Bord na Móna

Drinagh Bog

Cutaway Bog Decommissioning and Rehabilitation Plan 2023

This document seeks to address the requirements of Condition 10.2 of IPC License 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 Drinagh 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 Drinagh Bog.

In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0500-01, due regard was also given to the Peatlands Climate Action Scheme (PCAS) announced by the Minster. 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 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.

While this document outlines the enhanced rehabilitation measures planned for the Drinagh 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 Drinagh 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 Drinagh 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.

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NON-TECHNICAL SUMMARY

- Bord na Móna is planning to rehabilitate Drinagh Bog, near Kilcormac in Co Offaly.
- Peat harvesting is now finished at Drinagh Bog.
- This is happening as Bord na Móna are obliged to carry out peatland rehabilitation via an IPC License 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, and minimising impacts to downstream. Essentially this means putting the 'skin' of plants and mosses back on the peat. The bog was drained in the past to allow peat production. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is re-wetted. This means drain-blocking and other measures 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. This means the remaining peat is wet and that plants that prefer wetter conditions, like Bog Cotton and Reeds will thrive.
- Many Bord na Móna bogs can not 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 shallow wetlands with Reedbeds and Birch woodland, and in time a naturalised peatland can be restored.
- Re-wetting peat is also better for climate action. This reduces carbon emissions as re-wetting the remaining peat reduces carbon losses such as the production of Carbon Dioxide, the main Greenhouse Gas. The site is expected to still be a reduced carbon source for some time, but eventually the carbon sink function can re-establish as peat-forming conditions are restored. This will take some time.
- The development of a range of habitats in Drinagh Bog will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. It will increase the national area of native woodland. 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.
- Drinagh Bog was drained and developed for industrial peat production in the 1950s. Peat production ceased in 2016. Some rehabilitation was carried out in 2018 and in 2020. Much of the site has already started to develop pioneer habitats including cutaway wetlands.
- Measures proposed for Drinagh Bog include drain blocking and other measures required to raise water levels to the surface of the peat (changing levels of pipes for example).
- Bord na Mona plan to carry out this work in 2023.
- These rehabilitation measures will be planned by a team consisting of ecologists, hydrologists and engineers. It is a principle of Bord na Móna rehabilitation planning that no actions will be taken that would negatively impact on adjacent land. No boundary drains will be blocked. Water will still leave the site via the existing outlets.
- It will take some time for vegetation and habitats to fully develop at this bog, and a peatland ecosystem to be restored. However, it is expected that most of the site will be developing pioneer habitats after 10 years.
- 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,

such as renewable energy. Any other proposed development will planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the site.

- Bord na Móna have been granted consent to construct a Wind Farm in an adjacent bog at Drinagh (Derrinlough Wind Farm). Planning permission has recently been consented and construction has commenced. An amenity track through Drinagh and along the industrial railway is planned to link the Boora amenity complex with the amenity being developed as part of the Derrinlough Wind Farm. This amenity can be integrated into the rehabilitation plan as it is currently outside the rehab plan footprint.
- Peatland rehabilitation of these bogs 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 operates under IPC Licence issued and administered by the EPA to extract peat within the Boora bog group (Ref. P0500-01), see Appendix II for details of the bog areas within this Group. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the cutaway boglands within the licensed area. The bog is part of the Boora bog group (see Appendix II for details of the bog areas within the Boora Bog Group). Drinagh Bog is located in Co. Offaly.

This document seeks to address the requirements of Condition 10.2 of IPC License 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 plan is a specific rehabilitation plan for the bog 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;
- 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 actions;
- Budget and Costings; and
- 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 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 at peat surface ± 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.

The measures will also accelerate the development of new habitats for a range of species under pressure in the wider landscape and will have the potential to develop habitats (e.g. Annex I raised bog, wetlands that support wader water birds of conservation interest) that will contribute towards the delivery of national biodiversity objectives.

Drinagh Bog is proposed to be part of this Scheme (PCAS) and this rehabilitation plan outlines the approach to be taken.

1.1 Constraints and Limitations

This document only covers the area of **Drinagh Bog as outlined by the black dashed line in** drawing number DR-24-16-01 titled **Drinagh Bog**. This rehabilitation plan takes account of the **current land-uses** of Drinagh Bog.

Industrial peat extraction at Drinagh Bog commenced in the 1950's and permanently 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. Currently the former peat production area comprises a mosaic of various different pioneer habitats, in addition to bare peat and exposed gravel sub-soil. The combination of active rehabilitation measures and natural colonisation will quickly establish and/or increase the extent of pioneer vegetation and will be planned to accelerate environmental stabilisation.

