

Bord na Móna

Lemanaghan Bog

**Draft Cutaway Bog Decommissioning
and Rehabilitation Plan**

2024

This document seeks to address the requirements of Condition 10.2 of IPC licence Ref. P0500-01:

“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 licence condition requires Bord na Móna agree with the EPA the measures that will provide for rehabilitation, i.e. stabilisation of Lemanaghan Bog upon cessation of peat production and compliments the licence requirement to decommission the site.

Rehabilitation generally comprises site stabilisation with natural colonisation with or without targeted management.

Industrial peat production has now fully ceased at Lemanaghan Bog.

In addition, to preparing this document to comply with Condition 10.2 of IPC Licence Ref. P0500-01, due regard was also given to the Peatlands Climate Action Scheme (PCAS) announced by the Minister. This Scheme will see the Minister support, via the Climate Action Fund and Ireland’s National Recovery and Resilience Plan, Bord na Móna in developing a package of measures, ‘the Scheme’, for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme’. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e., measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support. The additional costs of the Scheme will be supported by Government, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator.

While this document outlines the enhanced rehabilitation measures planned for the PCAS extent of Lemanaghan Bog, activities which go beyond that required by Condition 10 in the Licence, rehabilitation necessary to comply with the ‘standard’ requirement of Condition 10 (in the absence of the Scheme) is also included, to estimate costs. The inclusion of the ‘standard’ rehabilitation together with the enhanced rehabilitation in this document allows the Scheme Regulator to distinguish and objectively determine the specific activities (and their associated costs) eligible for support under the Scheme.

Bord na Móna have defined the key rehabilitation outcome at the PCAS extent of Lemanaghan Bog as environmental stabilisation, re-wetting and setting the bog on a trajectory towards development of naturally functioning peatland and wetland habitats.

Any consideration of any other future after-uses for the PCAS extent of Lemanaghan Bog will be conducted in adherence to the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Bord na Móna are planning to develop a potential renewable energy project at Lemanaghan Bog. This project is currently in the pre-planning stages and is expected to be submitted for planning permission in summer of 2025. This area has been mapped as a constraint in the rehabilitation plan.

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Non-technical summary

- Lemanaghan bog is located in Co. Offaly and is part of the Boora Bog Group. Bellair North and Bellair South Bogs are located to the north and Turraun, Derries and Pollagh Bogs located to the south-east.
- Bord na Móna is now (2024) planning to rehabilitate two sections of Lemanaghan Bog henceforth referred to as the PCAS extent. These two areas are on the southern side of the R436 road which connects Ferbane in County Offaly to Ballycumber in County Offaly. The two sections include an area of drained high bog, Curraghalassa Bog, to the west and a larger section of cutaway bog, Derrynagun Bog, located 1.8km further north-east. Although traditionally included in what is known as Lemanaghan Bog, they are in fact (hydrologically) distinct from the area which is currently under consideration for a renewable energy development- which for the avoidance of doubt is excluded from this rehab plan.
- Bord na Móna are currently developing a renewable energy project called Lemanaghan Wind Farm within the area to the north of the aforementioned R436 road. This proposed renewable energy footprint or lands facilitating same will not overlap with the currently proposed PCAS extent. This proposed project is in the pre-planning stage.
- Derrynagun Bog, formerly supplied a range of commercial functions including the supply of horticultural peat and fuel peat.
- Industrial peat production commenced at the overall Lemanaghan Bog including the current PCAS extent) during the 1950's and ceased in 2019/20. However, the bog was in sod-peat production for some time, and it was only relatively recently that extensive areas had been put into milled peat production (within the past 15 years). As a result, 'red' acidic deep peat reserves remain on the former production area.
- The western lobe within the PCAS extent contains some features of archaeological significance and has not been used for peat production as a result of this, although it has been drained in the past. The eastern lobe, within the PCAS extent, also has archaeology present including an extant trackway of significance.
- Following cessation of harvesting, Bord na Móna are obliged to carry out peatland rehabilitation via an IPC licence issued by the Environmental Protection Agency. In addition, the Government has agreed to support peatland rehabilitation via the establishment of the Peatland Climate Action Scheme (PCAS). This is funded via the Government and by Bord na Móna.
- The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat (putting a "skin" back onto the peat), and minimising effects to downstream waterbodies.
- The PCAS extent was drained in the past to allow peat production. Drain blocking in these locations will minimise effects to downstream waterbodies. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is rewetted. Drain-blocking and other measures will be implemented to raise water levels to the surface of the bog and to encourage the natural colonisation of vegetation.
- In general, soggy ground conditions are preferred. Rewetting the remaining peat will result in plants that prefer wetter conditions, like Bog Cotton, will thrive.
- Some small sections with deeper residual peat have the capacity to regrow *Sphagnum* moss again, where there are suitable hydrological conditions. *Sphagnum* is a key species for restoring naturally functioning raised bog conditions.
- Many Bord na Móna bogs cannot be restored back to raised bog, as so much peat has been removed and the environmental conditions have been modified. However other natural habitats will develop like poor fen and *Sphagnum* rich (embryonic bog communities) (on deeper peat); and wetlands with Reedbeds and Birch woodland on shallower peat. In time a naturalised peatland can be developed.

- The development of a range of habitats at the PCAS extent will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. Many wetland habitats in the wider landscape have been reclaimed for agriculture and other uses and peatland rehabilitation is an opportunity to create new wetland habitats.
- Measures proposed for the PCAS extent include internal drain blocking and other measures required to raise water levels to the surface of the peat.
- These rehabilitation measures will be planned by a team consisting of expert ecologists and engineers. It is a guiding principle of Bord na Móna rehabilitation planning that no actions or activities will be undertaken that would negatively impact on adjacent land. No boundary drains will be blocked. Water will still leave the bog via the existing outlets.
- It will take some time for active raised bog communities (50 + years) to fully develop within the cutover in the PCAS extent, and for an active raised bog peatland ecosystem to be restored. However active raised bog can potentially develop in the high bog Curraghalassa post rehabilitation in a shorter time frame.
- This is a peatland rehabilitation plan. This plan does not consider future after-use or development. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments. Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the bog.
- Peatland rehabilitation of this bog will bring a range of benefits to the local community via improvements to the local landscape and is also important for supporting national policies and strategies in relation to reduction of carbon emissions from these peatlands, supporting biodiversity and improvements to water quality.

1. INTRODUCTION

Bord na Móna (BNM) operates under IPC licence issued and administered by the EPA to extract peat within the Boora bog group (Ref. P0500-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The boglands currently under consideration are part of the Boora Bog group (see Appendix II for details of the bog areas within the Boora bog group) and are located in Co. Offaly, approximately four kilometres north-east of Ferbane.

Bord na Móna is now (2024) planning to rehabilitate two sections of Lemanaghan Bog henceforth referred to as the PCAS extent. These two areas are on the southern side of the R436 road which connects Ferbane in County Offaly to Ballycumber in County Offaly. The two sections include an area of drained high bog, called Curraghalassa Bog, to the west and a larger section of cutaway bog, known as Derrynagun Bog, located 1.8km further north-east. Although traditionally included in what is known as Lemanaghan Bog, they are in fact (hydrologically) distinct from the area north of the R436, which is currently under consideration for a renewable energy development- and which for the avoidance of doubt is excluded from this rehab plan.

As noted, the remainder of Lemanaghan Bog (outside of the PCAS extent) will be part of the proposed Lemanaghan Wind Farm, which is currently in pre-planning. The proposed renewable energy footprint will extend across the central section of Lemanaghan Bog north of the R436. This proposed renewable energy footprint will not overlap with the PCAS extent.

This plan is a specific rehabilitation plan for the 2024 PCAS extent of Lemanaghan bog (i.e. Derrynagun and Curraghalassa Bogs) and outlines:

- Description of site management and status.
- Main issues and approaches to rehabilitation.
- Consultation to date with interested parties.
- Interaction with other policy and legislative frameworks (Appendix VI).
- The planned rehabilitation goals and outcomes.
- The scope of the rehabilitation plan.
- Criteria which define the successful rehabilitation and key targets to validate rehabilitation.
- Proposed rehabilitation actions.
- Proposed timeframe to implement these measures.
- Budget and Costings.
- Associated aftercare, maintenance, and monitoring.

Note: This plan should be read in conjunction with the accompanying Map book.

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme on its peatlands. Note this proposal is also known colloquially as the 'Peatlands Climate Action Scheme' (PCAS). The additional costs of the Scheme will be supported by Government through the Climate Action Fund, and Ireland's National Recovery and Resilience Plan administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have previously identified a footprint of 33,000 ha as peatlands suitable for this scheme. This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII & IX) under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC

obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. The Scheme commenced in 2021.

Only the costs associated with the additional, enhanced, and accelerated rehabilitation, i.e., those measures which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10, will be eligible for support under the Scheme. Bord na Móna announced the complete cessation of industrial peat production across its estate in January 2021.

It is expected that the Scheme (PCAS) will have benefits accruing from biodiversity provision, water quality and storage attenuation as well as increased carbon storage, reduced carbon emissions and acceleration towards carbon sequestration. The Scheme will also facilitate monitoring of carbon fluxes (greenhouse gases and fluvial carbon) in selected areas (in addition to other established Research programmes), to monitor changes in where the interventions will accelerate the trajectory towards a naturally functioning peatland ecosystem.

It is envisaged that the Rehabilitation Scheme (PCAS) will support activities, interventions, or measures across the Bord na Móna cutaway peatlands which accelerate the original timelines. Selected rehabilitation measures will take account of site environmental conditions, which can vary significantly. These measures potentially include:

- more intensive management of water levels through pump management, drain-blocking and cell bunding,
- re-profiling that will deliver suitable conditions for development of wetlands, fens and bog habitats,
- targeted fertiliser applications,
- seeding of targeted vegetation, and
- proactive inoculation of suitable peatland areas with *Sphagnum*.

These are collectively designed to optimise hydrological conditions (ideally and where possible water-levels <10 cm) for climate action benefits and to accelerate the trajectory of the site towards a naturally functioning ecosystem, and eventually a reduced carbon source/carbon sink again. In some areas of dry cutaway this trajectory will be significantly longer, and it is not feasible in the short-term to re-wet some areas. These areas will develop other habitats. The key to optimising climate action benefits is the restoration of suitable hydrological conditions and more intensive intervention means that the extent of suitable hydrological conditions can be optimised.

These measures are designed to encourage the development of peat-forming habitats, where possible. They are also designed to further slow the movement of water across the site (with the site acting similarly to a constructed wetland), slowing the release of water (improving local water attenuation) and water quality is also expected to improve as the site returns to a naturally functioning peatland ecosystem. It is anticipated that the combination of active enhanced rehabilitation measures and natural colonisation will quickly accelerate environmental stabilisation. Nevertheless, it will still take some time (30-50 years) for naturally functioning wetland and peatland ecosystems to fully re-establish.

1.1 Constraints and Limitations

This document seeks to address the requirements of Condition 10.2 of IPC licence Ref. P0500-01:

“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.”

It also seeks to outline measures to optimise climate action and other ecosystem services benefits, mainly through hydrological management.

This document covers the area of **the PCAS extent** of Lemanaghan Bog shown outlined as the 'BnM PCAS boundary' in the site location map (drawing number BNM-DR-25-07-RP-01). Although ditching exists on other parts of Curraghalassa Bog, it is noted that the PCAS extent is limited to lands in BNM ownership.

Parts of the PCAS extent (within the areas owned and under the control of Bord na Móna) are currently being used by domestic turf cutters for intensive private sod peat production. These areas are ecologically and hydrologically linked to the area owned by Bord na Móna where rehabilitation is planned. It is beyond the scope of this rehabilitation plan to address turf cutting issues on the PCAS extent that are outside of the control of Bord na Móna. Nevertheless, Bord na Móna are aware of such issues which may constrain the proposed rehabilitation actions, and this rehabilitation plan considered potential impacts of these on the delivery of the stated objectives.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way. There is some remaining stock still on the bog. It is envisaged extant stock will be removed prior to PCAS rehabilitation activities.

Lemanaghan Bog (outside of the PCAS extent) will be part of the proposed Lemanaghan Wind Farm, which is currently in pre-planning. The Lemanaghan Wind Farm footprint will extend across the central section of Lemanaghan Bog north of the R436 which is hydrologically distinct from the presently proposed PCAS extent.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or archaeological features. There are currently known archaeological features present within the PCAS extent, which constrain PCAS rehabilitation. The western lobe (Curraghalassa) within the PCAS extent contains some features of archaeological significance and has not been used for peat production as a result of this find. The eastern lobe (Derrynagun) also has archaeological features present including an extant trackway of significance. These areas have been mapped as constraints.

2. METHODOLOGY

This rehabilitation plan was developed with a combination of desktop and field surveys, consultations with internal and external stakeholders and cognisance of the Scheme (PCAS). The development of this rehabilitation plan considered recently published guidance issued by the EPA in 2020 – ‘*Guidance on The Process of Preparing and Implementing a Bog Rehabilitation Plan*’.

The ecological information and site information collected during the Bord na Móna ecological baseline survey, additional confirmatory site visits (covering the period 2011 to 2024 inclusive) and monitoring and desktop analysis forms the basis for the development of the rehabilitation plan for the bog, along with:

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016);
- Significant international engagement during this period with other counties in relation to best practice regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al.*, 2019);
- Consultation and engagement with internal and external stakeholders;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and LIDAR data;
- Previous research studies on site;
- Hydrological modelling; and
- The development of a Methodology Paper outlining the Scheme (PCAS)¹. This rehabilitation includes enhanced measures defined in the Methodology Paper which are designed to exceed the standard stabilisation requirements as defined by the IPC licence and to enhance the ecosystem services of Lemanaghan Bog, in particular, optimising climate action benefits.

2.1 Desk Study

The desk study involved collecting all relevant environmental and ecological data for the study area. The development of the rehabilitation plan also takes account of research, experience and engagement with other peatland restoration and rehabilitation projects and peatland research including Irish, UK, European and International best practice guidance (full citations are in the References Section):

- Anderson *et al.* (2017). An overview of the progress and challenges of peatland restoration in Western Europe.
- Barry, T.A. *et al.* (1973). A survey of cutover peats and underlying mineral soils. Soil Survey Bulletin No. 30. Dublin, Bord na Móna and An Foras Taluntais.
- Bonn *et al.* (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al.* (2009). *Sphagnum* in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al.* (2003). The Wetland Restoration Manual.

¹ [Supporting Material - BNM Peatlands Climate Action Scheme \(bnmpcas.ie\)](https://www.bnmpeas.ie)

- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Gann *et al.* (2019). International Principles and Standards for the practice of Ecological Restoration.
- Hinde *et al.* (2010). *Sphagnum* re-introduction project: A report on research into the re-introduction of *Sphagnum* mosses to degraded moorland. Moors for the Future Research Report 18.
- Joosten & Clarke (2002). Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making.
- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al.* (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al.* (2011). The Fen Management Handbook (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Pschenyckj *et al.*, (2021), Optimising Water Quality Returns from Peatland Management while Delivering Co-Benefits for Climate and Biodiversity. An Fóram Uisce.
- Quilty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian *Sphagnum* Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Regan, *et al.* (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al.* (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland.
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al.* (2015). A Practitioners Guide to Sphagnum Reintroduction. Moors for the Future Partnership.

Additional on-line resources were also incorporated into the desk study, including:

- Boora bog group Integrated Pollution Control Licence;
- Boora bog group Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity;
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Historic Environment Viewer at <https://webgis.archaeology.ie/historicenvironment/>

- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive catchments.ie/maps/ Map Viewer (www.catchments.ie);
- OPW Indicative Flood Maps (www.floodmaps.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie);
- River Basin Management Plan for Ireland 2022-2027
- Bord na Móna Annual Report 2021, 2022 and 2023.
- Spatial data in respect of Article 17 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>.

2.2 Consultation

A number of stakeholders have been identified during the course of Bord na Móna's rehabilitation and Biodiversity Action Plan activities and are contacted during the rehabilitation planning process for their views. See Section 4.

2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, the PCAS extent was surveyed in January of 2011. Additional ecological walk-over surveys and visits have taken place between 2017 - 2024. Habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent confirmatory site walk-over surveys and visits, and updates to baseline data.

Habitat mapping followed best practice guidance from Smith *et al.* (2011). Map outputs including all habitat maps and target notes were produced using GIS software application packages (ArcGIS). General marginal habitats and other habitats that had not been modified significantly by industrial peat extraction were classified using Fossitt *et al.* (2000). Plant nomenclature for vascular plants follows Stace (2019), while mosses and liverwort nomenclature follows identification keys published by the British Bryological Society (2010). A more detailed Bord na Móna classification system was previously developed for classifying pioneer cutaway habitats as Fossitt categories were deemed not to be detailed enough for cutaway bog (much of cutaway bog could be classified as Cutover Bog - PB4).

A detailed ecological survey report for Lemanaghan Bog is contained in Appendix III. Note that this report from 2017 refers to the entire of Lemanaghan Bog. Some areas discussed in this report are outside of the PCAS extent.

3. SITE DESCRIPTION

The PCAS extent is located in County Offaly. Two sections of the bog are proposed for rehabilitation, an area of drained high bog, Curragehalassa Bog, to the west and a larger section of cutaway bog, Derrynagun Bog, located 1.8km further north-east. These locations are approximately 4.5km east of Ferbane town and 3.5km northwest of Pollagh village (Grid reference: N 16109 26007).

The PCAS extent is part of the Boora Bog Group with Bellair North and Bellair South Bogs located to the north and Turraun, Derries and Pollagh Bogs located to the south-east.

The R436 Ferbane-Clara Road runs along the northern boundary of the two small sections comprising the PCAS extent, bisecting it from the remainder of Lemanaghan bog to the north-west. Access is via local roads off the R436.

The surrounding landscape is dominated by a mosaic of farmland, largely consisting of improved grassland, and other bogs, most of which are owned and managed by Bord na Móna.

See Drawing number BNM-ECO-03-01 titled **Lemanaghan Bog: Bog Site Location**, included in the accompanying Mapbook², which illustrates the location of the proposed PCAS extent in context to the surrounding area.

3.1 Status and Situation

3.1.1 Site history

Lemanaghan Bog formerly supplied a range of commercial functions including the supply of horticultural peat and fuel peat. Industrial peat extraction at Lemanaghan Bog permanently ceased in 2019/20 (having commenced bog development in 1959). However, the bog was in sod-peat production for some time, and it is only relatively recently that extensive areas had gone into milled peat production (within the past 15 years). As a result, deep peat reserves remain on much of the former production area, with 'red' acidic peat remaining. The former production area is beginning to develop pioneer vegetation since the cessation of peat production.

The western section of the PCAS extent (Curragehalassa) was found to contain some features of archaeological significance (20 gold coins dating from 1279-1301) and this area only had limited peat production as a result of this find. Other archaeological features that have been uncovered on the site include timber trackways and artefacts such as shoes. The eastern section (Derrynagun Bog) also includes archaeology and notably a trackway consisting of re-deposited boulder clay, large flagstones, split timbers, round woods, and brushwood deposited over five phases of construction.

