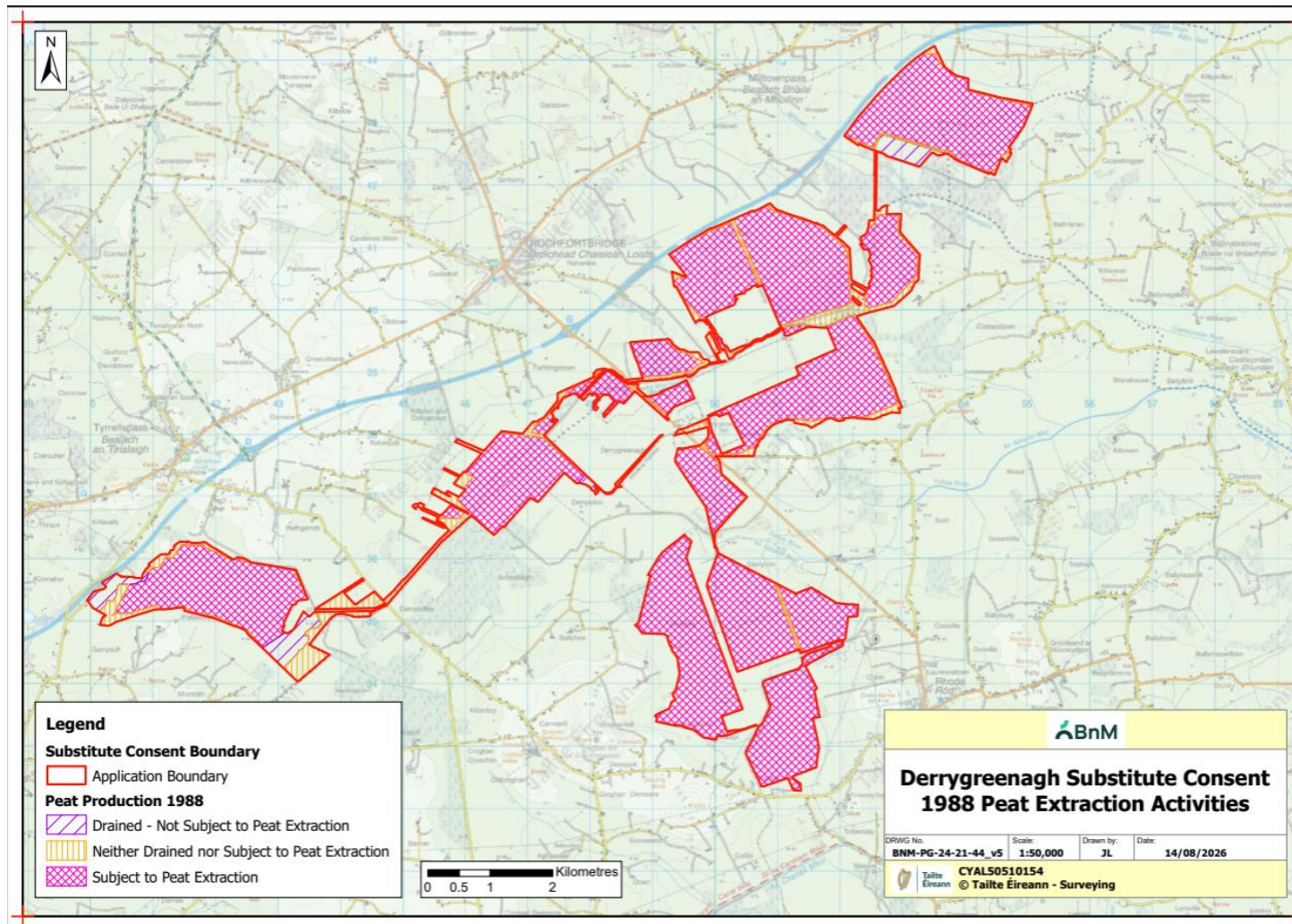


Figure 4-6: Application Site peat extraction areas in 1988

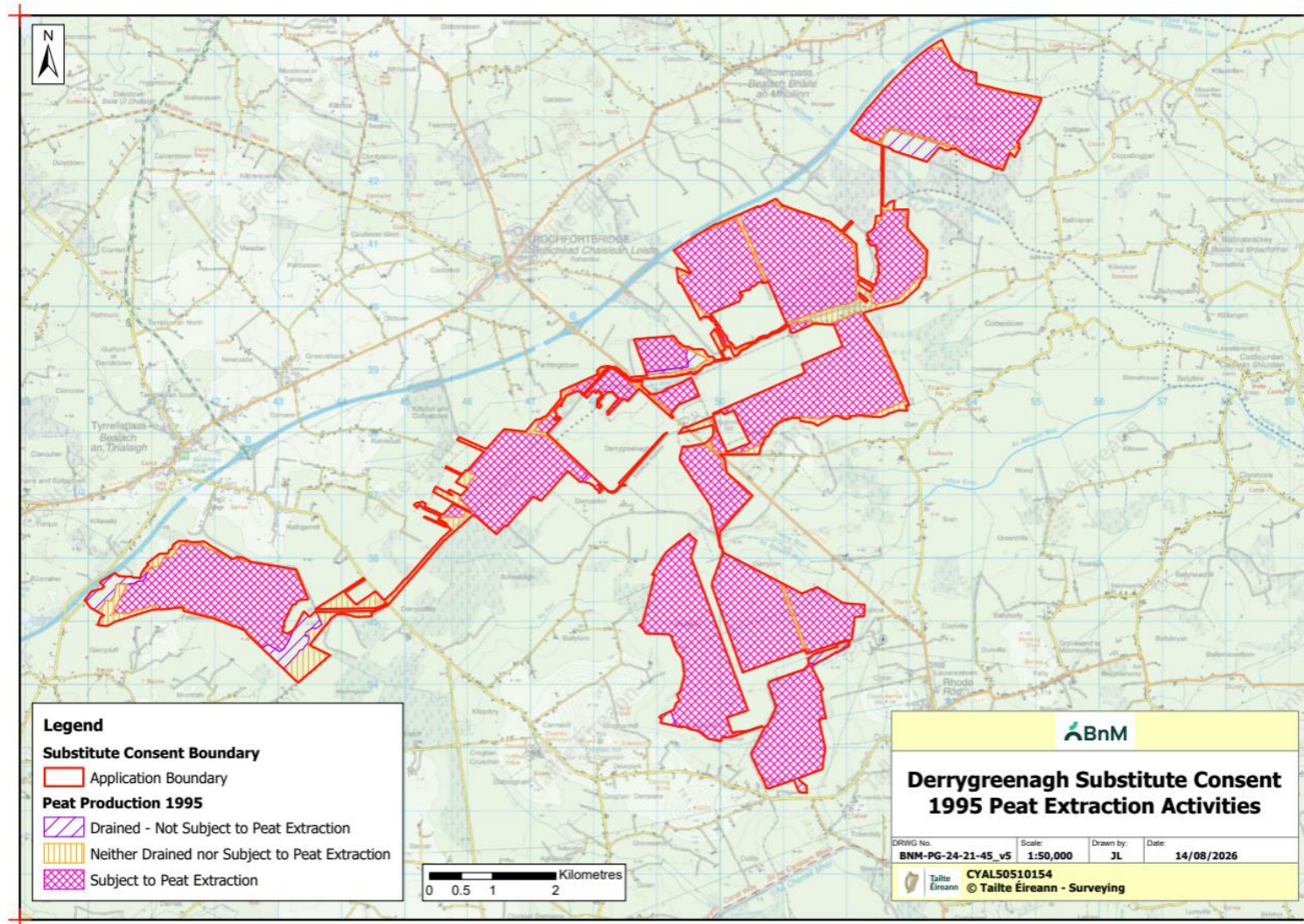


Figure 4-7: Application Site peat extraction areas in 1995

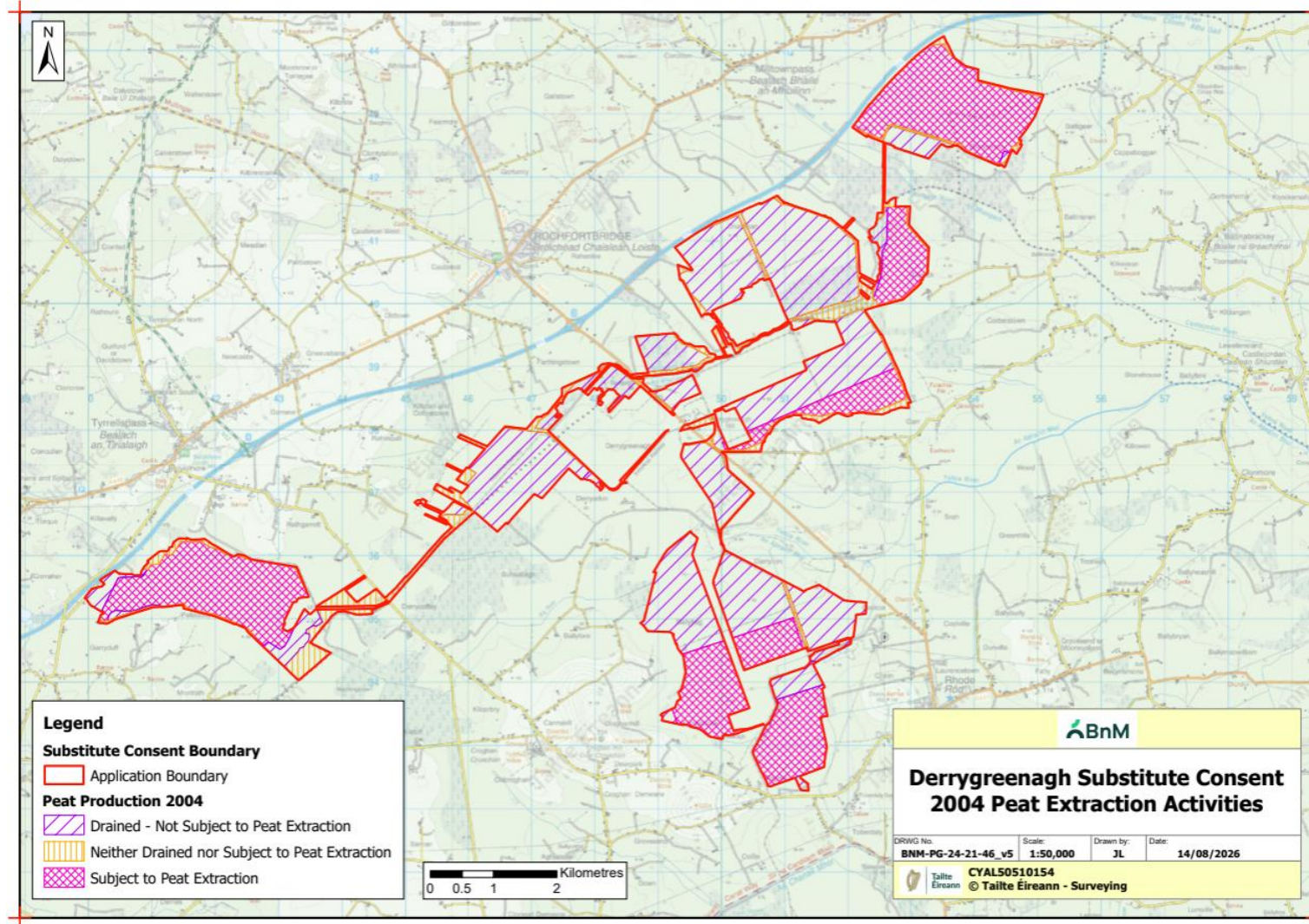


Figure 4-8: Application Site peat extraction areas in 2004

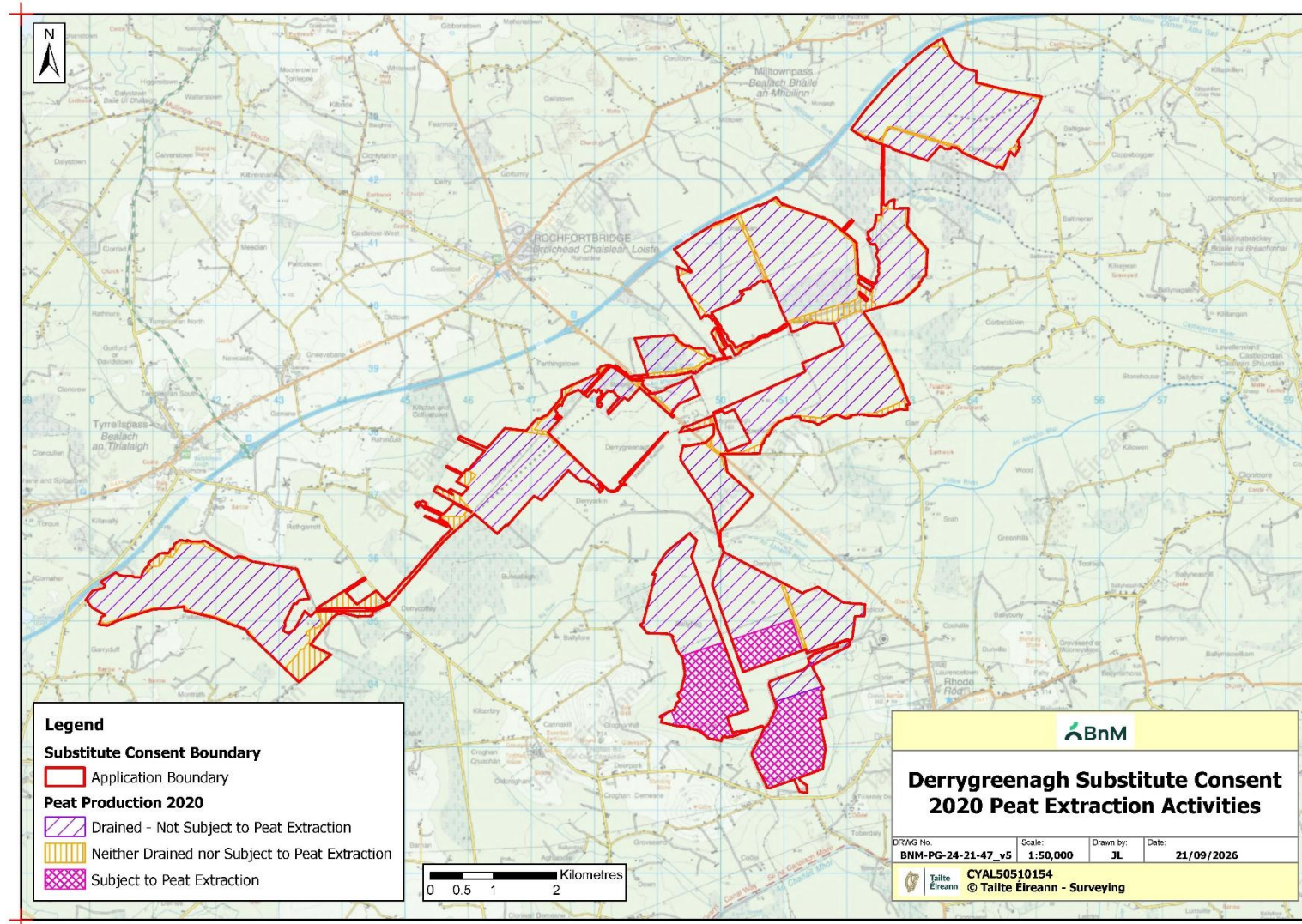


Figure 4-9: Application Site peat extraction areas in 2020

4.7.4 Peat Extraction Volumes July 1988 to 2020

The volumes of peat extracted at the Application Site varied from year to year and were influenced by weather conditions. The annual extraction quantities for the period from 1988 to 2020 are set out in Figure 4-10 and Table 4-4. There are no detailed records for peat extraction volumes between 1988 and 1991, therefore an average of the 1992 to 2019 peat extraction volumes was used for the 1988, 1989, 1990 and 1991 season (2020 volumes were excluded from this average calculation as they were not representative of a full year of peat extraction).