Nevertheless, it will take some time (30-50 years) for naturally functioning peatland ecosystems to fully re-establish.

Future land-use at Drinagh Bog has not been defined by Bord na Móna. Bord na Móna will continue to review the future after-use of its land-bank. Any consideration of any other future after-uses for Drinagh Bog, will be conducted in adherence to the relevant planning legislation and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Amenity use has been consented via planning for a small section adjacent to the north of Drinagh as part of the Derrinlough Wind Farm. This amenity (proposed track along the bed of the industrial railway) will link Derrinlough Wind Farm and the Lough Boora Discovery Park.

Parts of Drinagh Bog (outside the areas owned and under the control of Bord na Móna) are currently used by domestic turf cutters to harvest peat. 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 margins of Drinagh Bog 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. In addition, a small area within the northeast of Drinagh bog, within the control of Bord na Móna, has been identified as Turbary. However, this land has not been subject to peat extraction although some historic drainage has been undertaken.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way.

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 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-practise 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:
- Hydrological modelling; and
- The development of a Methodology Paper[1] outlining the Scheme (PCAS). 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 Drinagh 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-practise 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.
- 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.
- 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.

[1] Bord na Móna (2022). *Methodology Paper for the Enhanced Decommissioning, Rehabilitation and Restoration on Bord na Móna Peatlands – Preliminary Study Nov 2022 Version 19.* Bord na Móna. Available online at : https://www.bnmpcas.ie/supporting-material/

- 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.
- Pschenyckyj et al., 2021, Optimising Water Quality Returns from Peatland Management while Delivering Co-Benefits for Climate and Biodiversity, Report produced for An Fóram Uisce, Online, Available at: https://thewaterforum.ie/app/uploads/2021/04/Peatlands_Full_Report_Final_March2021b.pdf, Accessed 17.08.2021.
- Quinty & 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 Integrated Pollution Control Licence;
- Boora Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) web mapper;
- 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 2018 – 2021;
- Bord na Móna Annual Report 2020;
- Bord na Móna Annual Report 2021;
- Spatial data in respect of Article 17 reporting, available online at https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17;
- Bord na Mona Biodiversity Action Plan 2016-2021,
- Review of Raised Bog Natural Heritage Area Network (NPWS, 2014)

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 will be 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 Drinagh Bog was originally surveyed in October of 2009, and re-surveyed in September of 2014, additional ecological walk-over surveys and visits have taken place at Drinagh Bog between 2014-2023 to inform rehabilitation planning and habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent site walk-over surveys and visits, and updates to baseline data.

Habitat mapping followed best-practise 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 (2010), while mosses and liverworts nomenclature follows identification keys published by the British Bryological Society (2010). A more detailed Bord na Móna classification system was 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). Much of the pioneer cutaway vegetation is still at an early stage of its development and cannot be assigned to Fossitt Level 3 categories yet.

A detailed ecological baseline survey report for Drinagh Bog is contained in Appendix II.

3. SITE DESCRIPTION

Drinagh Bog is located circa 6km to the south of Ferbane and 5Km north west of Kilcormac, Co. Offaly. The bog is situated west of the R357 and east of the N62.

The bog location is provided in Drawing number BNM-DR-24-16-01 titled **Drinagh Bog: Bog Site Location**, included in the accompanying Mapbook. This illustrates the location of Drinagh Bog in context to the surrounding area.

The surrounding landscape is a mosaic primarily consists of low-lying agricultural land (pasture) interspersed with other cutover raised bogs, many of which have also been managed by Bord na Móna for peat production with some areas utilised for domestic turf-cutting. Lough Boora Discovery Park is approximately 4km east of Drinagh.

The Silver River, a tributary of the River Brosna, flows northward along the eastern boundary of Drinagh Bog. The Grand Canal is located, at the closest point, approximately 3km north of the site. Drinagh is linked to Boora Bog to the east (also owned by Bord na Móna) and Clongawny More bog to the West by railway line and a machinery travel path. The Drinagh wind farm development footprint is outside the rehabilitation area detailed by the black dashed line in drawing number BNM-DR-24-16-01.

3.1 Status and Situation

3.1.1 Site history

The site formerly provided peat for use in the Derrinlough Briquette factory and Ferbane Power Station, Ferbane, Co. Offaly.