3.1.2 Current land-use

Industrial peat production has permanently ceased at Lemanaghan Bog. Much of the former production area in the eastern extent of the PCAS footprint (Derrynagun) comprises bare peat, with developing pioneer vegetation. The western section of the PCAS extent (Curragehalassa) has previously been drained but only had limited peat production and comprises raised bog.

² Cutaway Bog Decommissioning and Rehabilitation Plan – Lemanaghan Bog Map Book

There are some areas of active turbarry around the margins of the bog. These are mapped in the accompanying Mapbook.

There is some remaining stock still on the bog. It is envisaged extant stock will be removed prior to PCAS rehabilitation activities.

Part of the railway network of the wider Lemanaghan bog extends into the northern section of Derrynagun bog. This will be decommissioned when all peat stocks have been removed from the bog.

3.1.3 *Socio-Economic conditions*

Bord na Móna has historically been a vital employer for the rural community of the Midlands of Ireland. Bord na Móna compiled a report on the role of peat extraction in the midlands historically in which they report that in 1986, by the end of Bord na Móna's Third Development Programme, a total of twenty-three work locations had been established around the country. The company had an average employment of approximately 4,688 in the mid 1980's, with a peak employment of 6,100 during the production season, which placed it among the country's largest commercial employers. The importance of such levels of employment were largely due to its regional concentration in the Midlands and the lack of alternative employment opportunities at the time.

According to the Energy Crop Socio-Economic Study undertaken by Fitzpatrick Associates in 2011, there were an estimated 1,443 jobs supported by the peat-to-power industry in Ireland at the time, some 81% of which were located in the catchment areas of the three peat-fired generating stations (Lough Ree, West Offaly, and Edenderry Power Stations). These constituted jobs in the plants and in peat extraction, jobs indirectly supported in upstream supply industries and jobs induced through the trickle-down effects of the wages and salaries of those supported directly or indirectly.

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In respect of Lemanaghan Bog, jobs included in the above study would have included those to facilitate peat extraction for the supply of horticultural peat, sod peat and fuel peat. Employment numbers have now declined with the cessation of peat extraction.

As the primary employer in many Midland counties, Bord na Móna played a central role in building communities through several initiatives, including education bursaries, support of local sporting clubs, the provision of community gain funds, charity programmes and the provision and building of amenity areas.

Employment numbers have now declined following the cessation of peat extraction at this bog. It is anticipated that the scheme (PCAS) will provide some employment for a team of workers at this site for a period of time (> 1 year).

There are approximately 1,400 people working in Bord na Móna at present, with approximately 225 roles directly involved in PCAS.

3.2 Geology and Peat Depths

3.2.1 Sub-soil geology

GSI data indicates that the western section of the PCAS extent (Curraghlassa) is underlain by undifferentiated Old Red Sandstone and the Navan Beds formation. The eastern extent of the PCAS footprint (Derrynagun) is underlain by the Navan Beds formation and Ballysteen Formation. Geological Survey of Ireland (GSI) mapping does not identify any karst features within the vicinity. The bog has a variable topography and several small mounds have been exposed with exposed glacial gravel. A small, elevated mound occurs within Curraghlassa Bog. Within Derrynagun, there are a small number of elevated areas of high bog at the margins, while the topography is more elevated around an archaeological feature in the north-west of the bog (due to less peat extraction close to this feature).

3.2.2 Peat type and depths

The majority of the PCAS extent has deep deposits of peat remaining, with the high bog lobe having peat depths in excess of 6m, while the main cutaway lobe has peat depths that range from c. 2.4m to 3.9m. Shallower peat deposits (<2m) are associated with areas of elevated ridges of substrate suspected to correspond to limestone till.

3.3 Key Biodiversity Features of Interest

For the purposes of this report only the areas to be rehabilitated (the PCAS extent) are described below. The two areas to be rehabilitated are located south of the R436 namely Curraghlassa Bog and Derrynagun Bog. A detailed ecological report covering the entire Lemanaghan Bog is provided in Appendix III. Some areas discussed in Appendix III are outside of the PCAS extent.

3.3.1 Current habitats

The most common habitats³ present at this site include bare peat and bog, along with scrub and woodland. A breakdown of the habitat types in line with Fossitt is presented below:

- Bare peat Cutover Bog (PB4)
- Raised bog (PB1)
- Pioneer poor fen (PF1)
- Pioneer Heather-dominated vegetation (in mosaic with scrub and poor fen) (PB4)
- Dry Heath
- Birch-dominated scrub and Birch woodland (WS1, WN7)
- Oak Ash Hazel Woodland (WN2)
- Conifer Plantation (WD4)
- Dry meadows and grassy verges (GS2)
- Wet grassland (GS4),

³ Codes refer to Heritage Council habitat classification, Fossitt 2000

- Improved Grassland (GA1)
- Pioneer dry Purple Moorgrass-dominated grassland (GS3/4)
- Drains (FW4) and silt ponds

Derrynagun Bog

This bog is dominated by bare peat (see plate 3.1, plate 3.3. and plate 3.4). Marginal habitats include Gorse scrub (WS1) (plate 3.2) remnant sections of raised bog (PB1) and Birch woodland (WN7), dry *Calluna* dominated heath, improved grassland (GA1), poor fen (PF2), artificial silt ponds (FL8), scrub and calcareous grassland (WS1, GS1), dry meadows and grassy verges (GS2) and wet grassland (GS4). The sections of remnant raised bog are small and very dry and are dominated by Heather. Some turf cutting is still carried out along the southeastern boundary. An ancient track way was uncovered in this section of bog.

Curraghalassa Bog

This part of the PCAS extent mainly consists of ditched high bog where (plate 3.5 & Plate 3.6) there has been only limited peat production due to archaeological constraints. It is surrounded by active cutover bog along the southeastern boundary and there is encroachment from private cutting around other sections (outside of the PCAS extent). Habitats found in this section of bog include; raised bog (PB1), wet grassland (GS4), scrub (WS1), poor fen and flush (PF2), Oak-Ash-Hazel woodland (WN2) and conifer plantation (WD4). There is encroachment of birch scrub and conifers onto the high bog.

Hydrological modelling indicates that ca. 0.1Ha of currently inactive parts of high bog may have the potential to be restored to ARB within a reasonable timeframe, through implementation of appropriate restoration measures, and are considered to be degraded raised bog (DRB).

See Drawing number BNM-DR-25-07-RP-17 titled **Lemanaghan Bog: Current Habitat Map**, included in the accompanying Mapbook, which illustrates the habitats at Lemanaghan Bog.

Photos of Habitats at Lemanaghan (2024)



Plate 3-1 Archaeological constraint – ancient trackway running through the NW of Derrynagun Bog. Trackway is developing pioneer vegetation and scrub.



Plate 3-2 Marginal scrub and pioneer vegetation at Derrynagun Bog.



Plate 3-3 Bare peat in the former production area in Derrynagun Bog.



Plate 3-4 Stockpile at Derrynagun Bog.

Photos of Habitats at Lemanaghan (2024)



Plate 3-5 Curragalassa Bog a drained raised bog which includes the western PCAS extent, view looking south. Birch scrub and conifers are encroaching in the centre of the bog.



Plate 3-6 Raised bog at Curragalassa with encroaching birch scrub and conifers.

3.3.2 Species of conservation interest

A number of species of conservation concern have been recorded at the greater Lemanaghan Bog and it is considered they are also likely to occur within the PCAS extent currently proposed should supporting habitat exist. The following is a summary of the records of these species available within both BnM records and those of the National Biodiversity Data Centre (NBDC).

Multiple mammal species have been recorded on or within 1 km including Irish Hare (*Lepus timidus subsp. Hibernicus*), Eurasian Badger (*Meles meles*), Red Fox (*Vulpes vulpes*), West European Hedgehog (*Erinaceus europaeus*) and Eurasian Red Squirrel (*Sciurus vulgaris*).

Regarding lepidopteran species, records exist for the following species recorded in the proximity of the PCAS extent: Common Blue (*Polyommatus icarus*), Meadow Brown (*Maniola jurtina*), Ringlet (*Aphantopus hyperantus*), Small Tortoiseshell (*Aglais urticae*), Speckled Wood (*Pararge aegeria*), Wood White (*Leptidea sp.*) and the species of conservation concern Large Heath (*Coenonympha tullia*) and Small Heath (*Coenonympha pamphilus*). These may occur within the PCAS extent in suitable habitat. A recent (2023) record for Marsh Fritillary exists within the main Lemanaghan bog, outside the PCAS extent.

Other species of conservation concern recorded within 1 km include Marsh Fritillary (*Euphydryas aurinia*), Dingy Skipper (*Erynnis tages*) and Dark Green Fritillary (*Argynnis aglaja*).

Numerous bird species are known to use the cutover bogs in Ireland's midlands as breeding grounds, wintering grounds or both.

Red listed species Lapwing (*Vanellus vanellus*), Kestrel (*Falco tinnunculus*), Woodcock (*Scolopax rusticola*), Snipe (*Gallinago gallinago*), and Meadow Pipit (*Anthus pratensis*), as well as other common bird species including included Bullfinch (*Pyrrhula pyrrhula*), Jay (*Garrulus glandarius*), Long-tailed tit (*Aegithalus caudatus*), Wood Pigeon (*Columba palumbus*), Blue Tit (*Cyanistes caeruleus*), Blackbird (*Turdus merula*), Pheasant (*Phasianus colchicus*), Rook (*Corvus frugilegus*), Hooded Crow (*Corvus cornix*) and Wren (*Troglodytes troglodytes*) have all

been recorded previously during BNM ecology surveys of the local receiving environment and may occur in suitable habitat within the PCAS extent.

The main Lemanaghan bog was also previously considered to be used occasionally during the winter by small flocks of Whooper Swan and by Hen Harrier (Biosphere Environmental Services, 2014). No habitat exists within the present PCAS extent for Whooper Swan but Hen Harriers have been noted utilising the western portion (Curraghalassa) in recent years.

NBDC records for red-listed⁴ bird species of conservation concern recorded in the 10km square (N12) which Lemanaghan intersects include the species: Meadow Pipit (*Anthus pratensis*), Swift (*Apus apus*), Goldeneye (*Bucephala clangula*), Dunlin (*Calidris alpina*), Stock Dove (*Columba oenas*), Yellowhammer (*Emberiza citronella*), Kestrel (*Falco tinnunculus*), Snipe (*Gallinago gallinago*), Grey Wagtail (*Motacilla cinerea*), Curlew (*Numenius arquata*), Grey Partridge (*Perdix perdix*), Golden Plover (*Pluvialis apricaria*), Woodcock (*Scolopax rusticola*), Redshank (*Tringa tetanus*), Redwing (*Turdus iliacus*), Barn Owl (*Tyto alba*) and Lapwing (*Vanellus vanellus*).

Peatland rehabilitation may result in positive quality effects on the relative abundance or proportion of species of conservation concern utilising bogs post rehabilitation. This may include Red or Amber listed species of breeding wader along with wintering species including Swans and other wildfowl⁵.

3.3.3 Invasive species

There are no NBDC or BNM records for high impact invasive species from the PCAS extent. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs. Although spatial overlap with the rehabilitation work is expected to be limited, these are, where necessary, to be treated in line with best practice during rehabilitation.

3.4 Statutory Nature Conservation Designations

There are a number of European Sites (SAC's or SPA's) in close proximity (i.e. within a 10 km radius at minimum) to the PCAS extent. The PCAS extent has no overlapping designated sites. The nearest EU Designated sites to the PCAS extent are as follows:

- Clara bog SAC (site code: 000572) located approximately 3.6 km east
- Ferbane Bog SAC (site code: 000575) located approximately 4 km west
- Moyclare bog SAC (site code: 000581) located approximately 7.6 km west

There are also a number of nationally designated sites in proximity to the PCAS extent. The aforementioned SACs are also designated as Proposed Natural Heritage Areas (pNHAs). Additionally, pNHAs include the Grand Canal pNHA (site code: 002104), located approximately 1.2km south, and Doon Esker Wood pNHA (site code: 001830), located approximately 7.7km north. Clonydonn Bog NHA (site code: 000565) is located 7.4 km north-west.

See drawing *BNM-DR-25-07-RP-23: Lemanaghan Bog Proximity to Designated Sites* in the accompanying map book.

⁴ Gilbert G, Stanbury A and Lewis L (2021), "Birds of Conservation Concern in Ireland 2020 –2026". Irish Birds 9: 523–544

⁵ https://www.bnmpcas.ie/wp-content/uploads/sites/18/2023/08/Annual-Monitoring-Report_Final-Rev-A_Redacted.pdf

3.4.1 Other Nature Conservation Designations

The Ramsar Convention entered into force in Ireland on 15th March 1985. Ireland currently has 45 sites/wetlands designated as Wetlands of International Importance (Ramsar Sites). These cover a surface area of 66,994ha.

The closest Ramsar Sites to the PCAS extent are Clara bog (Ramsar site no. 415) located approximately 3.6 km east and Mongan bog (Ramsar site no. 416) located approximately 12 km west.

Clara bog is designated as it is one of the largest remaining examples in Ireland of a “midland” raised bog with well-developed microtopography of hummocks, hollows, pools and sphagnum lawns. The Site also supports bog woodland species, rare butterflies, a rare click beetle and a rare moss. It is a breeding location for Merlin (*Falco columbarius*) and a habitat for the European otter (*Lutra lutra*), both species protected under the EU Habitats Directive.

Mongan Bog is an excellent example of a midland raised bog with several special features. The central part is unusually wet and has a particularly pronounced pattern of hummocks, pools and lawns, suggesting that this area is still growing. The bog supports various rare plants or plants with a limited distribution in Ireland. The Site is internationally important for wintering Greenland White Fronted Goose (*Anser albifrons flavirostris*).

3.5 Hydrology and Hydrogeology

The PCAS extent lies within three different catchments as defined by the EPA under the Water Framework Directive (WFD). The bog is entirely contained within the Lower Shannon Catchment (Catchment ID: 25A). The bog also lies within the Brosna Sub-catchment (Sub-catchment ID: 25A_8).

The PCAS extent has a gravity drainage regime. There are existing pumps in use on the adjacent Lemanaghan Bog to the North-West that is circa 1,400m from the FY25 boundary. Data from hydrogeological modelling and analysis completed previously on BnM bogs suggests a conservative zone of influence of BnM’s pumping stations on local groundwater levels is likely to be between 60m and 300m. As the pumps located in the constrained areas are circa 1,400m from the in-scope FY25 areas, it is considered that these pumps will not have an influence on the groundwater levels post FY25 rehabilitation.

A watercourse, called the Lemanaghan (EPA code: 25L72), flows in a westerly direction along the northern margins of Derrynagun Bog. This is a tributary of the Lemanaghan Stream (EPA code: 25L04). The Derrynagun stream (EPA code: 25D94) arises in the southern part of Derrynagun and flows in a southerly direction along the bog margins. The first order EPA watercourse Fortified House Castlearmstrong (EPA code: 25L72), flows partially along the eastern bog boundary in a south-easterly direction. The Kilcolgan Beg River rises in Lemanaghan bog and runs south along the western boundary of Curragalassa Bog and flows into the River Brosna. These watercourses are all tributaries of the River Brosna (EPA code: 25B09).

The PCAS extent has two treated surface water outlets, both from a previously active peat extraction catchment (Derrynagun). The other section of the bog to be rehabilitated (Curragalassa) was originally drained but only ever had limited active production. Derrynagun bog discharges to the Lemanaghan Stream (IE_SH_25L040890 LEMANAGHAN_STREAM_010) which in turn discharges to the River Brosna (IE_SH_25B090761 BROSNA_100). Curragalassa Bog discharges direct to The River Brosna (IE_SH_25B090800 BROSNA_110). Peat extraction ceased in Derrynagun bog in 2019/20 and did not commence at all in Curragalassa bog. Both the Lemanaghan Stream and River Brosna are classed as at Moderate water quality (Ecological Status or Potential SW 2016-2021) – Water Framework Directive.

The locations of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the water quality map see Figure *BNM-DR-25-07-WQ01: Water Quality Map* in the accompanying map book.

GSI data indicates that the majority of the PCAS extent lies within a locally important aquifer - bedrock which is moderately productive only in local zones. A small portion to the northeast of Curraghalassa bog lies within a Locally Important Aquifer – Bedrock which is Generally Moderately productive.

An aquifer is an underground body of water-bearing rock or unconsolidated materials (gravel or sand) from which groundwater can be extracted in useful amounts. GSIs Aquifer classes are divided into three main groups based on their resource potential, and further subdivided based on the type of openings through which groundwater flows. There are nine aquifer categories in total. Locally important aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or good yields (100-400 m³/d). This data gives an indication of sub-surface deposits (bedrock and unconsolidated materials) in terms of their groundwater resource potential and dominant groundwater flow type.

Regionally important aquifers are those in which the network of fractures, fissures and joints, through which groundwater flows, is well connected and widely dispersed, resulting in a relatively even distribution of highly permeable zones. There is good aquifer storage and groundwater flow paths can be up to several kilometres in length. There is likely to be substantial groundwater discharge to surface waters ('baseflow') and large (>2,000 m³/d), dependable springs may be associated with these aquifers.

The PCAS extent is located in an area mapped by GSI as of low groundwater vulnerability. Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features. Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes. These data indicate there is generally low risk of any groundwater contamination occurring at this site.

Quaternary sediment maps show that Lemanaghan is generally underlain by peat. In a wider context, the bog is surrounded by till derived from limestones, Gravels derived from Limestones, lacustrine sediments and alluvium.

3.6 Emissions to surface-water and watercourses

It is the expectation of BnM that rehabilitation measures should positively impact the water quality in receiving water bodies through enhancing the water attenuation across rehabilitated sites. The robust water monitoring programme implemented as part of PCAS will be used to assess water quality leaving rehabilitated sites at designated points. While water quality improvements assist in meeting water frameworks directive ambitions and targets, they can also improve drinking water sources in applicable catchments with drained peatlands and the potential for associated reduction in treatment requirements at drinking water treatment facilities.

Drainage is an important feature of industrial peat production and there were extensive field drains maintained throughout bog areas to facilitate industrial peat production annually, each of which eventually drains into a terminal silt pond that allows for settlement of suspended solids before entering the main river systems. In accordance with the existing Integrated Pollution Control licence, all drainage water from boglands in a licensed area is discharged via an appropriately designed silt pond treatment arrangement as required in Condition 6.6. of the licence. Industrial peat production has now permanently ceased at the PCAS extent.

Silt ponds are the key silt control infrastructure to control potential emissions from industrial peat production sites. As required under licence, BNM have a number of procedures for how it manages and maintains its silt pond network. The silt that builds up in silt ponds is excavated on a regular basis by Bord na Móna to facilitate an efficient level of silt control. Silt ponds will continue to be maintained during the rehabilitation and decommissioning. Silt pond decommissioning will be considered when sites are deemed to be on a trajectory of environmental stability and peatland rehabilitation has been completed.