Between July 1988 and 2020, an average of 173,799 tonnes of peat were extracted each year, with a total of 5,735,371 tonnes extracted at the Application Site between July 1988 and the cessation of peat extraction in 2020. Bord na Móna implemented a stockpiling system whereby the aim was to have three years supply stockpiled at any time to ensure there was a supply available to end users in years of poor harvest due to weather conditions. The peat extraction volumes therefore do not directly relate to deliveries of peat to end users over any given extraction year.

From the recorded volumes in Table 4-4, the most productive extraction year was 1995 with 400,097 tonnes extracted that season. The least productive extraction year was 2020 with 13,248 tonnes extracted. The year of 2020 doesn't represent a full extraction year as peat extraction ceased in June 2020.

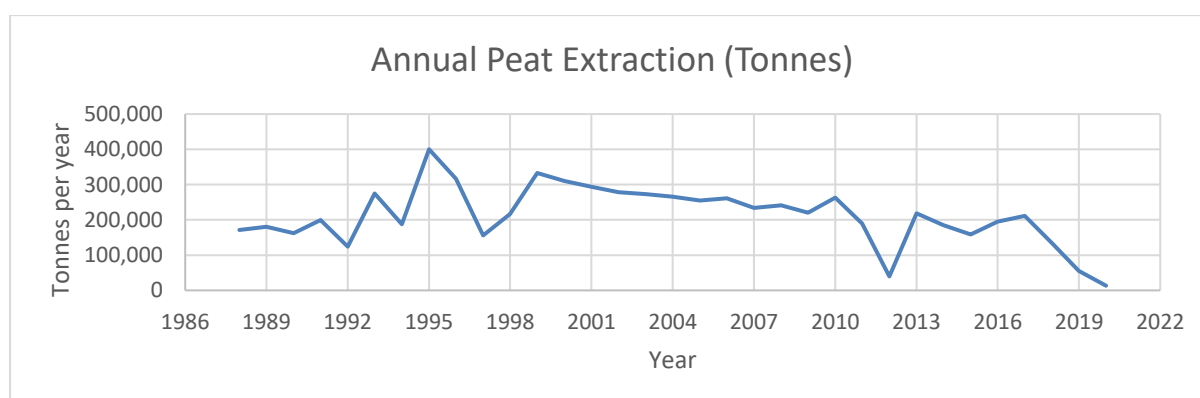


Figure 4-10: Annual peat extraction volumes July 1988 - June 2020

Table 4-4: Annual peat extraction quantities for the period 1988 to 2020

Year	Annual Extraction (Tonnes)
1988	110,675*
1989	221,350**
1990	221,350**
1991	221,350**
1992	102,953

Year	Annual Extraction (Tonnes)
1993	274,759
1994	187,384
1995	400,097
1996	316,376
1997	156,079
1998	174,322
1999	295,317
2000	270,631
2001	319,668
2002	122,597
2003	129,718
2004	982,40
2005	966,03
2006	114,255
2007	128,810
2008	127,422
2009	102,959
2010	213,908
2011	117,933
2012	39,409
2013	218,854
2014	185,143
2015	158,376
2016	194,944
2017	210,919

Year	Annual Extraction (Tonnes)
2018	134,171
2019	55,551
2020***	13,248
Total	5,735,371

**1988 peat extraction volumes are for months July – December 1988, when the Baseline period began as per Section 4.1.*

***Based on average peat extraction volumes at the Application Site for the period 1992-2019 absence of accurate data.*

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

4.7.5 Peat Destinations post-1988

Milled peat from the Application Site continued to be delivered to Rhode Power Station and Croghan Briquette Factory during the Peat Extraction Phase, up to the respective closure of these facilities in 2003 and 2000. In 2001, milled peat from the Application Site was delivered for the first time to the then newly commissioned Edenderry Power Station, Co. Offaly. Derrinlough Briquette Factory, Co. Offaly, first received milled peat from the Application Site in 2002, and from 2004 and 2005 peat from the Application Site began being transported to Lough Ree Power Station, Co. Longford and West Offaly Power Station in Shannonbridge, Co. Offaly, respectively.

In addition to energy generation, milled peat from the Application Site was also used as a horticultural growth medium. Peat from the Application Site was transported to the Bord na Móna Kilberry Horticultural Works, Co. Kildare for the first time in 2003, with small quantities also transported to Bord na Móna's Ballivor Horticultural Works in 2013 and 2015. A small amount of milled peat was transferred to Bord na Móna's Horticultural Works in Cúil na Móna, Co. Laois, for the first time in 1995, with no further deliveries made there until 2013. Milled peat for horticultural use was also supplied to other third-party users for horticultural use from 2012.

Peat was transported from the Application Site by a combination of Bord na Móna rail and HGVs on public roads. Further details can be found in Chapter 14 – Material Assets (incl. Traffic and Transportation).

4.7.6 Ancillary Activities 1988 to 2020

As outlined in Section 4.4, there were various ancillary structures and features associated with peat extraction activities at the Application Site.

The Derrygreenagh Works served as the central location for support services, including workshops, offices, and welfare facilities. These facilities were primarily used for the maintenance and repair of machinery associated with peat extraction and ancillary activities. The offices at Derrygreenagh Works provided administrative and welfare facilities, serving employees and staff on-site. The Works also played a central role in the administration of activities within the Application Site. As outlined in Section 4.4, the workshops and offices at the Derrygreenagh Works were built before the implementation of the Planning and Development Act (1963), which came into effect on 1 October 1964, and these structures are not part of this substitute consent application.

Welfare facilities were located across the Application Site. These facilities provided workers with a clean area for taking breaks and welfare services.