3.1.2 Current land-use

Industrial peat production has now permanently ceased at Drinagh Bog. Future land-use at Drinagh Bog has not been defined by Bord na Móna. Some rehabilitation measures ie. drain blocking, were previously carried out in the southern section of the site and can be seen on the recent 2020 aerial imagery, drawing number BNM-DR-24-16-22 titled **Drinagh Bog**.

The existing east-west rail line adjacent to the north of the rehabilitation boundary is still maintained. It is used to transport peat from adjacent sites to Derrinlough and will continue to be used until Derrinlough Brickette factory ceases production.

An amenity track along the industrial railway adjacent to the north of the bog rehabilitation boundary has been proposed as part of the consented and currently being constructed Derrinlough Wind Farm. This would link the Boora area with amenity tracks proposed for Drinagh Bog as part of the Derrinlough Wind Farm.

There are no known right of ways on this bog.

3.1.3 Derrinlough Wind Farm

As described in the Biodiversity Chapter of the Derrinlough Wind Farm EIAR, specifically designed to avoid any significant negative effects on faunal species and mitigation is in place. The Derrinlough Wind Farm has been designed to avoid any areas of remnant bog habitat, significant areas of mature woodland and is largely restricted to cutover bog and associated pioneering habitats. A suit of mitigation measures in relation to the protection of protected flora and fauna are outlined in the EIAR.

The Construction Environmental Management Plan (CEMP) also provides for the protection of other faunal species. In addition, the CEMP provides a suite of mitigation measures for the protection of water quality that have been incorporated into the project design, as well as those to be implemented during construction. These include the storage of fuels, re-fuelling activities and use of portable toilets. Some scrub and woodland has been removed as part of the construction of the windfarm and new replacement woodland habitat has been planted as part of the Construction Environmental Management Plan.

This rehabilitation plan takes account of the above infrastructure and all associated mitigation measures described in the relevant planning documentation and associated conditions, the Derrinlough Wind Farm Construction Environmental Management Plan, the Clongawny and Drinagh Draft Rehabilitation Plans 2020 (submitted as part of the Derrinlough Wind Farm EIAR), the Derrinlough Wind Farm schedule of mitigation submitted to the planning authority, and all associated documentation. The rehabilitation measures described in this plan takes account of, and builds upon, the measures described in the Draft Rehabilitation Plan 2020 submitted as part of the planning application.

3.1.4. 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.

In respect of Drinagh Bog, jobs would have included those to facilitate fuel peat production.

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.

These job numbers have now declined with 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) and operational staff will also be required for the lifetime of the wind farm.

There are approximately 1400 people working in Bord na Móna at present. There are approximately 225 roles directly involved in PCAS.

3.2 Geology, Hydrogeology and Peat Depths

3.2.1 Regional geology

GSI data indicates that the main lobe of Drinagh is underlain entirely by Waulsortian Limestones, while the south-western lobe is underlain partially by Waulsortian Limestones and partially by Visean Limestone. The Waulsortian Limestones unit is classified as a locally important aquifer as it is only moderately productive in local zones, whereas the Visean limestone is a regionally important aquifer as it is subject to karstification (conduit). Geological Survey of Ireland (GSI) mapping identifies a number of karst features (superficial solution features) within 1km of the bog. No data exists concerning depth to bedrock, however, there is a small area of bedrock outcrop in close proximity to the bog.

Quaternary geology maps show Drinagh underlain by peat, yet surrounded by inorganic deposits, including till derived from limestone which occurs to the west of the main lobe of the bog as well as to the east of this lobe. There is also a small pockets of limestone gravels mapped to the west of the main lobe of the bog and another small pocket within the bog. There are Alluvium deposits located along the eastern side of the bog (along the Silver (Kilcormac) River with some gravelly and sandy limestone deposits to the south of the south-western lobe.

Groundwater Vulnerability is typically used to indicate the susceptibility to groundwater pollution; however, it can provide a useful proxy indication of likely groundwater flow rates in the surrounding area. Groundwater vulnerability for the surrounding areas is generally moderate to high, with pockets of extreme vulnerability in areas where bedrock outcrop occurs.

3.2.2 Site specific geology

Published bedrock and Quaternary geological maps only present the shallowest deposits encountered and fail to present in information on the buried peat substrate. Coring carried out by RPS in 2022 across Drinagh provided further insight into the deposits underlying the site. GPR data is only available for the south-western section of the bog and is not available for the main lobe, therefore, interpretation of substrate is indicative only.

Combining the two datasets reveals the majority of the bog to be underlain by lacustrine deposits, with a pocket of limestone gravels extending into the main lobe of the bog from the west (based on GSI mapping combined west best judgement from a review of LiDAR data). The lacustrine deposits encountered would be expected to limit vertical losses to depth in areas where this occurs, whereas the gravel deposits are likely. Combining elevation data with the results of coring has permitted an indicative sub-peat substrate map.