A monitoring program to track and verify any changes in baseline water quality conditions pre and post decommissioning and rehabilitation has commenced, so that the success or otherwise can be tracked and verified for the National Parks & Wildlife Service, Environmental Protection Agency, and Local Authority Water Program, amongst a range of stakeholders.

Peat extraction was not identified as pressure in the second cycle of the river basin management plan is indicated as remaining so in the third cycle, currently under preparation.

The main emission limit value associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 3.7 mg/l and COD 100mg/l.

From an analysis of any results over number of years of the IPC licence environmental monitoring of some of the discharges from this bog, these indicate that results were under the Emission Limit Value for Suspended Solids and under the trigger level for Ammonia and COD.

Ammonia averaged 0.324mg/l and ranged from 0.19 to 0.5 mg/l with Suspended Solids ranging from 2 to 11 mg/l and averaging 8.0mg/l.

Bog	SW	Monitoring	pH	SS	TS	Ammonia	TP	COD	Colour
Lemonaghan	SW-23	Q2 23	8	2	311	0.193	<0.05	42	145
Lemonaghan	SW-23	Q2 18	8.1	11	408	0.28	0.23	50	67
Lemonaghan	SW-23	Q4 14	6.7	11	72	0.5	0.06	41	217

While water quality improvements assist in meeting water frameworks directive ambitions and targets, they can also improve drinking water sources in applicable catchments with drained peatlands and the potential for associated reduction in treatment requirements at drinking water treatment facilities.

The licence obligation of quarterly sampling regime on a selected number of ponds to be sampled over a 3-year cycle would not be sufficient to be able to appropriately track the changing water chemistry that will occur as part of this enhanced rehabilitation programme, so this sampling regime will occur monthly.

To assist in monitoring surface water quality from this bog, it was agreed to increase the existing licence monitoring requirements of the IPC Licence, to sampling for the same parameters every month.

This new sampling programme commences in February 2024. Sampling commenced on the main Lemanaghan bog in November 2020, but this programme did not include this catchment. Sampling will progress in advance of the scheduled works and for a period of up to 2 years post rehabilitation. Depending on the period required to confirm that the main two parameters, suspended solids, and ammonia as 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, the monitoring programme and intensity will be periodically reviewed and amended.

As the monthly monitoring program continues in 2024 and during the rehabilitation works planned for 2024, further trending will be produced to verify any ongoing trends.

In the preparation of this monitoring programme, Bord na Mona have been providing the Local Authority Water Programme (LAWPRO) with details of the surface water emissions points associated with this bog and will be amending some of the proposed monitoring locations on foot of this engagement. LAWPRO have in turn provided details of their monitoring programme and these are included in the Water Quality Map.

This is necessary to ensure that there is alignment with the WFD monitoring programme and that where possible, the monitoring programme will enable any improvements in water quality or establishing trends to be quantified against any available WFD monitoring data. It will also enable the periodic sharing of data which will inform the monitoring reports, success criteria and enable LAWPRO under the Water Framework Directive to track any changes in pressures and be aware of changes in water chemistry.

Monitoring results will be maintained, trended every six months and reported on each year and as required, as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, and will be provided to LAWPRO and the EPA as required to inform progress and national monitoring requirements under the WFD.

These results will also be available in April each year as a requirement of the Annual Environmental Report at www.epa.ie.

The parameters to include as per condition 6.2 of the IPC Licence include monthly monitoring for pH, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour & COD. In addition, DOC has been included as a parameter to try and identify any changes in carbon in the surface water, and where required by LAWPRO, to assist in investigating other changes in water chemistry, the series of parameters can be reviewed and amended.

Decommissioning and Rehabilitation Programme Water Quality Monitoring

Rehabilitation of cutaway peatland is closely linked with control of emissions. One of the criteria for successful rehabilitation is stabilisation through re-vegetation, which will stabilise all substrates and in turn remove the need for further silt control measures. This site is already largely vegetated. Re-wetted peat also aids the primary objective of stabilising peat, as when peat is re-wetted it is not vulnerable to wind erosion. Re-wetted peat and the development of wet peatland habitats can also act as sinks for silt and mobile peat, and increases additional retention time for solids, and the peatland vegetation can quickly stabilise this material within blocked drains on site (by acting like constructed wetlands).

Water quality of water discharges from restored peatlands normally improves as a result of bog restoration measures and the restoration of natural peatland processes (Bonn *et al.*, 20017). Bog restoration is also expected to improve water attenuation of the site as the drains are blocked, slowing water movement and water release from the site. Restored peatlands help slow the release of water and aid the natural regulation of floods downstream (Minayeva *et al.*, 2017). The National River Basin Management Plan (NRBMP) 2018-2021 (DHPCLG, 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD)". The NRBMP outlines how key actions such as the Bord na Móna peatland rehabilitation is expected to have a positive impact on water quality and help the NRBMP deliver its objectives in relation to the WFD.

Water will still discharge from designated emission points when rehabilitation at the PCAS extent of Lemanaghan has been completed. This discharge will have improved water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of the key

waterbody receptors i.e., the River Brosna and its tributaries and will support the future status of the waterbodies achieving Good Status.

Water quality monitoring will be established. There will be initial quarterly monitoring assessments of the site to determine the general status, the condition of the silt-ponds, assess the condition of the rehabilitation work, assess the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need to additional rehabilitation.

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, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD.

This sampling regime on a selected number of silt ponds will be carried out over a two-year cycle. The original (licence) requirement was for a quarterly sampling regime.

3.7 Fugitive Emissions to air

Rehabilitation of the drained peatland will seek to re-wet the dry peat where possible. Collectively re-wetting and re-vegetating will minimise any risk of emission to air from dust.

3.8 Carbon emissions

Irish peatlands are a huge carbon store, containing more than 75% of the national soil organic carbon (Renou-Wilson *et al.* 2012). Peatland drainage and extraction transforms a natural peatland which acts as a modest carbon sink (taking in 0.1 to 1.1 t of carbon as CO₂-C /ha/yr) into a cutaway ecosystem which is a large source of carbon dioxide (releasing 1.3 to 2.2 t of carbon as CO₂-C /ha/yr) based on Tier 1 Emission factors (Evans *et al.* 2017). Renou-Wilson *et al.* (2018) reported losses of between 0.81 – 1.51 CO₂-C /ha/yr from drained peatlands located in Ireland.

Re-wetting of dry peatlands will increase methane emissions (Gunther *et al.* 2020) as a consequence of the anoxic conditions within the peat body that provide a suitable environment for the microbial breakdown of plant litter and root exudates. Tanneberger *et al.* (2021) describes how peatland management has to choose between CO₂ emissions from drained peatlands or increased methane (CH₄) emissions from rewetted industrial peatlands. However, when radiative effects and atmospheric lifetimes of both GHG gases are considered and modelled, postponing rewetting increases the long-term warming effect of continued CO₂ emissions (Gunther *et al.* 2020). This means the increase in methane due to rewetting of dry peatlands is still negated by the CO₂ emissions reductions. Further, Wilson *et al.* (2022) confirmed the benefit of rapid rewetting to achieve strong carbon reductions and potentially altering the warming dynamics from warming to cooling depending upon the climate scenario.

It is expected that the PCAS extent of Lemanaghan Bog will become a reduced Carbon source/part carbon sink following rehabilitation. The potential of any cutaway site to develop as a carbon sink in the longer-term depends on the success of the rehabilitation measures, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. Much of this site is expected to develop raised bog, *Sphagnum*-rich habitats, poor fen, heath and Birch woodland along

with some wetland habitats and fen habitats. Birch woodland is expected to develop on the drier mounds and peripheral headlands.

3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

The majority of the PCAS extent can be rated as **Local Importance; lower value to Local Importance; higher value**. Bare peat in the former production area, and other intensively managed areas are assessed as **local importance (lower value)**.

Marginal habitats including woodland, scrub, pioneer cutaway habitats along with raised bog may act as a refuge and as ecological corridors for wildlife and are therefore deemed to be **locally important (higher value)**.

Draft

4. CONSULTATION

4.1 Consultation to date

Consultation seeks to engage an audience of relevant stakeholders at both a national and local level. National stakeholders have been identified from varied bog restoration and rehabilitation efforts undertaken by Bord na Móna over the past 40 years, with particular emphasis on engagement with stakeholders during their Biodiversity Action Plan programme, since 2010. National Stakeholders includes relevant government departments and agencies, relevant semi-state bodies, NGOs and other environmentally focused groups with a national remit.

Stakeholders were notified when the draft plan was finalised internally by Bord na Móna, and invited to make submissions on the objectives and content of this plan in relation to the 2024 PCAS extent. The draft plans and final versions of the rehab plans will be available on the Bord na Móna website (www.pcasinfo.ie).

There has been ongoing consultation about rehabilitation and other general issues over the years about the PCAS extent with various stakeholders in relation to:

- General consultation with range of stakeholders at annual Bord na Móna Biodiversity Action Plan review days 2010-2018.
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht).

There has been ongoing consultation about the planning and construction of Lemanaghan Wind Farm as part of planning for that particular proposed development. The proposed development is described in the project website (<https://www.lemanaghanwindfarm.ie/>) and has up to date project newsletters. To inform the current Plan, both national and local stakeholders, including neighbours whose land adjoins Lemanaghan Bog 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 at the PCAS extent of Lemanaghan Bog.

All correspondence received will be acknowledged and evaluated against the rehabilitation work proposed here, and the final draft of the Rehabilitation Plan will contain a review of the consultation.

4.2 Issues raised by Consultees

N/A Yet as consultation has not commenced.

4.3 Bord na Móna response to issues raised during consultation

N/A Yet as consultation has not commenced.

5. REHABILITATION GOALS AND OUTCOMES

The rehabilitation goals and outcomes outline what Bord na Móna want to achieve by implementing the rehabilitation. These include:

- Meeting conditions of IPC licence.
- Stabilisation or reduction in water quality parameters of water discharging from the site (e.g. suspended solids).
- Reducing pressure on receiving waterbodies that have been classified as *At Risk* from peatlands and from peat extraction, via stabilisation or improving water-quality from this bog, and therefore, reducing pressures.
- Optimising hydrological conditions for **climate action benefits as part of PCAS**.
- Optimising hydrological conditions for the development of *Sphagnum*-rich regenerating wet deep peat vegetation communities on cutover deep residual peat, where present.
- Optimising hydrological conditions for the development of *Sphagnum*-rich raised bog vegetation communities in the drained raised bog at Curragalassa, where possible.
- Supporting ongoing and potential future renewable energy, amenity, and other land-uses. Integrating rehabilitation measures with current amenity infrastructure on site. It is not proposed to carry out any rehabilitation actions to change or negatively affect any infrastructure.
- The main goal and outcome of this plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat production at the bog in a manner that is acceptable to both external stakeholders and to Bord na Móna and which optimise climate action and other ecosystem service benefits.

The rehabilitation goals and outcomes take account of the following issues.

- Natural colonisation will form the basis for the environmental stabilisation of the bare peat areas. Re-wetting of the cutaway, where possible, is a general rehabilitation strategy. The main target will be to maintain water-levels close to the peat surface, and to avoid the creation of large-water bodies. Re-wetting and water levels close to the peat surface accelerates the re-vegetation processes, the development of vegetation cover and therefore environmental stabilisation.
- It will take some time for stable naturally functioning habitats to fully develop at the PCAS extent of Lemanaghan Bog. This will happen over a longer timeframe than the implementation of this rehabilitation plan.
- Re-wetting residual peat will initially maintain and enhance the carbon storage capacity of the bog. There is scientific consensus that restoration of hydrology in damaged bog can improve carbon storage, water storage and attenuation and help support biodiversity both on the site and in the catchment (See Section 3.8). This will reduce carbon emissions from the site from a larger carbon source to a smaller carbon source. In time, the site has the capacity to develop in part as a carbon sink.
- It is not expected that the cutover at Curragalassa has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Nevertheless, re-wetting across the entire bog, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- There is potential for the rehabilitated raised bog in the western extent at Curragalassa to develop active raised bog in the future.

- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- WFD status in receiving water bodies can be affected by peatlands and peat extraction but is also affected by other sources such as agriculture. In addition, receiving water bodies that are assessed as 'At Risk' from peatlands and from peat extraction are likely to have several contributory sources of impacts (private peat extraction and Bord na Móna). Reducing pressures due to former peat extraction activities at Lemanaghan Bog will contribute to stabilising or improving water quality status of receiving water bodies in general. Ultimately, improving the WFD status of the receiving waterbody will depend on reducing pressure from a range of different sources, including peatlands in general (private and Bord na Móna).
- Re-wetting in general will benefit the future preservation of most known and unknown archaeological features. An Archaeological Impact Assessment (AIA) is to be carried out under the PCAS scheme.

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6. SCOPE OF REHABILITATION

The principal scope of this rehabilitation plan is the environmental stabilisation of the bog. This is defined by:

- The PCAS extent currently proposed at Lemanaghan Bog.
- EPA IPC licence - Ref. P0500-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Lemanaghan bog and ergo the PCAS extent is part of the Boora bog group.
- The Scheme is designed to exceed the stabilisation requirements as defined by the IPC licence. This scheme is designed to enhance the ecosystem services of the PCAS extent, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilisation is achieved (meaning IPC obligations are met) and, in addition, significant other ecosystem service benefits particularly for climate action will be accrued.
- The local environmental conditions of the PCAS extent of Lemanaghan Bog mean that intensive drain blocking is the most suitable rehabilitation approach for this site. The PCAS extent still retains deep peat reserves as the bog was in sod-peat production for some time and it is only recently that extensive areas had gone into milled peat production (within the past 15 years). As a result, much of the former production area still has 'red' acidic deep peat. An isolated section of the site in the south-west (Curragalassa) was not put into peat production and this area also contains reserves of deep peat.
- Bord na Móna have defined the key goal and outcome of rehabilitation at the PCAS extent as **environmental stabilisation** of the site via **optimising climate action benefits, where possible**. The re-wetting of residual peat in the area recently out of peat extraction will be optimised, **setting the site on a trajectory towards the development of peat-forming communities on residual deep peat, where possible**.
- The cutaway at Derrynagun Bog is predominantly bare peat and has begun to develop pioneer cutaway habitats. Rehabilitation is proposed to enhance residual peat re-wetting while taking account of existing archaeology and land-uses.
- Bord na Móna are currently developing a renewable energy project called Lemanaghan Wind Farm. This proposed renewable energy footprint will not overlap with the PCAS extent of Lemanaghan Bog.
- Rehabilitation of the PCAS extent will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such as the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.
- It is not proposed to carry out rehabilitation on all marginal or peripheral cutover bog zones. Generally, these bog remnants are narrow, or are subject to turbarry, and do not have positive bog restoration prospects.

6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry,

substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland).

- The majority of Derrynagun Bog is cutaway with deep peat reserves and has a gravity based regime, therefore *sphagnum* rich deep peat vegetation is likely to develop in this area in response to re-wetting. The raised bog at Curraghalassa is like to improve in condition in response to rewetting and will develop optimal raised bog vegetation communities in time.
- **Potential land-use.** Bord na Móna are planning to develop a potential renewable energy project at Lemanaghan Bog as part of the proposed Lemanaghan Wind Farm. This wind farm project is in pre-planning and is expected to be submitted for planning permission in summer 2025. In advance of a decision on the Lemanaghan Wind Farm planning permission, it is planned to rehabilitate only the part of Lemanaghan Bog in 2024 that is not constrained by the proposed wind farm infrastructure. The PCAS rehabilitation footprint does not overlap with the proposed development footprint.
- The remaining area at Lemanaghan (the proposed wind farm area) will be rehabilitated **either** in association with the proposed Lemanaghan Wind Farm Project, with peatland rehabilitation integrated into the proposed project, **or** will be completed in the event of an unsuccessful planning application. It is expected that Bord na Móna **will revise and update** a rehabilitation plan for the remainder of Lemanaghan when a decision is made in relation to the wind farm planning application. Bord na Móna remain fully committed to rehabilitating the whole bog and meeting the conditions of the IPC license. Phasing rehabilitation in this way has the potential to support additional climate action measures (integrating renewable energy).
- At this stage, it is not anticipated that any future potential land-use in the northern part of Lemanaghan will impact on the proposed rehabilitation in the currently proposed PCAS extent, as there is a natural hydrological break in the form of the regional road (R436) which bisects the bog.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care has to be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes any hydrological management on neighbouring farmland. It is intended that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land.
- **Turbary.** There are a number of areas (constraint) which border Curraghalassa bog on its eastern and western flanks that are subject to active turbary. There are some small, isolated turbary areas to the east of Derrynagun Bog. These areas are ecologically and hydrologically linked to the area owned by Bord na Móna where rehabilitation is planned.
- **Archaeology.** There are archaeological features present within the PCAS extent which constrain PCAS activities and require consideration for the purpose of ensuring ongoing conservation. The further discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. The rehabilitation will optimise hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future. Any newly discovered archaeology may require rehabilitation measures to be reviewed and adapted. An Archaeological Impact Assessment (Appendix XII) will be carried out to mitigate against any impact on archaeology that may be found. In the worst-case scenario works affecting the surface and sub-surface of the bog might disturb previously unknown archaeological deposits or artefacts without preservation by record taking place. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it will be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

- **Public Rights of Way.** Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remains intact where possible. In some instances, depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies during the consultation work associated with the decommissioning and rehabilitation work described here.
- **Turf-cutting.** A small area of remnant of high bog along the margins, will not be subject to rehabilitation measures. This is largely due to turf cutting, and the small area that this parcel of land covers and the limited effectiveness of rehabilitation measures in this area. This area is ecologically and hydrologically linked to the area owned by Bord na Móna where rehabilitation is planned.

6.2 Key Assumptions

- It is assumed that Bord na Móna will have all resources required to deliver this project.
- It is expected that weather conditions will be within normal limits over the rehabilitation plan timeframe. Long periods of wet weather have the capacity to significantly affect ground conditions and constrain drain blocking and other ground activities.

6.3 Key Exclusions

The scope of this rehabilitation plan does not cover:

- Constrained areas including areas subject to third party turf cutting/turbary, archaeological features, and areas outside the hydraulic break.
- Areas outside BNM ownership.
- The longer-term development of stable naturally functioning habitats to fully develop at Lemanaghan Bog. The plan covers the short-term rehabilitation **actions** and **an additional monitoring and after-care programme** to monitor the rehabilitation and to respond to any needs.
- This plan is not intended to be an after-use or future land-use plan for the PCAS extent.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.

7. CRITERIA FOR SUCCESSFUL REHABILITATION

This section outlines what criteria will be used to indicate successful rehabilitation and what critical success factors are needed to achieve successful rehabilitation. All criteria used to indicate successful rehabilitation will be measured to validate the achievement of the rehabilitation goals and outcomes and validate the completion of the rehabilitation.