As outlined in Section 4.4, fuel for machinery was, and still is, stored in above-ground tanks with bunding to prevent fuel spills or leaks. These tanks are located at Derrygreenagh Works, and refuelling procedures were upgraded to comply with licensing requirements in 2000.

During the Peat Extraction Phase, a 36-inch gauge railway system was the exclusive means of transporting milled peat from the bogs of the Application Site to the nearby Rhode Power Station up to 2003 and Croghan Briquette Factory until 2000.

The steel rails, with a weight of 30 lbs to 35 lbs per yard, were mounted on steel sleepers, with some areas using heavier rails on creosoted pine or redwood sleepers. Approximately 18.56 km of permanent track existed within the Application Site during these period, and temporary tracks were laid as needed to transport peat from stockpiles to the power station or the central peat loading facility at Derrygreenagh Works. These temporary tracks were typically 30-foot sections, laid and lifted using special equipment. The construction of permanent rail beds depended on proper drainage, and various level crossings were installed. Diesel locomotives were used to pull peat-filled wagons, which were equipped with lids to prevent the release of dust during transportation.

4.7.7 Pilot Rehabilitation Trials

Pilot rehabilitation trials were undertaken at Derryarkin bog between 2001 and 2002, with small areas of cutaway peatland rewetted through drain blocking and modifications to the main outfalls. Further rehabilitation trials were undertaken at Derryarkin bog in 2016, involving the application of fertiliser to approximately 30 ha of cutaway peatland in the northeastern portion of the site to promote vegetation establishment. At Drumman, rehabilitation trials were undertaken between 2010 and 2014 across approximately 18 ha of bare peat, with stabilisation and re-vegetation achieved through the application of fertilisers and nurse crops. These trials were undertaken to inform the suitability of rehabilitation measures for their inclusion in the Draft Cutaway Bog Decommissioning and Rehabilitation Plans which are required to be drafted in accordance with Condition 10 of the IPC Licence. No new rehabilitation trials have taken place, nor are planned to take place, during the Current Phase.

Rehabilitation measures will be undertaken in accordance with the detail set out in the Draft Cutaway Bog Decommissioning and Rehabilitation Plans (see Appendix 4-2), subject to agreement with the EPA. Details of these measures have also been included in Table 4-7, Section 4.9 below.

4.7.8 Control Measures from 1988 to 2000

Post-1988, but prior to the implementation of the IPC Licence at the Application Site in 2000, the environmental management measures set out in Section 4.5.6, remained in place across the Application Site. In addition, as evidenced in the 1991 Harkins Report (see Appendix 4.7), 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 improve silt pond design and use such that suspended solids emissions in surface run-off were reduced.

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 accordance 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 na 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 ca. 80,000-hectare land holdings of Bord na Móna had been subject to archaeological survey.⁵

⁵ 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>



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 2012.⁶ 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 and ancillary activities and whilst ensuring 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 paleo-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.*

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

Bord na Móna was granted an IPC Licence (Reg. No. P0501-01) for the Derrygreenagh Bog Group (within which the Application Site is located) in April 2000. Following the grant of the IPC Licence, the control measures listed in Section 4.5.6 have been updated and expanded. A copy of the IPC Licence is provided in Appendix 4-1. The IPC Licence application is publicly available and can be viewed on request at EPA Headquarters PO Box 3000 Johnstown Castle Estate County Wexford Y35 W821.

Following the grant of the IPC Licence in 2000, Bord na Móna staff underwent an EPA IPC Licence Compliance training programme, 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

⁶ 2012 Code of Practice between the Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna <https://www.archaeology.ie/sites/default/files/media/publications/cop-bord-na-mona-en.pdf>

the natural environment and ecosystem. Refer to Appendix 4-20 for the Bord na Móna IPC Licence Compliance 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. In September 2012, the IPC Licence was subject to a Technical Amendment for the purpose of aligning with 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 and ancillary activities 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. Refer to Chapter 9 Hydrology and Hydrogeology of this rEIAR and the Annual Environmental Reports (AER) included as Appendix 4-4 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 IPC Licence outlined the Scope, Management, Interpretation and Notification procedures required by the Applicant, respectively. Conditions 5 to 10 relate to the environmental monitoring and management of the Bog. Conditions 11 to 14 detail the Monitoring (equipment use), Recording and Reporting, Emergency Response and Financial Provisions duties of the Applicant.

Table 4-5 lists conditions 5 to 10, and where the corresponding assessments can be found in this rEIAR. Bord na Móna will continue to implement and practice the monitoring measures as listed in the Licence once the site is decommissioned, where applicable.

Table 4-5: Conditions 5 to 10 of the IPC Licence and corresponding technical assessments

Condition no.	Condition Title	Compliance Requirement	Assessment as part of this rEIAR
5	Emissions to atmosphere	The Applicant must undertake annual tests on boiler combustion efficiency and dust monitoring	Chapter 10: Air Quality
6	Emissions to water	Condition 6 ensures the Applicant must establish 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.	Chapter 9: Hydrology and Hydrogeology Appendix 4-4: Annual Environmental Reports (AER)
7	Waste Management	Condition 7 requires the Applicant to correctly dispose of waste to licenced facilities.	Chapter 14: Material Assets
8	Noise	Condition 8 ensures that any onsite activities do not give rise to noise exceedances at noise sensitive receptors.	Chapter 11: Noise and Vibration
9	Water Protection	Condition 9 requires '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.	Chapter 9: Hydrology and Hydrogeology
10	Cutaway Bog Rehabilitation	Condition 10 relates to site decommissioning followed by peatland rehabilitation.	Chapter 4: Section 4.9 Remedial Phase Chapter 7: Biodiversity

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 SOPs 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. Refer to Appendix 4-13 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 industrial peat extraction across all bogs within its landholding had ceased. However, peat extraction at the Application Site had already ended prior to this announcement, with peat extraction ceasing in 2020.