Data used in compilation of the sub-peat map suggest that peat rests directly on gravels in part of the main lobe, with the majority of the bog underlain by lacustrine clay. Studies completed at Clara Bog, Co. Offaly indicate that glacial till derived from limestone material has a higher hydraulic conductivity than the lower lying (and younger) lacustrine deposits. Since GPR data is only available for part of the bog, estimates of peat depth for the main lobe are derived from coring. On the main lobe of the bog, the peat is generally shallow

3.2.2 Peat type and depths

Commercial peat extraction commenced in the 1950's at Drinagh Bog and ceased in 2020. As a result of the harvesting programme in place at Drinagh, peat depths are varied across the site. However, much of the site comprises of residual shallow peat with some pockets of deeper peat, 1.1-2.5m, still persist.

Fen peat is the main peat type remaining in Drinagh.

3.3 Key Biodiversity Features of Interest

3.3.1 Current habitats

Within the larger eastern lobe of the rehabilitation boundary, the former cutover bog is currently developing pioneer cutaway wetland habitats (poor fen, Reed swamp, Birch woodland) (Plates 3.1-3.2). Much of the site is re-vegetating or re-wetted and the area of bare peat has been reduced significantly. Some rehabilitation measures have previously been carried out within the northeast of the bog by targeted drain blocking and berm construction. The resultant environmental conditions are therefore generally wetter at this location and closer to optimal condition than much of the rest of the site. This wetland area contains a substantial portion of open water. This area is developing into a wetland complex and there is a diverse mosaic of wetland habitats (several Poor fen vegetation communities) developing around the margins of the wetland. The areas of open water are shallow and there are frequent patches of emergent Common Reed and Bulrush developing in some sections as well as along the margins.

Some of the drier areas within much of the rest of the central and south of the larger eastern lobe are developing Birch scrub (emergent *Betula*-dominated community (A) (eBir), Open Betula-dominated community (B) (oBir) and Closed Betula scrub community (C)) and Poor fen vegetation. Bog cotton (pioneer *Eriophorum angustifolium* community) and Soft rush (pioneer *Juncus effusus* community (pJeff)) dominated communities are the most prominent vegetation types.

There is a small area of Birch woodland developed along the southwestern section as well as a small area of remnant raised bog (PB1). This patch of high bog has a surprisingly good cover of *Sphagnum* moss in places.

Much of the isolated southwestern lobe is dominated by bare peat that is devoid of vegetation due to recent cessation of peat production activities. Smaller sections classified as production-related are recolonising with mainly emerging and open Birch scrub and Soft rush-dominated Poor fen vegetation. There are smaller amounts of Bog cotton-dominated Poor fen vegetation also present associated with the other vegetation communities.

The most common habitats[2] present at this site include:

- Pioneer Soft Rush-dominated poor fen (pJeff) with less frequent Bog Cotton (pEang) or Bottle Sedge (pRos) -dominated poor fen.
- Bare peat
- Birch-dominated scrub (eBir, oBir & cBir) (on drier higher ground that is not flooded).
- Open water (OW) (permanent).

The most common habitats found around the margins of the site include:

- Scrub (WS1)
- Birch woodland (WN7)
- Raised bog (PB1)
- Cutover Bog (PB4)

[2] Codes refer BnM classification of pioneer habitats of production bog. Note: habitat categories presented are not exhaustive and are meant to indicate the primary habitats of importance which are present. Equivalent Fossitt (2000) (*A Guide to Habitats in Ireland,* The Heritage Council 2000) codes to the habitat descriptions are provided here but we note the referenced figure displays the general BNM habitat layer.

See Drawing number BNM-DR-24-16-17 titled **Drinagh Bog: Current Habitat Map**, included in the accompanying Mapbook, which illustrates the habitats at Drinagh Bog.

Plate 3.1 Example of some wetland habitats within the north of the rehabilitation boundary grading into drier Birch dominated scrub and woodland.

Plate 3.2 Example of wetland habitats occurring within the north of the Drinagh bog rehabilitation boundary.

3.3.2 Species of conservation interest

A number of species of conservation concern utilize the habitats available at Drinagh Bog. The following is a summary of the records of these species available within BnM records. Note these records include the whole of Drinagh and are not necessarily limited to the currently proposed PCAS extent. Variations in ecotope mean that not all species may occur in the area now proposed for rehabilitation.