The key objective of this rehabilitation plan is **environmental stabilisation** and the stabilisation of any emissions from the site that related to the former industrial drainage activities.

Rehabilitation is generally defined by Bord na Móna as:

- stabilisation of bare peat areas via targeted active management (e.g. drain-blocking/re-wetting) slowing movement of water across the site and encouraging a naturally functioning raised bog ecosystem; and
- mitigation of key emissions (e.g. potential suspended solids run-off).

In addition, Bord na Móna wish to optimise climate action and other ecosystem service benefits via enhanced rehabilitation measures.

7.1 Criteria for successful rehabilitation to meet EPA IPC licence conditions:

- Rewetting of residual peat in the area originally drained for industrial peat production to offset potential run off of suspended solids and to encourage and accelerate development of vegetation cover via natural colonisation, and increase in the area of potentially peat forming habitats. See Table 7.1 for a summary of the criteria for successful rehabilitation and associated monitoring. The target will be the delivery of measures and this will be measured by an aerial survey after rehabilitation is completed.
- That there is a stabilising/improving concentration of suspended solids and ammonia in discharges from Bord na Móna sites, associated with the measures undertaken to stabilise the peat surface by the blocking of the internal drainage system and the maximized rewetting of the peat surface. This will be demonstrated by developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be measured via water quality monitoring (suspended solids and ammonia) for at least 2 years after the rehabilitation has been completed.
- Receiving water bodies have been classified under the River Basin Management Plan and this classification includes waters that are At-Risk from peatlands and peat extraction. The success criteria will be that the At-Risk classification will see improvements in the associated pressures from this peatland or if remaining At-Risk, that there is an improving trajectory in the pressure from this peatland.

With regard to predicting and estimating likely trends that might materialise or could be considered as a target, the results of monitoring of surface water ammonia emissions from Longfordpass bog in Littleton over 3 years, post cessation of peat extraction with ongoing rehabilitation, were considered. These indicate a downward trend in Ammonia concentrations (Figure 7.1).

Similarly monitoring of surface water ammonia emissions from a Corlea bog in Mountdillon over the past 3 years post cessation of peat extraction with ongoing rehabilitation, indicate downward trends.

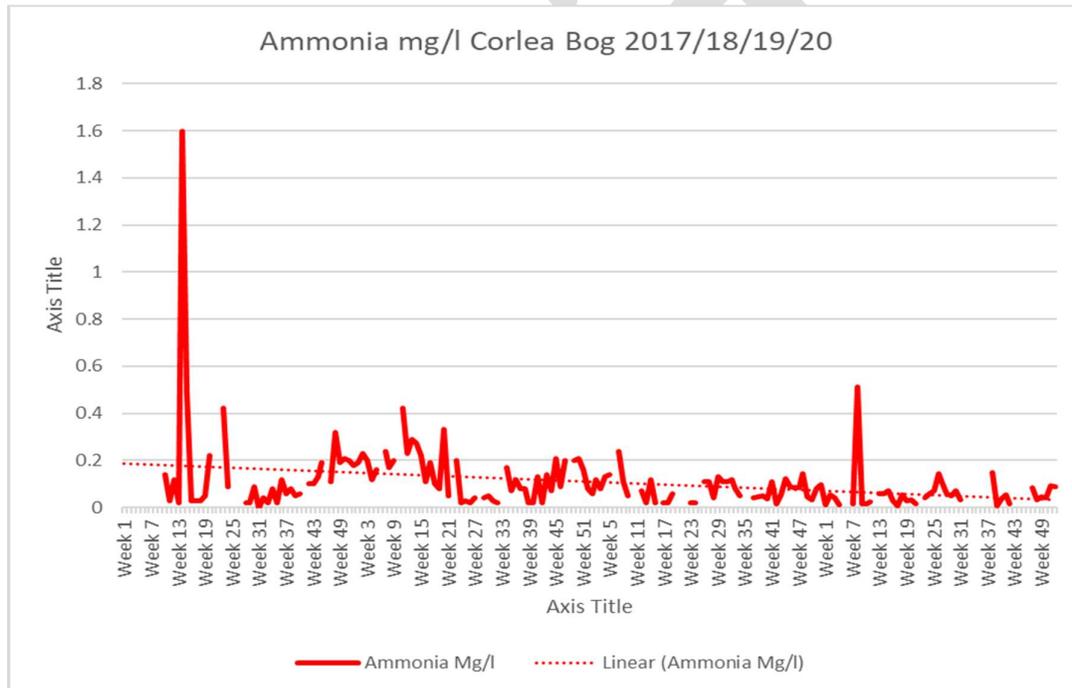
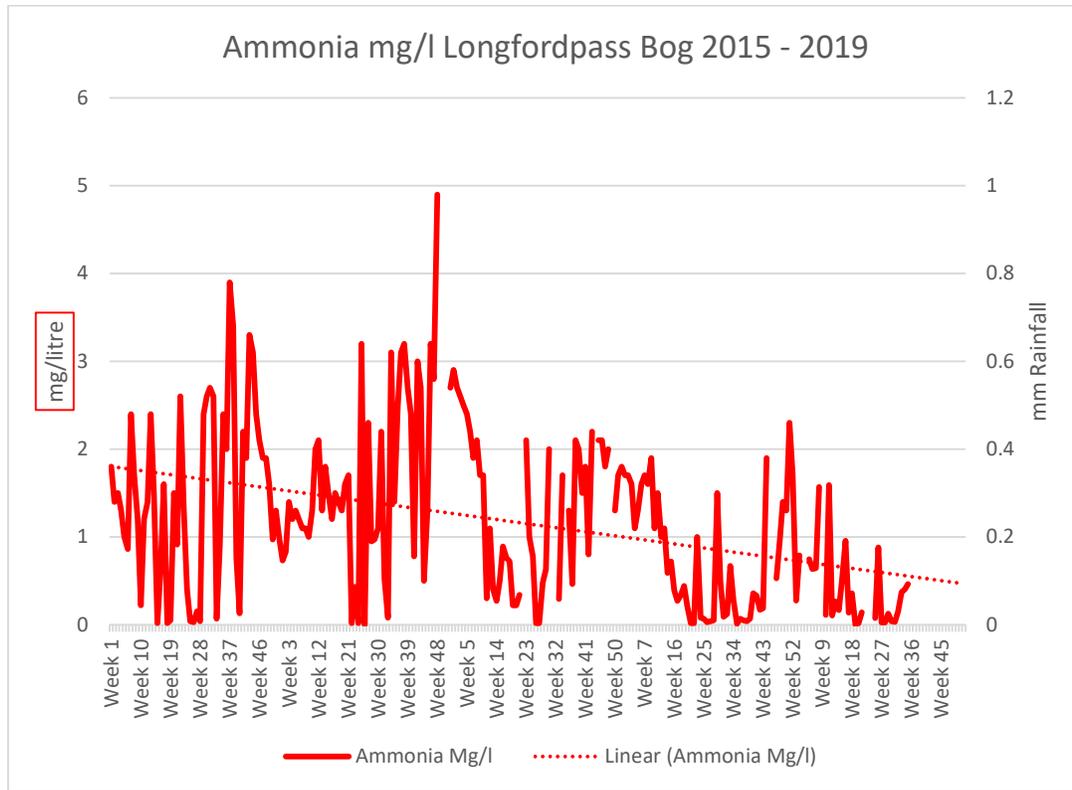


Figure 7.1. Ammonia levels over the period 2015-2019/2020 at Longfordpass and Corlea.

Additional criteria for successful rehabilitation to optimise climate action and other ecosystem service benefits:

- Optimising the extent of suitable hydrological conditions to optimise climate action and other ecosystem service benefits (optimising and maximising residual peat re-wetting). This will be measured by an aerial survey after rehabilitation has been completed.
- Accelerating the trajectory of the bog towards becoming a reduced carbon source/carbon sink. This will be measured through habitat mapping and the development of cutaway bog condition assessment. This cutaway bog condition assessment will include assessment of environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels (similar to ecotope mapping). Ecotope mapping will be carried out on the high bog at Curraghalassa Bog. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Reduction in carbon emissions. This will be estimated via a combination of habitat condition assessment and application of appropriate carbon emission factors derived from other sites. Baseline monitoring (habitat condition) will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Setting the site on a trajectory towards establishment of a mosaic of compatible habitats including *Sphagnum*-rich regenerating wet deep peat vegetation communities on cutover, sphagnum rich raised bog, heath, scrub, poor fen, and birch woodland, where conditions are suitable. Some of these habitats have already in part established as pioneer vegetation/wetlands. It will take some time for stable naturally functioning habitats to fully develop at the PCAS extent. This will be demonstrated and measured via aerial photography, habitat mapping and cutaway/habitat condition assessment. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.
- Improvement in biodiversity and ecosystem services. This will be demonstrated by metrics outlined in Section 9.1 that can be used to measure changes in ecosystem services (e.g. water quality parameters, development of pioneer habitats, breeding bird monitoring). This will be measured by collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services. Baseline monitoring will be carried after rehabilitation is completed (during the scheme). It is proposed that sites can be monitored against this baseline in the future.

Table 7-1 Summary of Success criteria, targets, how various success criteria will be measured and expected timeframes

Criteria type	Criteria	Target	Measured by	Expected Timeframe
IPC validation	Rewetting in the former area of industrial drainage.	Delivery of rehabilitation measures Restoration of hydrological regime.	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking) Establishment of a baseline for future monitoring of bare peat, vegetation	3 years

Criteria type	Criteria	Target	Measured by	Expected Timeframe
			establishment and habitat condition.	
IPC validation	Key water quality parameters Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilisation of key water quality parameters associated with this bog	Water quality monitoring for a period after rehabilitation has been completed	2 years
IPC validation	Reducing pressure from drainage on the local water body catchment (WFD)	Where this section of the water body (that this bog drains to) has not been identified as under pressure from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body, confirms that its classification remains at not being at risk from peat extraction associated with activities at this bog.	EPA WFD monitoring programme	WFD schedule

7.2 Critical success factors needed to achieve successful rehabilitation as outlined in the plan

The achievement of successful rehabilitation as outlined in the plan requires:

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Móna).** Bord na Móna maintains a provision on its balance sheet to pay for these future costs. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.
- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of

rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.

- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practice applied internationally in peatland management. Measures proposed in this plan have already been shown to be effective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan. If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on cutaway peatland takes time. Pioneer vegetation can develop relatively quickly (3-10 years) and wetland habitats can develop relatively quickly. Birch Woodland may take 20-30 years to develop. However, it may take 50 years for Active Raised Bog vegetation to re-develop on ground that was previously cutaway. Different environmental conditions will have a significant impact on the rate of natural colonisation, and as a result of the combination of different environmental conditions and the application of different rehabilitation measures, there will be a variety of habitat outcomes.
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation and restoration has shown that re-wetting improves conditions for natural colonisation and that natural colonisation is accelerated where the environmental conditions are most suitable. Rehabilitation measures have been designed to modify the conditions of areas within sites where conditions are less suitable for natural colonisation (modifying hydrology, topography, nutrient status, or availability of potential seed sources).
- **Monitoring to be robust and effective.** Rehabilitation Monitoring will be established to validate the success of rehabilitation as required by Condition 10 of the IPC licence. This will focus on collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services.

8. REHABILITATION ACTIONS AND TIME FRAME

Peatland rehabilitation requires detailed planning and the use of data from desktop surveys and field surveys. This data in association with topographical and hydrological modelling will be important in planning the future peatland landscapes and planning the use of the most appropriate rehabilitation methodologies to maximise climate action benefits. Hydrological modelling indicates those areas that are likely to re-wet when drains are blocked, based on the current topography, and areas where water levels may have to be modified, where needed. Enhanced rehabilitation measures will look to optimise hydrological conditions for re-wetting peat in other areas. This planning is also essential for matching the most sustainable rehabilitation methodology to the most suitable cutaway environment to maximise the benefits of the resource outlay (maximising cost/benefit).

A number of illustrative figures have been produced to inform Rehab Planning and Design, including Aerial Photography, Peat Depths, LiDar Surface Maps, and Depression Analysis modelling; these are included in the accompanying Mapbook as the drawings referenced below:

BNM-DR-25-07-RP-21 titled **Lemanaghan Bog: Aerial Imagery 2020**

BNM-DR-25-07-RP-04 titled **Lemanaghan Bog: Peat Depths**

BNM-DR-25-07-RP-03 titled **Lemanaghan Bog: LiDAR Map**

BNM-DR-25-07-RP-09 titled **Lemanaghan Bog: Depression Analysis**

The rehabilitation actions themselves will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in drawing titled **BNM-DR-25-07-RP-05 Lemanaghan Bog: Rehabilitation Measures** in the accompanying Mapbook (note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.)

These rehabilitation measures for the PCAS extent will include (see Table 8.1):

- 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. More intensive measures will be targeted towards the bare peat.
- Regular drain blocking on extant high bog with drainage ditches.
- Less intensive measures (targeted drain-blocking) will be used in areas where habitats have already established or where tree growth limits access.
- Measures will include drain blocking (3/100 m), modifying outfalls and managing water levels with overflow pipes.
- Wetland measures including blocking outfalls and managing water levels with overflow pipes.

Table 8-1 Types of and areas for rehabilitation measures at Lemanaghan Bog.

Type*	Code	Description	Area (Ha)
Deep peat cutover bog	DPT2	Regular drain blocking (3/100 m) + modifying outfalls and managing water levels with overflow pipes	62.6 ha
Deep peat cutover bog	DPT3	More intensive drain blocking (max 7/100 m), field reprofiling, modifying outfalls and managing overflows.	37.5 ha
Dry cutaway	DCT2	Modifying outfalls and managing water levels with overflow pipes	5.5 ha
Wetland cutaway	WLT4	Modifying outfalls and managing water levels with overflow pipes	0.5 ha

Type*	Code	Description	Area (Ha)
Marginal land	MLT1	No work required	7.3 ha
Marginal land	MLT2	More intensive drain blocking (max 7/100 m)	0.7 ha
Additional Works	AW2	Targeted drain blocking to optimise hydrological conditions/rewet the residual peat.	2.7 ha
Constrained area	Constraint	Constraint	6.3 ha
Constrained area	Constraint	Archaeology	10.9 ha
Silt Ponds	Silt pond	Silt pond	0.5 ha
Total Area			134.7 ha

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

8.1 Completed and Ongoing

- No rehabilitation has taken place to date within the areas under consideration.
- The majority of one bog within the PCAS extent, Derrynagun Bog, is still bare peat. Bare peat areas within the older cutaway areas are reducing due to natural re-colonisation of the cutaway.
- The western extent of the PCAS extent, Curraghalassa bog, is raised bog that is already vegetated.

8.2 Short-term planning actions (0-1 years)

- Seek formal approval of the enhanced plan from the EPA, noting the alternative standard plan should funding from the Scheme not materialise.
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator.
- Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (The Scheme PCAS) will be applied to the PCAS extent of Lemanaghan Bog. This will take account of peat depths, topography, drainage, and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies).
- A drainage management assessment of the proposed enhanced rehabilitation measures will be carried out and any issues identified resolved and the rehabilitation plan adapted.
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible.
- A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out.
- An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) is to be carried out. The scheduling of rehabilitation operations will be adapted, where required.
- Ensure all activities comply with the environmental protection requirements of the IPC licence.
- Carry out Appropriate Assessment of the Rehabilitation Plan.

- Track implementation and enforcement of the relevant IPC licence conditions, any proposed mitigation measures and other environmental control measures during the implementation of the rehabilitation plan.

8.3 Short-term practical actions – (0-2 years)

- Carry out proposed measures as per the detailed site plan. This will include drain blocking on deep peat, and fertiliser application targeting bare peat areas of headlands, high fields and other areas (where required) in addition to wetland creation and management prescriptions. All rehabilitation will be carried out with regard to best practice environmental control measures (Appendix IV).
- Monitor the success of rehabilitation measures in relation to developing suitable hydrological conditions.
- Carry out the proposed monitoring, as outlined.
- While natural colonisation has commenced since peat production ceased, short-term practical actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Short-term practical actions may include seeding of targeted vegetation and inoculation of *Sphagnum*.
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential run-off of suspended solids from the site during the rehabilitation phase.
- Submit an ex post report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an ex ante estimate for year 2 of the Scheme; and so on for each year of the Scheme.

8.4 Long-term (>3 years)

- Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- Delivery of a monitoring, aftercare and maintenance programme (See section 9 below).
- Decommissioning of silt-ponds will be assessed and carried out, where required.
- Reporting to the EPA will continue until the IPC licence is surrendered.

8.5 Timeframe

- **2023-2024:** Short-term planning actions.
- **2024-2025:** Short-term practical actions
- **2025-2026:** Long term practical actions. Evaluate success of short term rehabilitation measures outlined above and remediate where and if necessary.
- **2025-2026:** Decommission silt-ponds, if necessary.

8.6 Budget and costing

Bord na Móna appreciates the Minister's intention to support Bord na Móna in developing a package of measures, 'the Scheme', for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme'. However, *only the additional costs associated with the additional and enhanced rehabilitation, i.e., measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support.*

The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the Scheme will deliver benefits across climate action (GHG mitigation through reduced carbon emissions and acceleration towards carbon sequestration), enrich the State's natural capital, increase eco-system services, strengthen biodiversity, improve water quality and storage attenuation as well as developing the amenity potential of the peatlands.

Bord na Móna maintains a provision on its balance sheet to pay for the future costs of **standard** rehabilitation and decommissioning. This is updated every year - for more information see the Bord na Móna Annual Report (Bord na Móna, 2022). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

At this time, a 'standard' rehabilitation provision (sufficient to discharge the requirement of Condition 10 in the licence) has been allocated to the site based on the area of different cutaway types across the site (See Appendix I).

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9. AFTERCARE AND MAINTENANCE

9.1 Programme for monitoring, aftercare and maintenance

This programme for monitoring, aftercare and maintenance has been designed to meet the Conditions of the IPC licence. This is defined as:

- There will be **initial 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.
- These 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.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing 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.
- Enhanced water quality monitoring will aim to include up to 70% of a bog's drainage catchments.
- 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. The original (licence) requirement was for a quarterly sampling regime, but this has been increased to a monthly regime to appropriately track the changing water chemistry that will occur as part of this enhanced rehabilitation. In addition, DOC will be included as a parameter to try and identify any changes in carbon in the surface water.
- 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.

- Where other uses are proposed for the site that are compatible the provision of biodiversity and ecosystem services, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the required assessment process and planning procedures.