The Application Site still operates under the requirements of IPC Licence P0501-01, and any decommissioning works undertaken with respect to peat extraction and ancillary activities 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 licensed 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, the license requires the decommissioning of the Application Site by removing, disposing of, or recovering buildings, equipment, waste materials, and other ancillary infrastructure. A key objective of Condition 10 is to ensure that the Application Site is not causing, and is not likely to cause, environmental pollution, and that the site is left in a satisfactory condition such that the licensed lands can be deemed suitable for surrender of the IPC License under Section 95 of the EPA Acts.

To meet these requirements, Bord na Móna identifies all mechanical and infrastructural resources that were installed within the bogs to facilitate the development and extraction operations. This inventory is then reviewed to identify any items that could potentially result in environmental pollution if left in situ and therefore require removal.

The onsite machinery which are used during the Current Phase include;

- Wheeled Loader Lorry;
- Track Excavator;
- Locomotive and Wagons;
- Dump Truck, and;
- Tractors.

In reality, the majority of this machinery will be stored on site and will access the Application Site via the bogs themselves, thus ensuring there will be minimal vehicle movements associated with the machine works during the Current Phase.

The remaining bog and ancillary infrastructure include any unconsolidated plant, equipment and attachments, waste materials, unused raw materials (e.g. land drainage pipes), remaining peat stockpiles, stockpile coverings and pumps. Following the cessation of peat extraction, any remaining stockpiled peat at the Application Site was systematically transferred to Ballivor Horticultural Works, Derrinlough Briquette Factory, Lough Ree Power Station, West Offaly Power Station, Cúil na Móna Horticultural Works, Edenderry Power Station, and other third-party horticultural peat customers. Stockpile removal was completed in 2021. Ongoing decommissioning measures at the Application Site are outlined in Table 4-6.

As aforementioned, approximately 18.56km of permanent rail track was located within the Application Site boundary. The rail infrastructure will be decommissioned as part of the wider decommissioning programme under the IPC Licence. Decommissioning activities for each of the five bogs within the Application Site are detailed in Appendix 4.3.

Table 4-6: Future decommissioning items for Application Site.

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 all bogs
2	Clean silt ponds	Relevant to all bogs
3	Decommission peat stockpiles	Completed 2021
4	Decommission or remove buildings and compounds	Relevant to all bogs
5	Decommission fuel tanks and associated facilities	Not relevant
6	Decommission and removal of septic tanks	Not relevant
7	Decommissioning and removal of a number of existing bog pumps where suitable/necessary	Ballybeg Bog

In relation to waste management, Condition 7 of the IPC Licence requires that all identified waste items be disposed of or recovered in accordance with the procedures set out in the licence. The relevant conditions state:

“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 authorised 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."

In accordance with the IPC Licence, waste items are - and will continue to be - removed from the Application Site for recycling or disposal, using professional licenced contractors as required under Condition 7.2. Waste management records are, and will continue to be, maintained in full compliance with Condition 7.3.

Bord na Móna will dispose and treat the waste in accordance with the waste hierarchy, ensuring that where possible, materials will be reused or recycled in preference to recovery or disposal.

Validation of compliance with Condition 10.1 of the IPC Licence is undertaken through an Independent Closure Audit (ICA), followed by an EPA Exit Audit (EA), resulting in the partial or full surrender of the IPC Licence.

4.9 REMEDIAL PHASE

4.9.1 Peatland Rehabilitation Plans

Following the conclusion of the decommissioning activities, Bord na Móna are required under Condition 10.2 of the IPC Licence to prepare (to the satisfaction of the EPA) and implement, a Cutaway Bog Rehabilitation Plan. Condition 10.2 of the Licence states:

"Condition 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.*

Condition 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.*

Condition 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 each of the five bogs within the Application Site (i.e., Derryhinch, Drumman, Derryarkin Ballybeg and Toar Bogs), refer to Appendix 4-3 for details. It is the intention of Bord na Móna to rehabilitate the bogs in a phased approach under the requirements of the IPC Licence.

Decommissioning and rehabilitation plans have been 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, 2016⁷);
- Significant international engagement during this period with other countries 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; Gann et al., 2019);
- Ongoing consultation and engagement with internal and external stakeholders regarding rehabilitation, biodiversity and other general issues over the years about the Derrygreenagh Bog Group;
- Geographical Information System (GIS) Mapping;
- Bord na Móna drainage surveys;
- Bog topography and LIDAR data;
- Previous research studies on site; and,
- Hydrological modelling.

The current plans also take cognisance of the EPA Guidance on the Process of Preparing and Implementing a Bog Rehabilitation Plan (2020). Each plan contains within a detailed ecological

⁷ Bord na Móna. 2016. *Bord na Móna Biodiversity Action Plan 2016-2021*. Brosna Press, Ferbane. <http://www.bordnamona.ie/wp-content/uploads/2016/04/Biodiversity-Action-Plan-2016-2021.pdf>

report and GIS mapping pack. The key objective of Bord na Móna peatland rehabilitation is environmental stabilisation. The rehabilitation of the bogs 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 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 submission of the rehabilitation plans to the EPA for agreement and finalisation, a baseline ecology survey will be carried out to determine the status of natural colonisation and the potential for targeted rehabilitation measures to ensure stabilisation of the future cutaway.