Multiple mammal species have been recorded at Drinagh Bog. Evidence of Badger (*Meles meles)*, Fox (*Vulpes vulpes)*, Hare (*Lepus timidus hibernicus)* and Pine marten (*Martes martes*) were observed on site during BnM walkover surveys. NBDC data contains records of Hedgehog (*Erinaceus europaeus)*, Pygmy shrew (*Sorex minutus),* Eurasian red squirrel *(Sciurus vulgaris),* European otter *(Lutra lutra),* Irish stoat *(Mustela erminea Hibernica)* and Pine marten *(Martes martes)* on or in close proximity to the site.

Common frog (*Rana temporaria)* has been recorded on the site.

Cutaway bog habitat is known to be utilised by numerous bird species at different times of year. Records from BnM commissioned surveys (Derinlough EIAR) indicate that the wet areas offer a refuge to flocks of wintering wildfowl. Whooper swans (*Cygnus cygnus)* (listed on Annex I of the EU Birds Directive) have been recorded using the site occasionally. Whooper swan roosts are known to exist on the adjacent Derrinlough and the larger open water bodies in the wider area of Drinagh bog. Records of other wintering wildfowl on site include; Mute swan (*Cygnus olor)*, Teal (*Anas crecca)*, Wigeon (*Anas penelope)*, Pintail (*Anas acuta)* and Shoveler (*Anas clypeata)*. Other wetland birds of conservation concern recorded on site include; Cormorant (*Phalacrocorax carbo)*, Kingfisher (*Alcedo atthis)*, Grey heron (*Ardea cinerea)*, Little grebe (*Tachybaptus ruficollis)* and Black-headed gull (*Chroicocephalus ridibundus)*. Raptor species, including Hen harrier (*Circus cyaneus)*, also use the site during Winter months (Derrinlough EIAR). A Hen harrier winter roost was recorded in 2019 to the north-east of Drinagh. Wintering wader species such as Golden plover (*Pluvialis apricaria)*, Lapwing (*Vanellus vanellus)* and Snipe (*Gallinago gallinago)* have all been recorded at Drinagh bog.

During summer wader species such as Lapwing, Woodcock (*Scolopax rusticola)*, Ringed plover (*Charadrius hiaticula)* and Snipe (*Gallinago gallinago)* have been recorded attempting to breed on site or in the wider Drinagh Bog. Raptors such as Merlin (*Falco columbarius)*, Kestrel (*Falco tinnunculus)* and Sparrowhawk (*Accipiter nisus)* have been recorded over the site. There have been records of Merlin during spring but breeding, on site, is considered unlikely due to an absence of suitable nesting habitats. Barn owl (*Tyto alba)* have been recorded attempting to breed close to the site. Marsh harrier (*Circus aeruginosus)* has been recorded flying over the site during April 2019.

3.3.3 Invasive Alien Species

Invasive alien species known to occur at the subject bog (or desktop review suggests presence is likely), and for which reasonably foreseeable source impact pathways for dispersal may result from the proposed PCAS are described here. No invasive plant species, as listed under Regulation (EU) 1143/2014 on the prevention and management of the introduction and spread of invasive alien species, have been recorded at Drinagh Bog. A broad range of common garden escapes are occasionally present around the margins of Bord na Mona bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

3.4 Statutory Nature Conservation Designations

There are no European Sites (SAC or SPA) located within 5km of Drinagh Bog. Due to its location within the Lower River Shannon catchment, Drinagh is hydrologically connected to at least two downstream European Sites namely the Middle Shannon Callows SPA (Site Code 004096 -17km due west), and the River Little Brosna Callows SPA (Site Code 004086 - ca.22km south west). Distance to both sites is increased via hydrological link.

The nearest SAC is Moyclare Bog (Site Code 000581), which is over 7.5 km to the north. Ferbane Bog SAC (Site Code 000575) is approximately 8 km to the north of Drinagh.

Lough Boora pNHA (Site Code: 001365) is located approximately 3 km to the east of site. The Grand Canal pNHA (Site Code 002104) is over 3km to the North of Drinagh at its closest.

3.5 Hydrology

Drinagh forms part of the Lower Shannon Catchment (Catchment ID : 25A) as defined by the EPA under the Water Framework Directive (WFD) and is primarily situated within the Brosna_SC_070 sub-catchment, with a small portion of the south-western lobe located within the Brosna_SC_070 sub-catchment. The bog is located approximately 7km south of the village of Ferbane, County Offaly. The bog contains several drainage pathways and discharge locations, with the majority of the bog discharging to the silver (Kilcormac) River to the east of the bog, which flows into the River Brosna to the north of the bog.