Additional monitoring measures are also proposed to monitor ecosystem service benefits that have been derived by enhanced rehabilitation. These proposed monitoring measures will be funded by the proposed Climate Action Fund Scheme or additional other funding. Monitoring of climate action and other ecosystem service benefits will be designed to take account of the requirements of monitoring benefits of the overall Scheme and will be stratified; that is not all monitoring will be carried out in each site. These are defined as:

- Vegetation and habitat monitoring after rehabilitation is completed using a cutaway bog condition assessment. This assessment will include assessment of on environmental and ecological indicators such as vegetation cover, vegetation communities, presence of key species, *Sphagnum* cover, bare peat cover and water levels. It is proposed that sites can be monitored against this baseline in the future.
- The condition of the bog can be assessed using the condition assessment and suitable Greenhouse Gas (GHG) emission factors can be assigned to different habitats. GHG emission factors have been determined for various peatland habitats in Ireland (Wilson *et al.*, 2015) and are constantly being refined with more and more research. BnM is actively supporting research into GHG fluxes in different rehabilitated peatland habitats. This means that potential GHG emissions can be estimated from the site, as the site continues along its trajectory towards a naturally functioning peatland ecosystem.

9.2 Rehabilitation plan validation and licence surrender – report as required under Condition 10.4

IPC licence 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.*

Reporting to the EPA will continue until the IPC licence is surrendered. The bog will be included in the full licence surrender process as per the Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites EPA, 2012, when:

- The planned rehabilitation has been completed;
- The key criteria for successful rehabilitation has been achieved and key targets have been met;
- Water quality monitoring demonstrates that water quality of discharge is stabilising or improving; and
- The site has been environmentally stabilised.

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APPENDIX I. A STANDARD PEATLAND REHABILITATION PLAN TO MEET CONDITIONS OF THE IPC LICENCE

In the event that the Scheme (PCAS) is not supported by additional funding, Bord na Móna is still obligated to carry out peatland rehabilitation to meet the conditions of the IPC Licence. Under its EPA licences and following cessation of peat extraction, BnM is mandated to ‘decommission’ its operations by removing materials ‘that may result in environmental pollution’ and establish that ‘rehabilitation’ measures have environmentally stabilised peat production areas.

This proposed standard peatland rehabilitation plan is outlined here to **estimate potential costs**. Bord na Móna will still be expected to cover the costs that would have accrued from standard decommissioning and rehabilitation activities, as part of its original obligations. The existing costs associated with both the removal of potentially polluting materials and the environmental stabilisation of the peatlands resides with Bord na Móna. However, the expenditure necessary to deliver the additional and enhanced decommissioning, rehabilitation and restoration and the benefits that flow from these measures and interventions/improvements will be eligible for funding by government through the Climate Action Fund and Ireland’s National Recovery and Resilience Plan.

The same process as outlined in Section 2 will be followed.

Scope of rehabilitation

The principal scope of this rehabilitation plan is to rehabilitate the bog. This is defined by:

- The area of the PCAS extent at Lemanaghan bog.
- EPA IPC Licence - Ref. P0500-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The PCAS extent at Lemanaghan bog is part of the Boora bog group.
- The current condition of the PCAS extent.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- To minimise potential impacts on neighbouring land. Some boundary drains around the bog will be left unblocked as blocking boundary drains could affect adjacent land.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for the PCAS extent is environmental stabilisation of the site via rewetting. This is defined as:

- Carrying out drain blocking to re-wet peat and slow runoff.
- Stabilising potential emissions from the site (e.g., suspended solids).
- Environmental stabilisation.

The outcome is setting the site on a trajectory towards establishment of natural habitats.

Criteria for successful rehabilitation:

- Rewetting of areas formerly drained for industrial peat extraction to offset potential run off of suspended solids and to encourage development of vegetation cover via natural colonisation and reducing the area of bare exposed peat.

- That there is a stabilising/improving concentration of suspended solids and ammonia associated with the measures undertaken to stabilise the peat surface by the blocking of the internal drainage system and the maximised rewetting of the peat surface. This will be demonstrated by developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be measured via water quality monitoring (suspended solids and ammonia).
- Receiving water bodies have been classified under the River Basin Management Plan and this classification includes waters that are 'At Risk' from peatlands and peat extraction. The success criteria will be that the 'At Risk' classification will see improvements in the associated pressures from this peatland or if remaining 'At Risk', that there is an improving trajectory in the pressure from this peatland.

Rehabilitation targets

- Demonstrating the delivery of the rehabilitation through site visits and through updated aerial photography (indicating presence of peat blockages and re-wetting). This will be demonstrated by a post rehab aerial survey.
- Stabilising potential emissions from the site (e.g., suspended solids). The key target will be developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be demonstrated by water quality monitoring results.

Rehabilitation measures:

- Blocking field drains in drier sections of the former industrial production area using a dozer to create regular peat blockages (three blockages per 100 m) along each field drain to re-wet peat.
- Drain blocking on high bog.
- No measures are planned for the other surrounding marginal peatland habitats.
- Evaluate success of short-term rehabilitation measures and enhance where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2024. 1st phase of rehabilitation. Field drain blocking.
- 2024-2026. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- 2025-2026. Decommission silt-ponds, if necessary.

Table AP-1. Rehabilitation measures and target area.

Type	Code	Description	Area (Ha)
Deep Peat	DPT1	Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes	100.2
Dry Cutaway	DCT1	Modifying outfalls and managing water levels with overflow pipes	5.5

Type	Code	Description	Area (Ha)
Additional Works	AW2	Targeted drain blocking	2.7
Marginal land	MLT1	No work required	8
Constraint	Constraint	Turbary, Archaeology, Hydrological Breaks	17.22
Silt Ponds	Silt Ponds	Silt Ponds	0.6
Total			134.7

See Drawing number *BNM-DR-25-07-RP-20: Standard Rehab Measures* included in the accompanying Mapbook which illustrates the standard rehab measures to be applied.

Monitoring, after-care and maintenance

- There will be initial 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, assess the progress of natural colonisation, monitoring of any potential impacts on neighbouring land and general land security. The number of site visits will reduce after 2 years to bi-annually. These site visits will assess the need to additional rehabilitation.
- Water quality monitoring will be established.
- 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, Flow, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD.
- This sampling regime on a selected number of silt ponds will be carried out over a two-year cycle. The original (licence) requirement was for a quarterly sampling regime.
- Where other uses are proposed for the site, these will be assessed by Bord na Móna in consultation with interested parties. Other after-uses can be proposed for licensed areas and must go through the required assessment and planning procedures.

Validation and IPC Licence surrender

Reporting to the EPA will continue until the IPC Licence is surrendered. The bog will be included in the full licence surrender process as per the Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites (EPA, 2012) when:

- The planned rehabilitation has been completed;
- Water quality monitoring demonstrates that water quality of discharge is stabilising or improving; and
- The site has been environmentally stabilised.

APPENDIX II. BOORA GROUP CONTEXT

The Boora group of bogs are sited between Killeigh (Offaly) in the East to Banagher (Offaly) in the West and between Kinnitty (Offaly) in the south and Clara (Offaly) in the North. The River Shannon is the major river catchment for the area with a smaller area lying within the Barrow catchment.

The Boora Group is one of the oldest bog groups in Ireland. Bord na Móna was set up in 1946 and it commenced the development of the Boora Bogs in 1946 with milled peat production commencing in 1955. Milled peat was produced in the Boora Bogs for the supply of fuel peat to the power station in Ferbane which commenced power generation in 1957 and closed in 2001. The Boora bogs were also developed for the supply of milled peat to the Derrinlough Briquette factory, which commenced production in 1957.

Much of the Boora Bog complex became cutaway as it was in peat production at an early stage. A number of rehabilitation measures comprising naturalisation and development of alternative after-uses have been already explored at the Boora Bog Group, including coniferous forestry, biomass, agricultural grassland, amenity use, rare species conservation management (specifically Grey Partridge) and wetland creation. Some of this was carried out in the 1980s. While agricultural fields and coniferous forestry have been developed successfully on the cutaway bogs at Boora, it was found that these require financial investment that at this time exceeds any potential commercial output value. The Lough Boora Discovery Park encompasses all areas relating to amenity and biodiversity (www.loughboora.com).

The bogs in The Boora Bog Group have been used in the past to supply milled peat for the horticultural market, local power stations (Ferbane, Shannonbridge and West Offaly Power) and Derrinlough Briquette factory. Industrial peat extraction has now ceased in the Boora Bog Group. Remaining peat stocks are being transported to Derrinlough Briquette Factory and other customers.

A breakdown of the component bog areas for the Boora Bog Group IPC licence Ref. PO500-01, and current, indicative Peat Production Status, is outlined in Table Ap-2. See Drawing number BNM-ECO-xx-xx- titled **Boora Bog Group**, included in the accompanying Mapbook which illustrates the location of Lemanaghan Bog and the Boora Bog Group in context to the surrounding area.

Table Ap-2: *Boora Bog Group names, area and indicative status*

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Killaun	359.5	Cutover Bog Industrial peat production commenced at Killaun Bog in 1996 and ceased in 2020. Only the upper most layers of peat have been harvested. Deep peat reserves remain on site. Killaun is considered a deep peat cutover bog.	Killaun Bog formerly supplied a range of commercial customers including horticultural peat and fuel peat. Most of the former production area is bare peat.	2020	Draft 2017
Boora	1,842.4	Cutaway Harvested since the 1950's resulting in the exhaustion of the commercially viable peat resource	The majority of Boora bog has already been rehabilitated. A significant area of cutaway bog has been re-wetted, developed	2020	Finalised 2021 Rehab complete

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
		at the bog. The majority of Boora Bog is considered a shallow peat cutaway bog. Some areas of deep peat persist at this site.	as conifer forestry (Coillte) and developed as farmland (1980s). This site now forms the core of Lough Boora Discovery Park.		
Pollagh/ Cornalaur	280.8	Cutaway At Pollagh Bog, industrial peat production began in 2004 and ceased in 2020. Peat reserves of variable depth remain on site. Some deep peat areas remain. Pollagh is considered a cutover bog with variable peat depths.	Pioneer emergent peatland vegetation communities are developing throughout the bog. The adjacent Cornalaur Bog was never developed for peat production.	2020	Finalised 2021 Rehab complete
Noggusboy	917.4	Cutaway Bog Industrial peat production commenced at Noggusboy during the 1950's and ceased in 2020. Long-term peat extraction has exhausted commercially viable peat reserves on this bog. Noggusboy is considered a shallow peat cutaway bog.	Part of the site was developed for conifer forestry by Coillte. Part of the site was developed as Cloghan Lake, as part of Lough Boora Discovery Park, in 1999. There is some emerging naturally colonising cutaway.	2020	Finalised in 2022 Rehab complete
Drinagh	1,339.1	Cutaway Bog Industrial peat production commenced at Drinagh during the 1950's and ceased in 2020. Some small pockets of deep peat reserves remain in parts of Drinagh Bog but most of the commercially viable peat reserves have been exhausted. Drinagh is considered a shallow peat, cutaway bog.	Drinagh East is cutaway and has been extensively rehabilitated as wetland. This part of the site has extensive development of naturally functioning peatland habitats. Some Coillte conifer forestry is also present. There is some emerging naturally colonising cutaway in Drinagh West.	2020	Finalised 2023 Rehab commenced
Killaranny	242.8	Cutover Bog Industrial peat production commenced at Killaranny during the 1980's. Deep peat reserves remain on much of the bog. Killaranny is considered a deep peat cutover bog.	Killaranny Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat. A portion of the site is leased by NPWS since 2011 as a re-location area for turf cutters from nearby Clara Bog SAC.	2020	Finalised 2022 Rehab complete
Oughter	352.9	Cutaway	The site has naturally been re-wetting and there is	2012	Finalised 2021

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
		Development of Oughter Bog commenced in the 1960's. Industrial peat production ceased in 2012. Shallow peat depths remain over much of the former production bog area. Oughter is considered a shallow peat cutaway bog.	already significant natural colonisation. Part of the site has been developed as the Midlands National Shooting Centre of Ireland.		Rehab complete
Galros	191.5	Cutover Bog Industrial peat production commenced at Galros during the 1980's and ceased in 2020. Some areas of deep peat remain on the former production area. Galros is considered a cutover bog of variable peat depth.	Galros Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat. Some naturally emerging cutaway habitats are developing in part of the site.	2020	Draft 2017
Clongawny More	987.2	Industrial peat production commenced at Clongawny More during the 1950's and ceased in 2020. Some pockets of deep peat persist, particularly in the south-western portion of the former production area. Clongawny More is considered a cutover bog with variable peat depths throughout the site.	Part of the site rehabilitated, as part of Lough Boora Discovery Park, in 1999. Some Coillte conifer forestry is also present. The site has naturally been re-wetting and there is already significant natural colonisation. BnM currently have submitted an application for renewable energy development on this bog.	2020	Draft 2024
Derrinboy	305.7	Cutover Bog Derrinboy was first developed by BnM in the 1980's. Peat production ceased at Derrinboy in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat have been harvested. Derrinboy is considered a deep peat cutover bog.	Derrinboy Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat.	2020	Finalised in 2022 Rehab commenced
Moneitta	707.5	Cutover Bog Moneitta was first developed by BnM in the 1970's. Peat production ceased at Moneitta in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat were harvested. Moneitta is considered a deep peat cutover bog.	Moneitta Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat.	2020	Draft 2017

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Boora Lemanaghan Rail Link	6.9	N/A	Not applicable	N/A	N/A
Derries	368.2	<p>Cutaway Bog</p> <p>Development of The Derries Bog commenced in the 1960's. Industrial peat production ceased in 2005. Shallow peat depths remain over much of the former production bog area.</p> <p>The Derries Bog is considered a shallow peat cutaway bog.</p>	<p>Wetland rehabilitation carried out over part of site in 1999.</p> <p>Amenity trackway development in 2015. Part of the Lough Boora Discovery Park.</p> <p>The site has now been extensively naturally colonised and is a mosaic of wetland and Birch woodland habitats.</p>	2005	<p>Finalised 2021</p> <p>Rehab complete</p>
Turraun	534.5	<p>Cutaway Bog</p> <p>Development of Turraun Bog commenced in the 1950's. Industrial peat production ceased in 2018. Turraun is considered a shallow peat cutaway bog.</p>	<p>Wetland rehabilitation carried out over part of area in 1999 as part of the Lough Boora Discovery Park. This section of the site has now been extensively naturally colonised and is a mosaic of wetland and Birch woodland habitats.</p>	2018	<p>Finalised 2021</p> <p>Rehab complete</p>
Derryclure	327.6	<p>Cutover Bog</p> <p>Derryclure was first developed by BnM in the 1980's. Peat production ceased at Derryclure in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat were harvested. Derryclure is considered a deep peat cutover bog.</p>	<p>Derryclure Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat.</p>	2020	Draft 2021
Lemanaghan (outside present PCAS extent)	1,253.7	<p>Cutover Bog</p> <p>Industrial peat production commenced at Lemanaghan during the 1950's and ceased in 2019. Varied peat depths across the site. Deep peat reserves remain on much of the former production area of Lemanaghan Bog. It is considered a cutover bog.</p>	<p>Lemanaghan Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat.</p> <p>There are some naturally emerging cutaway habitats.</p>	2019	Draft 2017
Belair North	565.7	<p>Cutover Bog</p> <p>Belair North was first developed by BnM in the 1960's. Peat production ceased at Belair North in 2020. This bog was used to</p>	<p>Belair North Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat.</p>	2020	Draft 2017

Bog	Area (Ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
		supply horticultural peat. Only the upper layers of peat were harvested. Belair North is considered a deep peat cutover bog.			
Derrybrat	171.6	<p>Cutaway Bog</p> <p>Industrial peat production commenced at Derrybrat during the 1950's and ceased in 2016. Derrybrat has shallow peat depths across the site. It is considered a shallow peat cutaway bog.</p>	The site has been partially rehabilitated and there is already significant natural colonisation. Some conifer forestry has been developed by Coillte on the site.	2016	Finalised 2022 Rehab commenced
Belair South	228.8	<p>Cutover Bog</p> <p>Belair South was first developed by BnM in the 1970's. Peat production ceased at Belair South in 2020. This bog was used to supply horticultural peat. As a result, only the upper layers of peat were harvested. Belair South is considered a deep peat cutover bog.</p>	Belair South Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat.	2020	Draft 2017
Boora Bog Group Total	10,983.7				

APPENDIX III. ECOLOGICAL SURVEY REPORT

Ecological Survey Report			
<p><i>Note: This report outlines an ecological survey of the entire Lemanaghan bog. Some areas discussed in this report are outside of the PCAS extent of Lemanaghan Bog. This report should not be taken as a management plan for the site as other land-uses may still be considered. Information within this report may inform the development of other land-uses and identify areas with particular biodiversity value.</i></p>			
Bog Name:	<u>Lemanaghan</u>	Area (ha):	1285ha
Works Name:	Boora	County:	Offaly
Recorder(s):	MMC & DF	Survey Date(s):	25 th & 26 th January 2011
<p>Habitats present (in order of dominance)</p> <p>The most common habitats present at this site include:</p> <ul style="list-style-type: none"> • Bare peat (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II). • Birch Scrub – (cBir, oBir, eBir) and Gorse scrub (eGor) • Pioneer dry heath (dHeath) (frequently in mosaic with bare peat and or Bog Cotton-dominated vegetation) • Pioneer poor fen vegetation dominated by Bog Cotton, Soft Rush and/or Marsh Arrowgrass (pEang, pTrig, pJeff) • Dry grassland habitats – (gMol, gCal) • Temporary open water (TOW) • Access routes (railways, tracks and associated habitats) • Riparian zones (Rip) (drains, channelised streams and associated bank habitats) • Works area • Silt ponds (Silt) <p>The most common habitats found around the margins of this site include:</p> <ul style="list-style-type: none"> • Conifer plantation (WD4) (Codes refer to Heritage Council habitat classification, Fossitt 2000) • Raised bog (PB1) • Cutover bog (PB4) • Dry heath (HH1) • Improved grassland (GA1) • Hedgerows (WL1) • Oak-Ash-Hazel woodland (WN2) 			
<p>Description of site</p> <p>Lemanaghan Bog is located approximately four kilometres east of Ferbane in Co Offaly. The R436 Ferbane-Clara Road passes along much of the southern end of the site (two small sections of the site are located to the south of this road) while the</p>			

N62 Ferbane to Athlone Road forms a boundary with some of the western edge of the site. Pollagh village is located approximately 3.5 kilometres to the south of the site.

Lemanaghan Bog is a large bog that is well spread out over four main sections, one large main bog with three isolated, smaller bogs, 'cut' off by roads. A mineral island containing farmland and associated habitats is located close to the centre of the main section of the bog and is partially owned by Bord na Móna. A roadway extends through the bog to this mineral island. A relatively large area of the main site has been given over to private sod-peat production.

Much of the bog particularly, the eastern side of the bog, has been in production since 1959. However, the bog was in sod-peat production for some time and it is only recently that extensive areas have gone into milled peat production (within the past 15 years). As a result, much of the production area still has 'red' acidic peat and small areas where production has been in-active have developed more acidic type pioneer cutaway vegetation with Heather and Gorse prominent. An isolated section of the site in the south-west (south of the road) (Curraghlassa) contains some features of archaeological significance (20 gold coins dating from 1279-1301) and is not used for production as a result of this find. Other archaeological features that have been uncovered on the site include timber trackways and artefacts such as shoes.