A timeline for the stages of the measures included in the Cutaway Bog Decommissioning and Rehabilitation Plans is provided in Table 4-7.

Table 4-7: Timeline for Cutaway Bog Decommissioning and Rehabilitation Plan Actions

Phase	Derryarkin (Draft Plan 2026)	Drumman (Draft Plan 2026)	Ballybeg (Draft Plan 2026)	Derryhinch (Draft Plan 2026)	Toar (Draft Plan) (2026)
Measures Implemented	- Some cutaway was developed in the past (1980s) as grassland. This land has now been sold. - A significant portion of the site has already been developed as a conifer plantation by Coillte (12%). This forestry (conifer plantation) has established and is considered to be rehabilitated. Issues of forestry management will be addressed during forestry operations in the forested sections of the site by Coillte, and under the appropriate Felling Licence as granted by the Forest Service. - Part of the site is used for gravel extraction and there has also been some rehabilitation of this area. - There have been several phased pilot rehabilitation measures at Derryarkin. - Wetlands (143 ha) were created in 2001-2002 when main outfalls were blocked and cutaway was deliberately re-wetted. - An area of cutaway (13 ha) with significant bare peat cover adjacent to the road in Derryarkin was treated with fertiliser to encourage natural colonisation in 2016. - Rehabilitation with drain-blocking and hydrological management (wetland creation) has already been carried out across the site. There has also been some phased rehabilitation with a fertiliser treatment targeting primarily bare peat areas in 2016. - Natural re-colonisation of the cutaway so far has been effective across the site.	- A significant portion of the site has already been developed as a conifer plantation by Coillte (11%). - Rehabilitation has already been carried out in an additional 10% of the cutaway in Drumman North, with the development of a large wetland mosaic. - Rehabilitation trials have been carried out on 19 ha of bare peat cutaway in the north of the site, re-vegetating and stabilising these areas (2010). - Additional bare peat cutaway in the north of the site (30 ha) was treated with a fertiliser application (2012). This area has subsequently become well vegetated. - A second trial was developed in 2014 to test the ability of two different grass seed mixtures to establish on bare peat cutaway. This trial covered 2 ha. - Part of the site was used to establish a herb production trial. This pilot project has now been completed and the herb production has helped to establish vegetation as a nursery crop. - Parts of the site are already re-vegetating, with establishing cover of pioneer vegetation developing a mosaic of typical cutaway peatland and wetland habitats. Natural re-colonisation of the cutaway so far has been quite effective. Bare peat areas within the cutaway parts of the site are shrinking as vegetation develops and consolidates.	- Parts of the site are already re-vegetating, with established cover of pioneer vegetation developing a mosaic of typical cutaway peatland and wetland habitats. Natural re-colonisation of the cutaway so far has been quite effective. Bare peat areas within the cutaway parts of the site are shrinking as vegetation develops and consolidates. - A large section of the cutaway has already been developed as an Alder Biomass trial.	- A widespread drain-blocking programme will be implemented across the cutaway, where possible. In general, field drains will be blocked where possible to re-wet cutaway and re-wet to the optimum water-level. - Less intensive measures (tagreted drain-blocking) will be used in areas where habitats have already established. - Measures will include drain blocking (3/100m), modifying outfalls and managing water levels with overflow pipes. - Wetland measures including drain blocking, modifying outfalls and managing water levels with overflow pipes. - The existing silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase the silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that the silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. The 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).	- A targeted drain-blocking programme and hydrological management will be implemented in bare peat areas across the cutaway, where possible. In general, field drains will be blocked where possible to re-wet cutaway to the optimum water-level. - Areas of deeper bare peat will be targeted for more intensive drain-blocking. - Measures will include drain blocking (3/100 m), modifying outfalls, where possible, and managing water levels with overflow pipes. - The existing silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase the silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that the silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. The 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).
Short-term Planning Actions (0-1 Years)	- Seek formal approval of the rehabilitation plan from the EPA. - Develop a detailed site plan outlining how the various rehabilitation methods will be applied. This will take account of peat depths, topography, drainage and hydrological modelling (see rehabilitation map for an indicative view of the application of different rehabilitation methodologies). - A drainage management assessment of the proposed 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, existing land agreements and rehabilitation plans associated with the sand and gravel extraction pits at Derrygreenagh is to be carried out. • A review of remaining milled peat stocks 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. • Carry out Appropriate Assessment (AA) of the Rehabilitation Plan. Incorporate any required mitigation measures from the AA (if required) in the plan for the delivery of rehabilitation and decommissioning across the site. • 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.
Medium-term Practical Actions (0-2 Years)	• Carry out proposed measures as per the detailed site plan. 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. • 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.
Long-term Actions (>3 Years)	• Evaluate success of short-term rehabilitation measures outlined above 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.

4.9.2 Description of Proposed Rehabilitation Measures

Rehabilitation works have commenced on the Application Site already in the form of natural revegetation and re-colonisation (as described in the Cutaway Bog Decommissioning and Rehabilitation Plans (Appendix 4.3)) and in Table 4-7. Further rehabilitation work will commence immediately following the full decommissioning of the Application Site. The Cutaway Bog Decommissioning and Rehabilitation Plans included provides a description of the five bogs and their ecology. It also provides a framework and outlines the typical 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 likely be implemented.

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

Drain Blocking

Drains will be blocked using several methods depending on the size and type of drain. These methods will include the following:

- Peat dams within small drainage channels on the cutover bog;
- Removal or blocking of drainage pipes, or modification of drainage levels, where required.