Regional hydrological data suggest that Drinagh receives average precipitation of 848mm/yr (1981-2010), with an estimated annual effective precipitation rate of 442.6mm/yr based on GSI data. The GSI also estimate a recharge rate of 17.7mm/year. This is considered to be an underestimate for the elevated mounds of gravel, where a more likely estimate of recharge would be 60mm/year. In contrast, the rest of the bog is underlain by a low-permeability substrate and is comprised of low-lying topographic basins with shallow peat (<1.5m). Therefore, these areas are expected to receive groundwater inputs (as indicated by SEC readings), which are estimated to be up to 50mm/year. Therefore, the available precipitation that may become runoff (assuming no change in storage) is estimated to range from 382.6mm/yr – 492.6mm, which equates to an annual runoff rate of c. 3,826m^3/ha – 4,926m^3/ha. This highlights that the low-lying topographic basins will retain adequate water throughout the year, with the level of outfalls being the main control on water levels. However, the small section of the bog that are elevated, steeply sloping and underlain by gravels will be extremely difficult to rewet and are likely to remain dry regardless of the measures implemented.

3.6 Emissions to surface-water and water-courses

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.

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 period. Silt pond decommissioning will be considered when sites are deemed to be on a trajectory of environmental stability and peatland rehabilitation has been completed.

The proposed area of Drinagh bog for rehabilitation has one treated surface water outlet from a previously active peat extraction catchment and balance of the catchment ceased production in the 1990's all which discharge to IE_SH_25S020700 SILVER (KILCORMAC)_050 . The Silver River 050 is classified as *At Risk* and at *Moderate* Ecological Status (2010-2015), was listed as being under pressure from peat extraction in the second cycle of the river basin management plan.

Details of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the accompanying structures map along with water quality map. See Drawing number **BNM-DR-24-16-SP01** titled **Peatlands and Climate Action Scheme Drinagh: Sampling Points**, along with Drawing number **BNM-DR-24-16-WQ01** titled **Peatlands and Climate Action Scheme Drinagh: Water Quality Map** included in the accompanying Mapbook, which illustrate the various drainage and water quality infrastructure present at Drinagh.

There is a robust monitoring program to track and verify any changes in baseline water quality conditions pre and post decommissioning and rehabilitation 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.

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, broadly under the trigger level for Ammonia and COD. Ammonia averaged 1.83 mg/l and ranged from 0.1 to 3.9 mg/l with Suspended Solids ranging from 2 to 28 mg/l and averaging 11.1 mg/l, see Table 3.1.

Table 3.1 Results of Water Quality Monitoring at Drinagh Bog

Bog	SW	Monitoring	pH	SS	TS	Ammonia	TP	COD	Colour
Drinagh	SW-7	Q4 20	NS	NS	NS	NS	NS	NS	NS
Drinagh	SW-8	Q4 20	7.4	2	269	2.44	0.05	55	197
Drinagh	SW-9	Q2 20	7.4	21	228	0.563	0.12	49	166
Drinagh	SW-7	Q4 20	NS	NS	NS	NS	NS	NS	NS
Drinagh	SW-8	Q4 20	7.4	2	269	2.44	0.05	55	197
Drinagh	SW-7	Q2 19	7.9	5	272	0.46	0.05	80	91
Drinagh	SW-8	Q2 19	7.8	5	264	3.9	0.05	72	107
Drinagh	SW-7	Q3 17	7.7	5	316	0.83	0.05	49	128
Drinagh	SW-8	Q3 17	7.9	5	232	2.9	0.05	56	146
Drinagh	SW-7	Q4 16	7.6	28	180	1.1	0.01	93	73
Drinagh	SW-8	Q4 16	7.6	25	214	3.6	0.01	77	142
Drinagh	SW-9	Q4 16	7.7	13	319	0.1	0.01	49	48

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. Re-wetted peat also aids the primary objective of stabilizing peat, as when peat is re-wetted it minimises risk to wind erosion. Re-wetted peat and the development of wet peatland habitats can also act as sinks for any 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 because of bog rehabilitation and restoration measures and the restoration of natural peatland processes (Bonn et al., 20017). Peatland rehabilitation 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 raised bog restoration programme is expected to have a positive impact on water quality and help the NWBMP deliver its objectives in relation to the WFD.

Decommissioning and Rehabilitation Programme Water Quality Monitoring.

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 on a monthly basis.

In order 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 commenced in November 2020 and is enabling a baseline to be established, with sampling to progress during 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.