An old pilgrim path (walking trail) follows the eastern boundary of the site. This trail connects Clonmacnoise with Ballycumber and is a way-marked trail.

Main section

A small works area is located towards the central part of the site. This area contains some small buildings and machinery. A long silt pond and pump are located immediately to the east of this area and the stream that flows through the site flows in and out of this silt pond.

For the most part sections of the site in the north-east and to the east of the access roadway (Castletown Bog) to the central mineral island (farm) are in full production and are mapped as bare peat. At the time of the ecological survey drainage works were on going in these sections of the site. Marginal habitats found around the edges of the site included bog woodland, dry calcareous grassland (gCal) and remnant raised bog. A small section of the site that the BnM boundary maps show within the site has been transformed into a go-cart racing track. A section of remnant raised bog in the south-eastern corner of the site was being subjected to turf cutting resulting in this habitat becoming drier.

A section of dry heath (dHeath) exists directly to the east of the mineral island (farm). This area has been ditched and had its top surface of vegetation removed in the past but it was now revegetated with Heather with patches of Birch scrub developing. An area with three silt ponds is located along the eastern boundary of the site. The access road to the mineral island consisted of a rough un-tarred track that was bounded by fragmented hedgerows. Three mature Scots Pine trees are located alongside the track.

There are two sections of mineral island (farm) that are located side by side within the site. Both sections are composed of grassland and hedgerows. The first mineral island is more southerly in aspect than the other. This section of agricultural grassland, scrub and hedgerow are in private ownership (farm) and is not managed by BnM. Some habitats that surround this area consist of bog woodland with an area of scrub and cutaway bog located to the south west, these afore mentioned habitats are located within the BnM property. The area of cutover bog is still used for turf cutting and drying and was also subjected to some dumping of domestic rubbish. To the east of this section of cutaway an area that up until ten years ago was used for industrial peat production, however since production ceased in this area poor fen and scrub habitats were developing.

The most northerly mineral island is owned by BnM and consists of agricultural grassland, hedgerows and scrub. The grasslands are cut for silage once a year (leased from BnM) with no domestic animals kept on the grassland. The hedgerows consisted of Ash, Oak, Birch, Holly, Blackthorn, Hazel, Willow and Gorse. These hedgerows have not been cut back in some time and are tall and leggy. Patches of scrub are also located within this area and these areas of scrub are developing into a mixture of Birch woodland (WN7) (along the edges of the mineral island) and Oak-Ash-Hazel (WN2) woodland. No domestic animals are kept on this mineral island but several Rabbits and Hare were observed, there were also signs of

Badger. An old disused access track still remains that connected this mineral island with other farmland along the north western boundary of the site. There may be potential for some semi-natural calcareous grassland to be present around this mineral island, due to the long-term management of the area (grazing-farming).

South of the mineral island (farm) owned by Bord na Móna there is a small area of bog (between the mineral island and the railway to the south) that seems to have come out of production. There has been no production in this area for 10 years. This area has a variable topography and several small mounds have been exposed with exposed glacial gravel. These are being vegetated with dry calcareous grassland. The surrounding bog is a mosaic of bare peat and patches of poor fen dominated by Soft Rush and some marsh Arrowgrass. Towards the southern end there is a fall in the topography and there is some development of Bottle Sedge-dominated vegetation in an area that is wetter.

In the south-east corner, an area to the north of the R436 public road contained mainly bare peat and is in full production. A silt pond was located within this area and a stream (tributary of the Brosna River) flows along the western boundary. Some pioneer habitats, mainly Gorse scrub and Purple Moorgrass-dominated grassland were also becoming established along the western edge of this section. A bog road cuts through the northern end of this section. To the north of the bog road a small remnant section of raised bog is present. This section of raised bog is small, dry and degraded due to encroaching turf cutting. Pioneer habitats surrounding the remnant section of raised bog include dry calcareous grassland (gCal) and Purple Moorgrass-dominated grassland (gMol) with large areas of bare peat remaining.

Main section –southern part (south of works area)

The majority of this area is production bog with bare peat. There are several bands of cutaway vegetation several fields wide that have developed in the southern half. These areas of cutaway vegetation run most of the length of this section and are interspersed with several active production fields with bare peat. The bare peat in the southern half of the production area is mainly blacker fen peat. These cutaway sections are legacies of the former sod-peat production. A band of high bog (about 2 fields wide) mostly vegetated with dry heath (Heather), Purple Moor-grass-dominated vegetation and Birch scrub (oBir, cBir) has been left in the centre of each section where a deep drain flowed along the length of the bog. One of these cutaway strips also has an access zone where an old railway is found on the remaining high bog. On either side of the remaining high bog there are several fields that are also out of production and at various stages of pioneer cutaway habitat development. The central parts are higher and are influenced by a series of underlying large ridges/mounds that run through the bog in a N-S direction. These areas generally have denser Birch scrub (eBir and oBir) and some element of Purple Moorgrass vegetation or dry grassland (gDa-An) development. The lower (and younger?) sections generally have typical poor fen vegetation with Soft Rush dominating. Further north, the poor fen vegetation generally peters out.

There are several areas along the central riparian zone-stream where there is some wet production bog. This is the lowest part of the site and there are pumps on both sides. However, there has been no pumping this year due to maintenance issues and water has been allowed to build-up on both sides.

The southern boundary of most of this section has a band of extensive cutover bog that has been given over for private sod-peat cutting. There is a deep drain (Rip) running the length of this section that contains Common Reed with an adjacent access track. Silt-ponds are also present towards the south-west corner and this riparian zone has developed mature Birch scrub. This area is a mosaic of more active cutover bog with bare peat and regenerating older cutover bog with typical communities such as pioneer dry heath (Heather (dHeath)), Bog Cotton-dominated vegetation Purple Moorgrass-dominated vegetation and Birch scrub (oBir). The more active peat cutting seems to be taking place towards the south-west corner and this section has more bare peat and younger pioneer communities such as bare peat in mosaic with Soft Rush and Bog Cotton. Some of the older more established Bog Cotton and Purple Moorgrass-dominated vegetation (in the wetter areas) also contains hummocks of *S. papillosum*, *S. capillifolium* and *S. subnitens*.

There is a small area of ditched bog that never went into production along the Ferbane-Clara road in the south-western section. This high bog is very dry and dominated by Heather. There has been significant subsidence along the drains creating troughs and ridges through-out the bog. There are very poor prospects for any raised bog restoration within this section.

Derrynagun Bog (PCAS extent)

This section of bog is located to the south east of the main section of bog. The Ferbane-Clara road separates it from the main section of the site. This bog is for the most part it is bare peat. Fringe habitats include Gorse scrub (WS1), Silt ponds, remnant sections of raised bog (PB1) and Birch woodland (WN7). The sections of remnant raised bog are small and very dry and are dominated by Heather. Some turf cutting is still carried out along the south eastern boundary of the site. An ancient track way has been uncovered in this section of bog in the past.

Northern section

This section of the bog is separated from the main section of the bog by a small public road, there is a rail connection to the more northerly Bellair Bog from this section of the site.

The majority of this section of the site is bare peat. However approximately five production fields along the eastern boundary of the site have revegetated with Heather. This section of the site does not appear to have ever been harvested to a great extent (approximately three peat harvesting seasons). A section of remnant raised bog is located along the eastern boundary of the site, this area of raised bog was dry and was dominated by Heather. Drains have been installed in this area, most likely by local turf cutters that are cutting turf along the north eastern boundary of the site.

North-west section

This section is 'cut-off' from the main section by the railway running around the site. This section extends to the Ferbane-Athlone (N62) road. The majority of this section is bare peat. It is relatively young and the peat is generally 'red' acidic peat. However, there is a significant area north of a second access zone that has not been in production for some time and is developing a mosaic of dry heath with Heather, Gorse scrub and scattered Birch. The stream that flows through the site flows along the northern boundary of this section. Along the southern margin of this area there is some high bog that is used for private sod-peat production. There has been some regeneration of pioneer dry heath and Bog Cotton within this area.

Curraghalassa Bog (PCAS extent)

This section of the site is located in the south-west corner and is 'cut off' from the rest of the site by the Ferbane-Clara Road. It mainly consists of ditched high bog where there has been no production due to archaeological constraints. It is surrounded by active cutover bog along the south-eastern boundary and there is encroachment from private cutting around other sections.

The high bog is very dry and dominated by Heather. The drainage has been very effective and there is significant subsidence along the drains creating ridges in the centres of the fields and troughs along the drains. There are only small patches of more typical high bog vegetation with Bog Asphodel more prominent. Occasional drains still have some *S. cuspidatum* where the drainage is slightly impeded. However the *Sphagnum* cover on the high bog is very low. The moss cover is generally represented by *Hypnum jutlandicum* and *Campylopus introflexus*. Birch (2-6 m high), some Pine and some Gorse are scattered over the bog with the central section becoming quite dense with trees between the two mineral mounds. Some of this area could be classified as Birch woodland/scrub (WN7). It also contains more frequent Purple Moorgrass and Bog Myrtle. However the majority of the woodland/scrub has been damaged recently by fire. This burn has also affected the high bog south of the mineral islands and significant areas of Heather have been burnt and the ground cover now has a significant portion of bare peat. The prospects for raised bog restoration at this stage are very poor and this area is more likely to develop Birch woodland in the long-term.

The main topographical features of this bog are two small mineral islands or mounds that both have several mature Oak and Ash. Some of the Oak trees are quite large. This woodland development (WN2) is related to the underlying mineral sub-soil. The woodland development is quite poor as both areas are small and the ground cover is dominated by Ivy and Bramble. Timber may have been removed from both mounds at some stage in the past. Other typical WN2 species include Hazel, Elder, Hawthorn, Blackthorn and Soft-Shield Fern. In both mounds the Oak-Ash-Hazel type woodland grades into more typical Birch woodland where Birch is dominant. Other typical species such as Bramble, Bracken, Broad Buckler Fern

and Bilberry are present. One noticeable feature of the north-east mound was that there were several young Oak trees growing on peat within the Birch woodland/scrub around the mound.

Designated areas on site (cSAC, NHA, pNHA, SPA other)

None

Ferbane Bog cSAC (NPWS site code 000575) is located 2.3 km east of the site while The Grand Canal (NPWS site code 002104) is located to the south of the site. The Boora-Lemanaghan rail link (not surveyed) passes over the canal.

Adjacent habitats and land-use

Surrounding habitats include remnant sections of raised bog (PB1), Conifer plantations (WD4), cutover bog (PB4), wet grassland (GS4), improved agricultural grassland (GA1), depositing river (FW2), Birch woodland (WN7) and a newly constructed go cart track (BL3) that is partly located within the BnM boundary.

Watercourses (major water features on/off site)

- Tributaries (unnamed) of the Brosna River flow along the eastern boundary of the site and flow south to the River Brosna (2 km from site).
- Another tributary flows through the centre of the site and is significantly channelised in a deep channel with poor riparian development. Parts of this stream were heavily silted, although Mallard were roosting in one section. There may be potential for Kingfisher along this stream. No signs of Otter were noted.
- A further tributary of the Brosna River flows out of the south western corner of the site.
- All water courses on or next to the site are part of the Shannon catchment.

Peat type and sub-soils

The majority of the site still has 'red' acidic peat, although the site is now milled for fuel peat. Some of the areas initially in production have been inactive for some time and are now developing pioneer dry heath and scrub. There are some sections where blacker fen peat has been exposed.

Glacial sub-soil seems to underlay much of the southern area and this is exposed in some places on the tops of mounds. Blue-silty clay is also exposed in places along the central stream and shell marl was exposed near the pumps. Shell marl was exposed in some of the drains in Derrynagun.

Fauna biodiversity

Birds

Several bird species were noted on the site during the survey.

- Lapwing (4) on Derrynagun Bog.
- Kestrel
- Bullfinch (3)
- Woodcock (1)

- Jay (2)
- Snipe (1)
- Long-tailed Tit (using conifers adjacent to bog and road in SW area)
- Other more common species included Meadow Pipit, Wood Pigeon, Pheasant, Blue Tit (4), Grey Crow Wren, Rook and Blackbird.

Mammals

Signs of several mammal species were recorded on the site.

- Badger (scrapes) and signs of foraging in several locations
- Fox (scats in several locations)
- Rabbit (sighting, frequent signs around the bog)
- Hare (several sighted in different locations)
- Mink (tracks)

References

European Commission (1996). Interpretation manual of European Union habitats. Brussels. European Commission, DGXI.
Fossitt, J. (2000). A guide to habitats in Ireland. Kilkenny. The Heritage Council.

APPENDIX IV. ENVIRONMENTAL CONTROL MEASURES TO BE APPLIED TO BOG REHABILITATION

- Bog restoration/rehabilitation measures will be restricted to within the footprint of the proposed rehabilitation area.
- The proposed rehabilitation will have due regard to noise limits and hours of operation (i.e. dusk and dawn) to minimise any potential disturbance on resident and local fauna that utilise the site and immediate environs.
- All plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).
- The proposed activities will be restricted to daylight hours and there will be no requirement for artificial lighting.
- Silt ponds will be inspected and maintained as per the IPC licence.
- During periods of heavy precipitation and run-off, activities will be halted.
- Measures will be carried out using a suitably sized machine and, in all circumstances,, excavation depths and volumes will be minimised where possible.
- All machines will be regularly checked and maintained prior to arrival at the site to prevent hydrocarbon leakage.
- Hoses and valves will be checked regularly for signs of wear and will be closed and securely locked when not in use.
- Fuelling and lubrication of equipment shall only be carried out in designated areas away from surface water drainage features and ecologically sensitive areas.
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- Vehicles will never be left unattended during refuelling.
- No direct discharges to waters will be made. No washings from vehicles, plant or equipment will be carried out on site.
- All plant refuelling will take place using mobile fuel bowsers. Only dedicated trained and competent personnel will carry out refuelling operations.
- Mobile storage such as fuel bowsers will be bunded to 110% capacity to prevent spills. Tanks for bowsers and generators shall be double skinned. When not in use, all valves and fuel trigger guns from fuel storage containers will be locked. All pumps using fuel or containing oil will be locally and securely bunded where there is the possibility of discharge to waters.
- Potential impacts caused by spillages etc. during rehabilitation will be reduced by keeping spill kits and other appropriate equipment on-site.
- Site activities will be carried out in accordance with 'best practice'. In order to ensure compliance and implementation of 'best practice', these measures will be communicated to relevant Bord na Móna staff and updated as required.

APPENDIX V. BIOSECURITY

The potential for importation or introduction of non-native plant species (such as Japanese Knotweed, Himalayan Balsam, etc.) during future rehabilitation management, such as drain-blocking using excavators, has the potential to result in the establishment of invasive species within the site. Section 49 of the European Communities (Birds and Natural Habitats) Regulations 2011 prohibits the introduction and dispersal of invasive alien species (particularly plant species) listed on Part 1 (third column) of the 'Third Schedule'.

This section aims to reduce the risk from, and impacts of, invasive species and protecting biodiversity on lands under Bord na Móna ownership. Rehabilitation and decommissioning in the bog will have due regard to the relevant biosecurity measures outlined below:

- Records of problematic invasive species within the various bog units will be marked out with signs to highlight areas of infestation to personnel.
- All plant machinery will be restricted from disturbing known colonies of invasive species.
- All plant machinery will avoid unnecessary crossings to adjoining lands.
- Good site hygiene will be employed to prevent the introduction and spread of problematic invasive alien plant species (i.e. Japanese Knotweed (*Fallopia japonica*), Himalayan Balsam (*Impatiens glandulifera*), Himalayan Knotweed (*Persicaria wallichii*), etc.) by thoroughly washing vehicles prior to entering the area.

The biosecurity measures outlined above are in line with best practice guidelines issued by the National Roads Authority (NRA, 2010) – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads and broadly based on the Environment Agency's (2013) – The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites (Version 3, amended in 2013, accessed on the Environment Agency's website on the 11th of July 2016).

In addition to the above, Best Practice measures around the prevention and spread of Crayfish plague⁶ will be adhered with throughout all rehabilitation measures and activities.

⁶ <https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/>

APPENDIX VI. POLICY AND REGULATORY FRAMEWORK

Bord na Móna Plc is a publicly owned company, originally established in 1934 to develop some of Ireland's extensive peat resources for the purposes of economic development and to support energy security. In the decades since its establishment the company has employed tens of thousands of people in its fuel, energy, and horticultural growing media businesses. For much of its history the company's support of important national policy aims has been enabled and encouraged in a variety of ways by Government.

Today, Bord na Móna is undertaking a number of highly significant actions in support of climate policy. These actions involve a radical transformation and decarbonisation of nearly the entire Bord na Móna business. This transformation will be driven by unlocking the full potential of our land and creating significant value for Ireland and the Midlands in particular.

Bord na Móna is an integral part of the economic, social, and environmental fabric of Ireland and Irish life. As a key employer in the Midlands, the company is conscious that its obligations go beyond purely commercial and environmental – there is also a social responsibility to employees and the communities served by Bord na Móna. It is the company's role and absolute priority to ensure that its long-term strategy delivers on all of these important areas in a robust and balanced way.

There are a wide range of policies, plans, legislation and land designations that inform the development of this Bord na Móna peatland rehabilitation plan. Bord na Móna have also developed and operate various policies and strategies that also inform the development of this rehabilitation plan.

1 EPA IPC Licence

Bord na Móna operates under IPC licence issued and administered by the EPA to extract peat within the Boora Bog Group (Ref. P0-500-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Boora Bog group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

2 National Climate Policy

The National Policy Position establishes the fundamental national objective of achieving a transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. It sets out:

- the context for the objective;
- clarifies the level of GHG mitigation ambition envisaged; and
- establishes the process to pursue and achieve the overall objective.

The evolution of climate policy in Ireland will be an iterative process based on the adoption by government of a series of national plans over the period to 2050. GHG mitigation and adaptation to the impacts of climate change are to be addressed in parallel national plans – respectively through the National Climate Action Plan. The plans will be continually updated, as well as being reviewed on a structured basis at appropriate intervals and, at a minimum, every five years. This will include early identification and ongoing updating of possible transition pathways to 2050 to inform sectoral strategic choices.

Bord na Móna is following a decarbonisation programme aimed at reducing the carbon emissions from its activities. Industrial peat production has now ceased and several other decarbonisation measures are being

implemented. The company aims to further develop renewable energy and resource recovery markets with a key objective of reducing the carbon intensity of all products. In addition, the carbon emission mitigation benefits associated with the post-peat extraction rehabilitated peatland following re-wetting, revegetation and colonisation of significant areas with native woodland will make a significant contribution to achieving the State's carbon emission reduction targets.