These methods are fully described in the Irish Wildlife Manual, *Best Practice in Raised Bog Restoration in Ireland* (Mackin et al, 2017).

Monitoring

As per the Cutaway Bog Decommissioning and Rehabilitation Plans, a programme of monitoring, aftercare and maintenance will be implemented to validate the efficacy of the rehabilitation measures in achieving environmental stabilisation. Monitoring will initially involve quarterly monitoring assessments of the site to determine the general status of the site, the condition of the silt ponds, assess the condition of the rehabilitation work, monitoring of any potential impacts on neighbours' land, general land security, boundary management, dumping and littering. The number of these site visits will reduce after 2 years to bi-annually, and then after 5 years to annual visits. Monitoring visits will also consider any requirements for further practical rehabilitation measures.

The baseline condition of the site will be established post-rehabilitation implementation by using an aerial survey to take an up-to-date aerial photo, when rehabilitation is completed. This will be used to verify completion of rehabilitation measures. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated, if needed. It is proposed that sites can be monitored against this baseline in the future.

Water quality monitoring at the bog will be established. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.

In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing IPC Licence monitoring requirements to sampling for the same parameters to every month during the scheduled activities and for a period up to two years post rehabilitation, depending on the period required to confirm that the main two parameters, suspended solids and ammonia are remaining compliant with the licence emission and trigger limit values and there is an improving trajectory in these two parameters i.e. reduction in concentration.

Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at www.epa.ie.

The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD and DOC. This monthly sampling regime on a selected number of silt ponds will be carried out over a two-year cycle.

If, after two years, key criteria for successful rehabilitation are being achieved and key targets are being met, then the water quality monitoring will be reviewed, with consideration of potential ongoing research on site. The water quality data, the aerial surveys and the habitat mapping will be collated and will be submitted to the EPA as part of the final validation report.

If, after two years, key criteria for successful rehabilitation have not been achieved and key targets have not been met, then the rehabilitation measures and status of the site will be evaluated and enhanced, where required. This evaluation may indicate no requirement for additional enhancement of rehabilitation measures but may demonstrate that more time is required before key criteria for rehabilitation has been achieved. Monitoring of water quality will then also continue for another period to be defined.

4.10 POTENTIAL FUTURE LAND USE

4.10.1 Proposed Derrygreenagh Renewables Project

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 2025, the Climate Change Performance Index 2024, and the Change Advisory Council's Annual Report 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 Application Site for both peatland remediation and wind energy infrastructure and to facilitate environmental stabilisation of the Application Site and the optimisation of climate action benefits.

As described in Chapter 2, BnM intend to develop a wind and solar energy project across Derryarkin, Drumman, Derryhinch and Ballybeg Bog, currently known as Derrygreenagh Wind

and Solar project. The proposed development is currently at the design phase and is likely to consist of wind turbines, solar photovoltaics and a battery energy storage system. The design of the development will align and integrate with the peatland rehabilitation measures as required under the IPC Licence P0501-01.

A third party intends to develop infrastructure at lands within the Application Site, consistent with the Government's Large Energy User Action Plan (LEAP), and which will be subject to separate planning and regulatory consent as appropriate.

Any future development within the Application Site, will be the subject of separate planning applications. Where required, such applications will be accompanied by an Environmental Impact Assessment Report (EIAR), which will assess the likely significant environmental effects associated with the construction, operation and decommissioning of the respective developments, including consideration of the rehabilitation measures being implemented at the Application Site.

4.11 REFERENCES

- Anon, *Bog Life: Bringing Lowland Raised Bogs to Life*. Natural England(2016)
- Bord na Móna, *Rehabilitation of industrial cutaway bog, North-West Mayo. IPC Application* (2002)
- Bord na Móna, 2016 – Bord na Móna Biodiversity Action Plan 2016-2021. Brosna Press, Ferbane. <http://www.bordnamona.ie/wp-content/uploads/2016/04/Biodiversity-Action-Plan-2016-2021.pdf>
- Clarke, Donal, *Brown Gold, A History of Bord na Móna and the peat industry in Ireland*(2010)
- Clarke, Donal and Rieley, Jack, *Strategy for Responsible Peatland Management* (6th Edition) (2010)
- Dunne, F., *Blanket Bog, Heath and Upland Grassland Enclosures, Baseline Surveys and Monitoring Methodologies*(2000)
- EPA, *Guidance on the Process of Preparing and Implementing a Bog Rehabilitation Plan* (2020)
- Farrell, C.A. and Doyle, G.J., *Rehabilitation of industrial cutaway Atlantic blanket bog in County Mayo, North-west Ireland. Wetlands Ecology and Management*, 11, 21-35 (2003)
- Gann et al., *International Principles and Standards for the Practice of Ecological Restoration* (2nd Edition) (2019)
- Joosten, Hans and Clarke, Donal, *Wise Use of Mires and Peatlands – Background and Principles including Framework for Decision-Making*(2002)
- Kent, *Vegetation Description and Data Analysis: A Practical Approach* (2nd Edition) (2011)
- Lunt et al., *Peatland Restoration*(2010)
- Mackin et al., *Irish Wildlife Manual – Best Practice in raised bog restoration in Ireland*(2017)
- NPWS and the Department of Agriculture, Food and the Marine (DAFM), *A Manual for the Production of Grazing Impact Assessments in Upland and Peatland Habitats* (1999)
- Perrin et al., *Detailed habitat and ecotype classification based on The National Survey of Upland Habitats*(2014)