Initial monthly results are included in Appendix XIII for Drinagh. These results cover the period from November 2020 to January 2023 and are from the surface water outlet from the sections of bog to be rehabilitated in 2023. Peat extraction ceased in some sections of this bog in the 1990's and as expected some of the key water quality parameters that can impact water quality from peat extraction activities, remain on a relatively static trajectory, with suspended solids indicating a downward trend and well below any limits of concern. During this period ammonia had a downward trend for SW 8, and results did not indicate any significant increase or decrease for SW 7 and 9 during the 27 months of sampling, with all other parameters fluctuated slightly, most likely influenced by normal weather patterns, including rainfall.

Monthly ammonia concentrations from both bogs from November 2020 to January 2023 had a range of 0.02 to 2.77 mg/l with an average of 0.75 mg/l. Results for suspended solids for the same period indicate a range of 2 to 12 mg/l with an average of 2.7 mg/l, see Appendix XIII.

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 2022 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.

This enhanced monitoring programme will aim to include a minimum of 70% of a bog's drainage catchments, whatever number of surface water outlets these include.

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 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 & 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.

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 largely bare peat. Re-wetted peat also aids the primary objective of stabilizing 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 NWBMP deliver its objectives in relation to the WFD.

Water will still discharge from designated emission points when rehabilitation at Drinagh has been completed. This discharge will have improving 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 water receptors; the Lower Shannon catchment.

3.7 Fugitive Emissions to air

None

The bog is no longer in industrial peat production. Rehabilitation of the peatland will seek to re-wet the dry peat where possible and re-vegetate all areas (whether wet or dry). Collectively, ceasing industrial peat production, 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 longterm 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 Drinagh Bog will become a reduced carbon source 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 bog is expected to develop regenerating wet deep peat vegetation on deep peat areas, and wetland habitats on shallow peat with open water, reed swamp and fen habitats with alkaline emission factors. 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 site can be rated as having a **Moderate value, locally important (D) as** much of the site has developed wetlands and scrub**.**

It is expected that the overall ecological value of this site will increase in the future as the site re-vegetates, matures and forms semi-natural habitats, such as more extensive areas of fen and Reed swamp.

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.

To inform the current Plan, both national and local stakeholders, including neighbours whose land adjoins Drinagh 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 Drinagh.

There has been ongoing consultation about rehabilitation, biodiversity and other general issues over the years about Drinagh Bog with various stakeholders in relation to:

- General consultation with range of stakeholders at annual Bord na Mona Biodiversity Action Plan review days 2010-2018.
- The development of Lough Boora Discovery Park (Offaly County Council).
- Bird surveys carried out by Birdwatch Ireland for Bord na Móna.
- Breeding bird surveys of the adjacent Drinagh Bog with Birdwatch Ireland.
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans).
- Sub-committee on Shannon Flooding Work Programme and Measures (OPW, Waterways Ireland, ESB, LA's, Fisheries Ireland, NPWs etc).
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht).
- Proposed amenity track development (in the consented Derrinlough Wind Farm).
- The development of Lough Boora Discovery Park (Offaly County Council).
- Development of a management plan for Lough Boora with local stakeholders from Drinagh Bog Area (Birdwatch Ireland 2018).

There has been ongoing consultation about the planning and construction of Derrinlough Wind Farm over the years (see Bord na Móna Wind Farm | Derrinlough Wind Farm[3]) as part of that particular development. This website describes the project and has up to date project newsletters. Specific consultation relating to the wind farm development is not listed here. The windfarm is currently under construction (March 2023). It is planned to provide amenity access at this site when the windfarm is constructed (as per the windfarm Planning Permission). Ongoing consultation with the local community and other stakeholders in relation to wind farm construction and operation, and community fund is continuing (Bord na Móna Renewable Energy).

Local stakeholders will continue to be identified through ongoing engagement with neighbours whose land adjoins Drinagh Bog. Additionally, 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) have

[3] https://www.derrinloughwindfarm.ie/

been contacted. Any identified local interest groups were 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 Drinagh Bog.

Phone correspondence was undertaken as either follow up to submissions received, or to instigate consultation. All correspondence received will be acknowledged and evaluated against the rehabilitation work proposed here, and the final draft of the DrinaghRehabilitation 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 stabilization 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 embryonic *Sphagnum*-rich vegetation communities on deep peat, or reed swamp and fen on shallow more alkaline peat and other subsoils, where present.
- Optimising hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future.
- Supporting ongoing renewable energy, amenity and other land-uses. Integrating rehabilitation measures with current renewable energy and amenity infrastructure (currently in construction) on site. It is not proposed to carry out any rehabilitation actions to change or negatively affect any amenity infrastructure.
- Supporting expected future land-uses.
- 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.