3 National Peatlands Strategy

The National Peatlands Strategy (2015) contains a comprehensive list of actions, necessary to ensure that Ireland's peatlands are preserved, nurtured and become living assets within the communities that live beside them. It sets out a cross-governmental approach to managing issues that relate to peatlands, including compliance with EU environmental law, climate change, forestry, flood control, energy, nature conservation, planning, and agriculture. The Strategy has been developed in partnership between relevant Government Departments/State bodies and key stakeholders through the Peatlands Council.

The strategy recognises that Ireland's peatlands will continue to contribute to a wide variety of human needs and to be put to many uses. It aims to ensure that Ireland's peatlands are sustainably managed so that their benefits can be enjoyed responsibly. It aims to inform appropriate regulatory systems to facilitate good decision making in support of responsible use. It also aims to inform the provision of appropriate incentives, financial supports and disincentives where required. The strategy attempts to strike an appropriate balance between different needs, including local stakeholders like turf-cutters and semi-state bodies such as Bord na Móna.

In line with a National Peatlands Strategy recommendation, a Peatlands Strategy Implementation Group (PSIG), was established, assisted in the finalisation of the Strategy, is overseeing subsequent implementation and will report to Government on an annual basis on the implementation of the actions and principles contained within the Strategy.

Bord na Móna is a key stakeholder in the National Peatlands Strategy and the Peatlands Strategy Implementation Group. The strategy recognises the potential for some Bord na Móna sites to be restored and to contribute to the national SAC and NHA network of protected raised bog sites. The strategy (agreed in 2015) also recognises the various different values of cutaway bog and developed six key principles (with Bord na Móna) for the after-use of cutaway bog.

- Bord na Móna will continue to assess and evaluate the potential of the company's land bank, using a land use review system. The assessment will help prepare a set of evidence-based management plans for the various areas of peatland. These plans will also inform its cutaway bog rehabilitation.
- The policy of Bord na Móna is not to open up any undrained new bogs for peat production.
- Lands identified by Bord na Móna as having high biodiversity value and/or priority habitats will be reserved for these purposes as the proposed future land use.
- Generally, Bord na Móna cutaway bogs that flood naturally will be permitted to flood unless there is a clear environmental and/or economic case to maintain pumped drainage.
- In deciding on the most appropriate afteruse of cutaway peatlands, consideration shall be given to encouraging, where possible, the return to a natural functioning peatland ecosystem.
- This will require re-wetting of the cutaway peatlands which may lead in time to the restoration of the peatland ecosystem.

- Environmentally, socially and economically viable options should be analysed to plan the future use of industrial cutaway peatlands, in conjunction with limiting factors as outlined in Bord na Móna's Strategic Framework for the Future Use of Peatlands.

The National Peatlands Strategy highlights the importance and value of developing peatland rehabilitation plans for Bord na Móna cutaway sites and implementing this peatland rehabilitation. Some of these principles have now been superseded by the company's decision to cease industrial peat extraction. The National Peatlands Strategy is currently being reviewed by Government.

4 Draft National River Basin Management Plan 2022-2027 (Water Framework Directive)

The Draft River Basin Management Plan for Ireland 2022-2027 (Department of Housing, Local Government and Heritage, 2022) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). In broad terms, the objectives of the WFD are (1) to prevent the deterioration of water bodies and to protect, enhance and restore them with the aim of achieving at least good status and (2) to achieve compliance with the requirements for designated protected areas.

The NRBMP 2018-2021 outlined how peat extraction can be a potentially significant pressure on various water quality parameters. Peatland rehabilitation of Bord na Móna cutaway (in addition to other measures) was part of the WFD (2018-2021) programme of measures. The NRBMP 2018-2021 takes account of the fact that Bord na Móna was in the process of phasing out the extraction of peat for energy production, that it set a target to rehabilitate 9,000 ha of cutaway bogs (covering 25 peatlands) by 2021 (in 2018) and will look to implement best-available mitigation measures to further reduce water quality impacts caused by peat extraction while the phasing-out process is taking place. This NRBMP 2018-2021 rehabilitation target was superseded by the acceleration of the Bord na Móna de-carbonisation programme and the Peatland Climate Action Scheme (PCAS).

The development of site rehabilitation plans and the delivery of peatland rehabilitation by Bord na Móna was expected to have a positive impact on water quality and will help the NRBMP 2018-2021 deliver its objectives in relation to the Water Framework Directive and is one of the five key principle actions.

The draft NRBMP 2022-2027 describes how the number of waterbodies impacted by peat, industry and forestry have decreased by 10, 10 and 5 waterbodies, respectively since the second cycle. Impacts on water quality and river habitat arising from peat and peat extraction and associated drainage include the release of ammonium and fine-grained suspended sediments, and physical alteration of aquatic habitats. Drainage of peatlands also results in changes to the hydromorphological condition of rivers.

The draft NRBMP 2022-2027 outlines how maintaining and restoring Irish bogs will lead to a decrease in waterborne carbon leaching to levels comparable with intact bogs as well as reducing losses of peat silt and ammonia. Vegetation on the surface of the peat can also slow the flow of water over the land surface. Based on the EPA's most recent reports, peat extraction and drainage are impacting on 106 water bodies across the country, with peat the single pressure on 28 of these water bodies. However, compared to the data in the second-cycle plan, the number of water bodies impacted by peat has decreased.

The cessation of industrial peat extraction by Bord na Móna in 2021 was expected to have a significant positive impact on water quality of receiving water courses by reducing the impact of peat extraction as a key pressure on particular water courses. This is now being supported by the results and conclusions of the draft NRBMP 2022-2027.

5 National Biodiversity Action Plan 2016-2021

The National Biodiversity Action Plan 2016-2022 has a vision that biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally. Ireland's 2nd National Biodiversity Action Plan outlines the main policies, strategies, actions and targets in relation to biodiversity. This plan has several Bord na Móna specific objectives and actions including implementing the BnM Biodiversity Action Plan 2016-2021 and overlaps with both the National Peatlands Strategy and the National Raised Bog Special Areas of Conservation Management Plan 2017-2022.

Rehabilitation of Lemanaghan Bog is expected to significantly contribute in the future to actions and targets of the National Biodiversity Action Plan 2016-2021, particularly in relation to peatland restoration and creation of new habitats such as wetlands and woodlands.

6 National conservation designations

Bord na Móna operates in a wider landscape that also includes a network of European and National nature conservation sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), National Heritage Areas (NHAs, cNHAs) and National Nature Reserves). Bord na Móna will take account of this network of conservation objectives and their conservation objectives when developing these rehabilitation plans. It is expected that peatland rehabilitation will, in general, benefit the conservation objectives of this network of nature conservation sites.

7 National Raised Bog Special Area of Conservation Management Plan 2017-2022

The National Raised Bog Special Area of Conservation Management Plan 2017-2022 sets out a roadmap for the long-term management, restoration and conservation of protected raised bogs in Ireland. The Plan strikes an appropriate balance between the need to conserve and restore Ireland's raised bog network as part of Ireland's commitments towards the EU Habitats Directive, and the needs of stakeholders and gives recognition to the important role that communities have to play in the conservation and restoration of raised bogs. The National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017-2022 is part of the measures being implemented in response to the on-going infringement action against Ireland in relation to the implementation of the EU Habitats Directive, with regard to the regulation of turf cutting on the Special Areas of Conservation (SACs). The then Minister for Arts, Heritage and the Gaeltacht, also published a **Review of Raised Bog Natural Heritage Area Network** in 2014.

Bord na Móna has played a key role in the development of the National Raised Bog Special Area of Conservation Management Plan 2017-2022 and the Review of the Raised Bog Natural Heritage Area Network. Several Bord na Móna sites were assessed by the National Parks and Wildlife Service as part of the above Plan and Review and there is an expectation that several Bord na Móna sites will be designated as SACs and NHAs in the future. This will reinforce the network of protected raised bog sites and replace in part sites that will be de-designated as they have been deemed to be significantly damaged and are deemed to have no raised bog restoration prospects. The Peatland Climate action scheme (PCAS), which includes enhanced rehabilitation measures, is expected to restore several sites that will contribute to The National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017-2022 targets in relation to the restoration of raised bog habitat.

Bord na Móna has also responded to the needs of the NRBMP and provided several sites to the government for the relocation of turf-cutters from SACs. This is part of a suite of ongoing bog conservation measures in the NRBMP to manage turf-cutting in protected sites. Bord na Móna and the National Parks and Wildlife Service continues to engage regarding the ongoing relocation of turf-cutters from protected raised bog sites.

8 All-Ireland Pollinator Plan 2021-2025

The All-Ireland Pollinator Plan 2021-2025 outlines key objectives and actions to protect and support pollinating insects and the habitats they rely on. A Bord na Móna specific action in this plan includes the adoption of pollinator-friendly management within the Bord na Móna network of sites. One action to help achieve this objective is habitat rehabilitation and restoration, where possible, of pollinator-friendly habitats, including peatland habitats.

9 Land-use planning policies

As Bord na Móna operates in many counties across Ireland, it is important to note the respective development plans in these counties. Many of the existing development plans recognise the potential that exists in the after-use of cutover/cutaway peatlands. Bord na Móna seeks to work with all of the relevant local authorities to ensure that the most appropriate after-uses are reflected in local planning policy. The following areas of consistent importance are of both direct and indirect relevance to Bord na Móna: heritage, tourism, biodiversity/conservation, landscape, renewable energy, and economy/enterprise.

10 National Archaeology Code of Practice

Bord na Móna operates under an agreed Code of Practice regarding archaeology with the Department of Arts, Heritage and the Gaeltacht and the National Museum of Ireland which provides a framework to enable the Company to progress peat extraction whilst carrying out archaeological mitigation. (<https://www.archaeology.ie/sites/default/files/media/publications/cop-bord-na-mona-en.pdf>)

The Code replaced a set of Principles agreed with the Department of Arts, Heritage and the Gaeltacht in the 1990s. Under the Code, Bord na Móna, the Minister and Director work together to ensure that appropriate archaeological mitigation is carried out in advance of peat extraction.

- BNM must ensure that any monuments or archaeological objects discovered during peat extraction are protected in an appropriate manner by following the Archaeological Protection Procedures.
- BNM must 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.
- BNM must ensure that any archaeological objects discovered on Bord na Móna lands are reported immediately to the Duty Officer of the National Museum of Ireland.
- Bord na Móna will adhere to the Archaeology Code of Practice relating to management of any archaeological finds that may arise during cutaway peatland rehabilitation and decommissioning.

11 Bord na Móna Biodiversity Action Plan 2016-2021

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands. The Bord na Móna Biodiversity Action Plan also outlines key International and European policy in relation to biodiversity. This includes the **United Nations Convention on Biodiversity 2011-2020 (CBD)** and **European Biodiversity Strategy to 2020**. Further details of these policies and Bord na Móna's responses can be found in the Bord na Móna Biodiversity Action Plan (Bord na Móna 2016). Both policy documents highlight targets such as reducing pressure on biodiversity, promoting sustainability, habitat restoration and benefits of ecosystem services.

One example of a key CBD target is:

- *“Restore at least 15% of degraded areas through conservation and restoration activities.”*

The EU's headline target for progress by 2020 is to:

- *“halt the loss of biodiversity and the degradation of ecosystems in the EU by 2020, restore them as far as feasible, while stepping up the EU contribution to averting global biodiversity loss.”*

This rehabilitation plan is aligned to the CBD target and the EU Biodiversity Strategy target and will help Ireland meet its commitment to these international Biodiversity policies.

12 Bord na Móna commitments

Bord na Móna made the commitment in 2009 not to develop any new peatland sites for industrial peat production. The company has continued to work with different stakeholders.

The company announced that industrial peat production would be cut by over 50 percent in 2019 and would entirely cease over most of its lands by the mid-2020s. Rehabilitation measures would continue to be carried out with the focus on re-wetting and rehabilitation of cutover and cutaway areas in line with national policies (such as the National Peatland Strategy, the National Biodiversity Action Plan, the Climate Action Plan 2019, the Water Framework Directive, etc.) and rehabilitation guidelines set down by the Environmental Protection Agency. To date, 15,000 hectares of cutaway and cutover bog have been rehabilitated using this approach with 5,000 hectares in active rehabilitation.

In line with Bord na Móna's accelerated decarbonisation programme, the company made a further commitment to a significantly larger rehabilitation target. This was reflected in our plans to rehabilitate a further 20,000 hectares of cutaway and cutover bog to wetland and woodland mosaics by 2025. In addition, we planned to restore a further 1,000 hectares of raised bog habitat by 2025.

The above commitments have now been followed by the decision by the company to cease industrial peat extraction and rehabilitate a target of 33,000 ha between 2021-2025.

These commitments outline the importance of peatland rehabilitation to Bord na Móna. The company will continue to demonstrate environmental responsibility and continue to deliver on these commitments in relation to peatland rehabilitation and in relation to the future management of these lands to maximise their benefits, particularly their ecosystem service benefits, along with the sustainable development of a portion of the land bank for other uses, such as renewable energy.

13 Bord na Móna Strategic Framework for the future use of cutaway peatlands 2020 (Draft)

The general after-use strategy of Bord na Móna is outlined in the Bord na Móna Strategic Framework for Future-Use of Cutaway Bogs 2020 (draft document). This document outlines how Bord na Móna's cutover peatland estate is complex in nature with great variability in terms of peat depths, peat types, drainage, subsoil condition and environmental value. Thus, future options require consideration on a site-specific basis, also bearing in mind the considerable internal variation within bogs. The development of the land-bank will also take account of national needs, while also taking account of the various national legislation, policies and plans related to the management of peatlands. In general, Bord na Móna will seek to balance and optimise commercial, social, and environmental value of these sites, and develop integrated land-uses, while taking account of the need for sustainability and their biodiversity value.

Any consideration of other future after-uses for Bord na Móna land such as development or other mixed uses will be conducted following the relevant planning guidelines and consultation with relevant authorities and will be considered within the framework of this peatland rehabilitation plan.

Draft

APPENDIX VII. DECOMMISSIONING

1. Condition 10 Decommissioning

This is a requirement of the applicable Integrated Pollution Control Licence issued by the Environmental Protection Agency. This condition 10.1 requires the following:

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.

The main success criteria pertaining to successfully complying with this condition is ensuring that no environmental liability remains from this infrastructure and material and that the bog can be deemed suitable for surrender of the license under section 95 of the EPA Acts. This is achieved by Bord na Móna identifying and quantifying any mechanical and infrastructural resources that were installed in the bog to enable the development and production operation at the site. This list is then refined to identify any items that would be deemed as possibly resulting in environmental pollution, should they not be removed.

Typically, these items/infrastructures would be any remaining, unconsolidated plant, equipment and attachments, waste materials, unused raw materials such as land drainage pipes, remaining peat stockpiles, stock pile covering, pumps, septic tanks and fuel tanks.

In relation to this bog, the list and tasks would be as follows:

Item	Description	Lemanaghan Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Where relevant
2	Cleaning Silt Ponds	Cleaning Silt Ponds
3	Decommissioning Peat Stockpiles	Where relevant
4	Decommissioning or Removal of Buildings and Compounds	Where relevant
5	Decommissioning Fuel Tanks and associated facilities	Where relevant
6	Decommissioning and Removal of Bog Pump Sites	Not relevant
7	Decommissioning or Removal of Septic Tanks	Where required

In addition, condition 7 of the licence requires these now defined waste items to be disposed of or recovered as follows:

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.

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.

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

7.3.1 The names of the agent and transporter of the waste.

7.3.2 The name of the persons responsible for the ultimate disposal/recovery of the waste.

7.3.3 The ultimate destination of the waste.

7.3.4 Written confirmation of the acceptance and disposal/recovery of any hazardous waste consignments sent off-site.

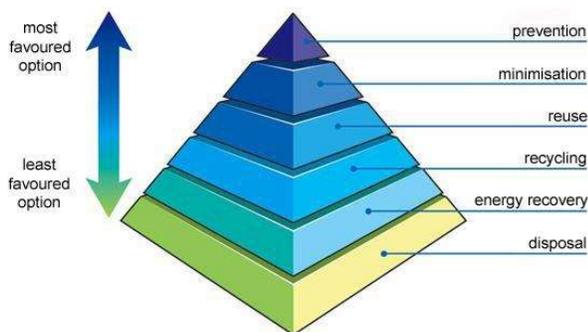
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

As required by the licence, these waste items will be removed for recycling or disposal, using external contractors with the required waste collection permits, approved under 7.2, with waste records maintained as required under 7.3.

Where possible, Bord na Móna will utilize the appropriate waste hierarchy to identify waste that can reused or recycled ahead of disposal.



The validation of the success of condition 10.1 is carried out through an Independent Closure Audit (ICA), followed by and EPA Exit Audit (EA) and the eventual partial or full surrender of the licence.

APPENDIX VIII. GLOSSARY

Cutaway Bog: A Bord na Móna site generally becomes cutaway when it is economically unviable to continue industrial peat extraction or when the majority of peat has been removed.

Deep peat cutover bog. Deep peat cutover bog is defined as former raised bogs that have been in industrial peat production, where production has ceased but the residual peat depth is typically in excess of 2m. *Sphagnum* mosses are key species of raised bogs and the majority of the peat mass is formed from these mosses. *Sphagnum* species and other raised bog species are a key part of raised bog habitat function and prefer more acidic, nutrient poor, water-logged conditions. Typical raised bog *Sphagnum* mosses and other bog species do not thrive with the more typical alkaline water chemistry of cutaway bog but do grow well in these more acidic conditions where peat has been re-wetted. There is potential to re-develop embryonic *Sphagnum*-rich plant communities in these conditions if the peat can be re-wetted. This brings the opportunity of re-developing embryonic *Sphagnum*-rich vegetation communities that are considered Carbon sinks or peat-forming habitats and restoring the carbon sequestration function of these sites.

Dry cutaway bog: Cutaway bog is categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that some areas of cutaway will remain relatively dry due to the heterogenous topography of the cutaway, as well as requirements for continued drainage on site for identified after-uses, or off site in relation to neighbouring lands or other infrastructure. Ridges and mounds of glacial deposits can become exposed during peat extraction and form a heterogenous topographical mosaic separated by basins. Dry cutaway may have very thin or no residual peat where ridges and mounds have been exposed. The exposed sub-soils are a mix of glacial gravels, muds and tills that can be quite free-draining. Dry cutaway may also have deeper residual peat but in a location (i.e. at the margin) where the peat cannot be re-wetted due to boundary constraints. Dry cutaway may also develop in situations where there a relatively steep slope that inhibits re-wetting. The majority of dry cutaway will develop towards grassland, heath, scrub and dry woodland habitats.

Environmental stabilisation: The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat, slowing water movement across the bog, minimising effects to downstream waterbodies and meeting the conditions of the IPC licence. This is achieved by a combination of re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention. Habitats will develop that reflect the underlying environmental conditions. Other after-use development may also serve to act as environmental stabilisation.

Marginal land. Marginal land is defined as land around the margin of the industrial peat production area. This margin generally contains a range of habitats including scrub, Birch woodland, cutover bog and raised bog remnants. It has a variety of land-uses including turf-cutting (private turbary).

Rehabilitation: Rehabilitation is defined in general by Bord na Móna as environmental stabilisation of the former cutaway. This is generally achieved via re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention. It is not possible to restore raised bog habitats on BnM cutaway in general in the short-term. In general, most of the peat mass has been removed from many BnM cutaway sites and the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status. This means there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland). Other after-use development may also serve to act as rehabilitation.

Restoration: Ecological restoration to defined as the process of re-establishing to the extent possible the structure, function and integrity of indigenous ecosystems and the sustaining habitats they provide" (SER 2004).

Defined in this way, restoration encompasses the repair of ecosystems (Whisenant 1999) and the **improvement of ecological conditions in damaged wildlands** through the **reinstatement of ecological processes**. In general, Bord na Móna cutaway peatlands cannot be restored back to raised bog in a reasonable timeframe as their environmental conditions has changed so radically (with the removal of the acrotelem – the living layer and much of the peat mass). However, they can be returned to a **trajectory** towards a naturally functioning peatland system (Renou-Wilson 2012). **Raised bog restoration** is an objective of some BnM sites where there is residual natural raised bog vegetation and where the majority of the peat is still intact.

Standard rehabilitation: This is defined as rehabilitation that is designed to meet the conditions of the EPA IPC licence. The key objective of rehabilitation is environmental stabilisation. This is achieved by a combination of re-wetting, where possible, and natural colonisation of the former cutaway, with or without intervention. Other after-use development may also serve to act as rehabilitation.

Standard decommissioning: This is defined as decommissioning that is designed to meet the conditions of the EPA IPC licence. This is defined as to 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.

Wetland cutaway bog. Wetland cutaway bog is defined as former raised bogs that have been in industrial peat production, where production has ceased and the majority of peat has been cutaway, and where this cutaway has the potential to be re-wetted. A significant number of Bord na Móna sites have pumped drainage and these sites are likely to develop a mosaic of wetland habitats when pumping is reduced or stopped. The water chemistry of wetland cutaway frequently is strongly influenced by the more alkaline sub-soils that have been exposed during peat production. This means that pioneer vegetation is more typical of fen and wetland, rather than raised bog. Wetland cutaway will have a broad range of hydrological conditions depending on the local topography. In some cases, these wetlands may form deep water (> 0.5 m) whilst other areas may have the water table at or just below the surface of the ground.

APPENDIX IX. EXTRACTIVE WASTE MANAGEMENT PLAN

(Minimisation, treatment, recovery and disposal)

Objective:

The objective of this generic plan is to comply with the requirements of regulation 5 of the Waste Management (Management of Waste from Extractive Industries) Regulations, and to prevent or reduce waste production and its harmfulness.

Scope:

This plan covers IPC Licence's Ref P0500-01, Boora Group of Bogs in County Offaly.

1.0 Extractive Waste:

Waste classified as extractive waste from peat extraction operations arise from three operations associated with this activity.

1.1 Silt Pond excavations and maintenance.

All peat extraction activities are serviced by a silt lagoons/ponds. During the excavation of these silt ponds, pre IPC Licensing in 1999 and since licensing, the excavated material is stored adjacent to the silt pond, where it either remains in situ or is levelled out. As required by condition 6.6, these silt lagoons are cleaned twice per annum or more often if inspections dictate. These silt cleanings are also deposited on the same location, adjacent to the silt pond, where they may be levelled periodically to allow room for subsequent cleanings. These mounds of silt pond excavation material and cleanings are generally no higher than 2-3 metres.

1.2 Power Station screenings:

Peat from the bogs is screened prior to processing. This screening removes oversized peat, stones and bog timbers. Schedule 3 (ii) of the IPC licence permits disposal of these peat screenings back to the bog, where it is levelled and graded into the surrounding peat landscape. These locations have been agreed with the Agency as per condition 7.4 of the IPC Licence, and as per the attached locations.

1.3 Bog Timbers:

During peat extraction operations, bog timbers often arise in the bog surface and are required to be cleared. These timbers consist of bog pine, oak and some yew. Some of these timbers, such as the oak and yew are removed for use in the wood craft industry, with the remaining bog pine stockpiled in locations at the opposite end of each bog, where it generally becomes a habitat for flora and fauna. These piles of timber are generally no higher than 1-2 metres.

2.0 P0500-01 IPC Licence Extractive Waste Conditions

2.1 Condition 7.5 Extractive Waste Management

The licensee shall draw up a Waste Management Plan (to be known as an Extractive Waste Management Plan) for the minimisation, treatment, recovery and disposal of extractive waste. This Plan shall meet the requirements of regulation 5 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009. The Plan shall be submitted for agreement by the Agency by the 31st of December 2012. The Plan shall be reviewed at least once every five years thereafter in a manner agreeable to the Agency and amended

in the event of substantial changes to the operation of a waste facility or to the waste deposited. Any amendments shall be notified to the Agency.

All extractive waste shall be managed in accordance with the Extractive Waste Management Plan. A report on the implementation of the Extractive Waste Management Plan shall be provided in the AER.

2.2 Condition 7.6 Waste Facility

- (i) No new waste facility may be developed or an existing waste facility modified unless agreed by the Agency.
- (ii) The licensee shall ensure that all existing waste facilities are managed and maintained to ensure their physical stability and to prevent pollution or contamination of soil, air, surface water or groundwater.
- (iii) The licensee shall ensure that all new waste facilities are constructed, managed and maintained to ensure their physical stability and to prevent pollution or contamination of soil, air, surface water or groundwater.
- (iv) Operational measures shall be continuously employed to prevent damage to waste facilities from personnel, plant or equipment.
- (v) The licensee shall establish and maintain a system for regular monitoring and inspection of waste facilities.
- (vi) All records of monitoring and inspection of waste facilities, as required under the licence, shall be maintained on-site in order to ensure the appropriate handover of information in the event of a change of operator or relevant personnel.

2.3 Condition 7.7 Excavation Voids

7.7.1 Unless otherwise agreed by the Agency, only extractive waste shall be placed in excavation voids.

7.7.2 When placing extractive waste into excavation voids for rehabilitation and construction purposes, the licensee shall, in accordance with regulation 10 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009, and the Extractive Waste Management Plan:

- Secure the stability of the waste
- Put in place measures to prevent pollution of soil, surface water and ground water.
- Carry out monitoring of the extractive waste and excavation void.

Condition 7.5. Extractive Waste Management Plan. 5 (1)

3.0 Minimisation.

3.1 Silt pond excavation material and cleanings.

IPC Licence conditions require all production areas to be serviced by an appropriately designed silt pond based on storage volume and retention time. Condition 6.6 requires all ponds to be cleaned bi-annually and more often if inspections dictate, so the only opportunity for minimisation of same is through Standard Operating Procedures. These are required under condition 2.2.2 (i) regarding minimisation of suspended solids, and are in-place to minimise the generation of silt, which in-turn will minimise the generation of silt pond waste.

3.2 Power Station Screenings.

These screenings cannot be minimised as they are a consequence of peat production, stones, timbers and oversize peat materials are naturally occurring on the bog, and are required to be removed prior to processing.

3.3 Bog Timbers.

Bog timbers are also naturally occurring materials within a bog and are required to be removed prior for production. The volume of these bog timbers varies from bog to bog and as such their minimisation is not controllable or quantifiable.

4.0 Treatment

4.1 Silt pond excavation material and cleanings.

The silt pond excavation material and silt cleanings do not require any treatment for its end use which will be either backfilling these silt pond voids as per condition 7.7.1 above as part of the Bog Rehabilitation Plan, or reincorporated into the surrounding peatlands.

4.2 Power Station Screenings.

The factory screenings are permitted to be returned to the bog as they were naturally occurring materials from the bog, and as such do not require any treatment to serve this purpose.

4.3 Bog Timbers

As per 1.3 above, these timbers are stockpiled at two locations in each bog, as per the attached list of sites and become habitats for various flora and fauna.

5.0 Recovery

5.1 Silt pond excavation material and cleanings.

Condition 2.2.2 (vi) requires the reuse of silt pond waste to be examined. This was undertaken in 2006, the outcome of which was that this waste peat silt material, as a fuel, was contaminated with sub-soils, rendering it unsuitable for combustion. In addition, volumes are small compared to overall peat production volumes.

5.2 Power Station Screenings.

Given the nature of these screenings as outlined in 1.2 above, there is no further use identified and they are permitted to be disposed of back to the bog.

5.3 Bog Timbers

Investigations into processing these materials into smaller fractions for potential heating purposes did not yield any viable results. In addition, these older stockpiles are now classified as habitats and as such would not be considered for reuse as a fuel.

6.0 Disposal

6.1 Silt pond excavation material and cleanings.

Schedule 3 (ii) permits the disposal of silt pond cleanings (Lagoon Sediments) to the bog and these locations, adjacent to the silt pond site, are presented in the attached spreadsheet, with associated grid coordinates.

6.2 Power Station Screenings.

Schedule 3 (ii) permits the disposal of screenings (Peat Screenings) to the bog at designated locations agreed under Condition 7.4, and these locations, are presented in the attached spreadsheet, with associated grid coordinates.

6.3 Bog Timbers

These naturally occurring bog timbers are stockpiled at locations in each bog, grid coordinates attached.

7.0 Extractive Waste Management Plan

5 (2a) (i)

The vast majority of peat extraction bogs were all designed and drained for production prior to the 1960's and as such the production fields layout cannot be altered. Under our Cleaner Reduction Procedures, various design changes have been implemented to the production machines and process to reduce lost peat which eventually is captured in the silt ponds and requires removal as waste peat silt. This along with training and ongoing research and development will continuously reduce waste peat and subsequently waste silt pond cleanings. Bog timbers are present naturally in various volumes and quantities in different bogs and as peat production involves stripping peat in layers, the exposure, generation and removal of these timbers is unavoidable. Work has been undertaken recently into project looking at grinding of these bog timbers in situ using a timber miller, and if this project becomes viable it will contribute to the reduction of bog timbers.

5 (2a) (ii)

Given the nature and expanse of peat bogs, the stockpiling and storage of these waste materials do not present a visual, storage or stability problem. As required under Condition 10 of the IPC Licence, the silt pond excavations and screenings will be utilised to backfill the silt pond voids once the bogs have finished and stabilised in accordance with our Bog Rehabilitation Plan. Storage of these wastes in the interim, open to the elements does not present a change on the nature of these wastes that will threaten the environment or prevent their reuse during the bog rehabilitation process.

5 (2a) (iii)

Under Condition 10 of the IPC Licence, all silt ponds will be decommissioned once the bog surface has stabilised, in agreement with the Agency. This will involve the removal of weirs and flow controls, returning the silt pond back to its original drain or removing the silt pond from the drainage system. Both of these activities will involve placing the silt pond extraction and cleaning material back into the excavation void.

5 (2a) (iv)

The peat bogs do not contain any topsoil, so this is not required.

5 (2a) (v)

Peat mineral resources do not undergo any treatment.

5 (2b)

These three extractive waste are all being reused and recovered back to their original extraction points and have not undergone any physical, chemical, or biological change.

5 (2c) (i, ii & iii)

These three extractive wastes, stored on the bog for reuse or recovery during the bog rehabilitation phase, do not require any management or monitoring during the operation of these bogs. Silt pond excavations and cleanings are stored adjacent to the silt pond and quickly revegetated and stabilise, the screenings are graded back into the bog at the agreed locations upon disposal and the bog timbers do not prevent any water or airborne danger to the environment.

5 (3)

The three extractive wastes arising from peat extraction operations at this site are classified wastes from mineral non-metalliferous excavation, with an EWC code of 0101 02. The materials are not classified as hazardous under Directive 91/689/EEC20, and do not contain substances or preparations classified as dangerous under Directives 67/548/EEC5 or 1999/45/EC6 above a certain threshold.

The peat excavations and cleanings are stored in locations and in a manner that they could not collapse and are remote in their nature. The stockpiles are located adjacent to silt ponds that are cleaned regularly and as such these stockpiles are managed and levelled to facilitate further cleanings.

Therefore, the material stored at these waste facilities would not be considered to be a Category A waste facility.

Classification in accordance Annex II.

Waste Material	Description	Classification	Chemical Process treatment	Deposition description	Transport System
Silt Pond Excavations and cleanings	Peat and mineral soils associated with peatlands. Stored for reuse during bog rehabilitation, with no displacement of overburden.	01 01 02	None	Excavated from silt ponds by excavator and deposited adjacent to the silt pond.	Excavator
Peat Screenings	Stones, timbers and oversized peat particles, reincorporated into low areas, agreed with the Agency, and stabilised under normal natural bog conditions.	01 01 02	None	Removed by screen at the factory and transported by tractor and trailer to the designated and agreed locations	Tractor and trailer
Bog Timbers	Pine, Oak and Yew species, stored at locations in each bog. Not subject to any stability issues due to exposure to atmospheric/meteorological conditions.	01 01 02	None	Removed from the bog surface by excavator and transported by tractor and trailer to the agreed locations	Tractor and Trailer

Description of operations.

Silt pond excavations arise from the requirement to have silt ponds treating all peat extraction sites. Silt pond cleanings arise from the removal of peat silt from silt ponds as required under IPC Licence. Bog timbers arise from preparation of the bogs surface for peat production. Estimated quantities of materials are below:

Closure plan. (Bog Rehabilitation Plan).

Condition 10.1 – 10.3 of the IPC Licence requires the following:

- 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.
- 10.1.2 Implement the agreed cutaway bog rehabilitation plan (refer Condition 10.2).

10.2 Cutaway Bog Rehabilitation Plan:

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

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

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

10.4 A final validation report to include a certificate of completion for the Rehabilitation Plan, for all or part of the site as necessary, shall be submitted to the Agency within six months of execution of the plan. The licensee shall carry out such tests, investigations or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment. This plan including maps and ecological classifications are available on file at the Boora IPC Licence Coordinators office. The location in relation to the silt pond excavations and cleanings are adjacent to the silt ponds, which are considered under the Shannon River Basin Management Plan in accordance with the requirements of Directive 2000/60/EC. Screenings and bog timbers are all naturally occurring elements of peatland and their placement back to the bog in smaller concentrated designated waste facilities does not constitute a risk to the prevention of water compliance. The lands under where these materials are deposited are peatlands and are un-effected by the placing of this material.

Review

This plan will be reviewed every five years. This review will entail an inspection of these waste facilities to ensure their placing, management, maintenance, and stability comply with the requirements of the Extractive Waste Management requirements and condition 7.5, 7.6 and 7.7 of the Boora IPC Licence P0500-01.

APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
 1. The land is waterlogged;
 2. The land is flooded, or it is likely to flood;
 3. The land is frozen, or covered with snow;
 4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
 5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- No fertiliser will be spread on land within 2 metres of a surface watercourse.
- Buffer zones in respect of waterbodies, in line with advice on the implementation of the European Union (Good Agricultural Practice for Protected of Waters) (Amendment) Regulations 2022, latest statutory instrument below at link: <https://www.irishstatutebook.ie/eli/2022/si/113/made/en/pdf>
- will be adhered with at all times with regard to fertiliser application. Reproduced as follows:

Water body / Feature	Buffer zone
Any water supply source providing 100m ³ or more of water per day, or serving 500 or more people	200 metres (or as little as 30 metres where a local authority allows)
Any water supply source providing 10m ³ or more of water per day, or serving 50 or more people	100 metres (or as little as 30 metres where a local authority allows)
Any other water supply for human consumption	25 metres (or as little as 30 metres where a local authority allows)
Lake shoreline	20 metres
Exposed cavernous or karstified limestone features (such as swallow holes or collapse features)	15 metres
Any surface watercourse where the slope towards the watercourse exceeds 10%	10 metres
Any other surface waters	5 metres*

APPENDIX XI. CONSULTATION SUMMARIES

[Results to follow]

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APPENDIX XII. ARCHAEOLOGY

Role of the Archaeological Liaison Officer

1. To communicate this Code of Practice and the *Archaeological Protection Procedures* (Appendix IV) to all personnel operating on the bog.
2. To ensure that all notices relating to the *Archaeological Protection Procedures* are posted and maintained at appropriate locations on the bog.
3. To report any stray finds, presented to the Liaison Officer from his/her group of bogs, to the Duty Officer of the National Museum of Ireland.
4. To provide for the appropriate protection of the stray find, whether in-situ or removed from the bog, as directed by the Duty Officer of the National Museum of Ireland.



Code of Practice

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Code of Practice

5. To arrange for the delivery or collection of the stray find, as directed by the Duty Officer of the National Museum of Ireland.
6. To complete the Report of Discovery of Archaeological Object(s) in Bogs (Appendix V), as directed by the Duty Officer of the National Museum of Ireland.
7. To maintain a file of all stray finds and associated documentation and provide copies to the Project Archaeologist.
8. To provide assistance, where required, to the Department during archaeological surveys.
9. To provide assistance, where required, to Bord na Móna's Consultant Archaeologists, during investigation and mitigation of monuments.
10. To report to the Bord na Móna members on the Archaeology Management Liaison Committee any planned developments or new activities on cutaway peatland areas within his/her group of bogs.



Bord na Móna	Procedure: ENV017	Rev: 1
	Title: Archaeological Findings	Approved: EM

1) Purpose

The purpose of this procedure is to describe the arrangements in Bord na Móna for findings of Archaeological material (Stray Finds).

All objects, sites or monuments, no matter how fragmentary, are important elements of our heritage.

2) Procedure

1. Check whether there are any known archaeological monuments in your area.
2. Be vigilant at all times - objects or traces of structures can be found on the field surfaces, in the drain faces, on the bog margins or caught within the mechanics of machinery.
3. If an object is found leave it in place, if it is safe to do so, note its position and immediately contact your Archaeological Liaison Officer who will assess the situation and contact the Duty Officer of the National Museum of Ireland.
4. Resist the temptation to investigate the find spot as this may disturb fragile archaeological deposits.
5. If the object is already dislodged or is in imminent danger, remove it carefully, mark its find spot and report it immediately to your Archaeological Liaison Officer.
6. Objects made of wood, leather or textile, which are removed from peat should be kept in conditions similar to those in which they are found. This can be done by packing them in peat or, if waterlogged, placing them in a clean basin of water and sealing the container. Resist the temptation to clean or remove peat from the object.
7. If timbers or other materials, such as gravel or stones, which could be part of a man-made structure are noted on the bog, mark the location and report it immediately to your Archaeological Liaison Officer. If you suspect the find is of archaeological importance, resist the temptation to expose it any further as this could result in damage to the structure.
8. Report anything that looks unnatural in the bog – your Archaeological Liaison Officer will decide whether it should be referred to the appropriate authorities.

NOTE: Our archaeological heritage is a finite, non-renewable resource. Once a site is destroyed its information is lost forever and we have lost the chance to understand a little more about our past, where we have come from and perhaps the opportunity to learn for the future.

Your Archaeological Liaison Officer is

3) Records

Revision Index			
Revision	Date	Description of change	Approved
1	13/09/2020	First release	EMcD
2			

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