- Although there is some significant cover of pioneering vegetation, it will take some time for stable naturally functioning habitats to fully develop across the entirety of Drinagh. 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. PCAS is expected to deliver significant contributions to Ireland's climate action.
- It is not expected that the cutover bog within the site 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). Furthermore, only a proportion of the bog has potential to develop *Sphagnum*-rich habitats in this timeframe. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as such 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 contributary sources of impacts (private peat extraction and Bord na Móna). Reducing pressures due to former peat extraction activities at Drinagh will contribute to stabilising or improving water quality status of receiving water bodies in general. Ultimately, improving the WFD status of the receiving water body will depend on reducing pressure from a range of different sources, including peatlands in general (private and Bord na Mona).
- Bord na Móna have rehabilitated several bogs in the wider bog group, including the neighbouring bogs Derrybrat bog, Boora bog and Noggusboy bog. There are expected to be cumulative water quality and other ecosystem service benefits to receiving water bodies from rehabilitating more than one bog in the same catchment.
- 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.
- Existing land uses, such as renewable energy generation and energy storage infrastructure.

6. SCOPE OF REHABILITATION

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

- The area of Drinagh bog as defined in the accompanying map book.
- EPA IPC Licence – Ref. P0502-01. 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. Drinagh are part of the Blackwater 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 Drinagh, in particular, optimising **climate action benefits**. The proposed interventions will mean that environmental stabilization 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 Drinagh mean that deep peat measures along with wetland creation is the most suitable rehabilitation approach for this site. Drinagh have a gravity drainage regime and have residual deep peat along with shallower areas.
- Bord na Móna have defined the key goal and outcome of rehabilitation at Drinagh 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, and the development of wetlands/Reed Swamp and fen on shallow more alkaline peat and other subsoils.**
- Rehabilitation of Drinagh will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such was the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.

2.1 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).
- **Current/future land-use.** A key future land-use is amenity. As part of the Derrinlough Wind Farm the rail line adjacent to the north of the Drinagh rehabilitation areas will be used as an amenity trail. Any proposed enhancement measures (ie. Targeted drain-blocking) can be positively aligned with future planned land-uses as there is no overlap in footprint. Re-wetting will be planned as to not to rule out potential future amenity.
- **Renewables**: The permitted Derrinlough Wind Farm is currently in the early stages of construction by Bord na Móna on cutaway peatlands in parts of Clongawny and Drinagh bogs in west Co. Offaly. There is no footprint overlap with the rehabilitation footprint of Drinagh 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 anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land.

- **Archaeology**. There are no previously mapped archaeological features present at Drinagh, which may similarly constrain PCAS activities. The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. While the rehabilitation will optimise hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future, any new archaeology may require rehabilitation measures will be reviewed and adapted. If this occurs, rehabilitation measures will be reviewed and adapted. An Archaeological Impact Assessment (Appendix XII) will be carried out to mitigate against any impact on found archaeology at Drinagh. 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 should be avoided and reported to Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.
- **Public Rights of Way**. There are no known rights of way within the rehabilitation area of Drinagh Bog.
- **Turbary**. Areas of active turbary are excluded as they are currently being used by domestic turf cutters to harvest peat. 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 Drinagh.

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:

- Active turbary areas are excluded.
- The longer-term development of stable naturally functioning habitats at Drinagh 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 Drinagh.
- 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 enhanced rehabilitation plan is **environmental stabilisation** and the stabilisation of any emissions from the site that related to the former industrial peat extraction 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 natural colonisation; and
- mitigation of potential key emissions (e.g. suspended solids).

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 former area of industrial peat production to offset potential silt run off and to encourage and accelerate development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat. 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 stabilizing/improving concentration of suspended solids and ammonia in discharges from Bord na Móna sites, associated with the measures undertaken to stabilize 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 materialize or could be considered as a target, monitoring of surface water ammonia emissions from Longfordpass bog in Littleton over 3 yrs., post cessation of peat extraction with ongoing rehabilitation, were considered. These are indicating 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 4 yrs. post cessation of peat extraction with ongoing rehabilitation, indicate downward trends.

As the monthly monitoring program at Drinagh Bog continues in 2022/2023 during the rehabilitation works planned for 2023, and data from the 2022 monitoring program is compiled, further trending will be produced to verify any ongoing trends.

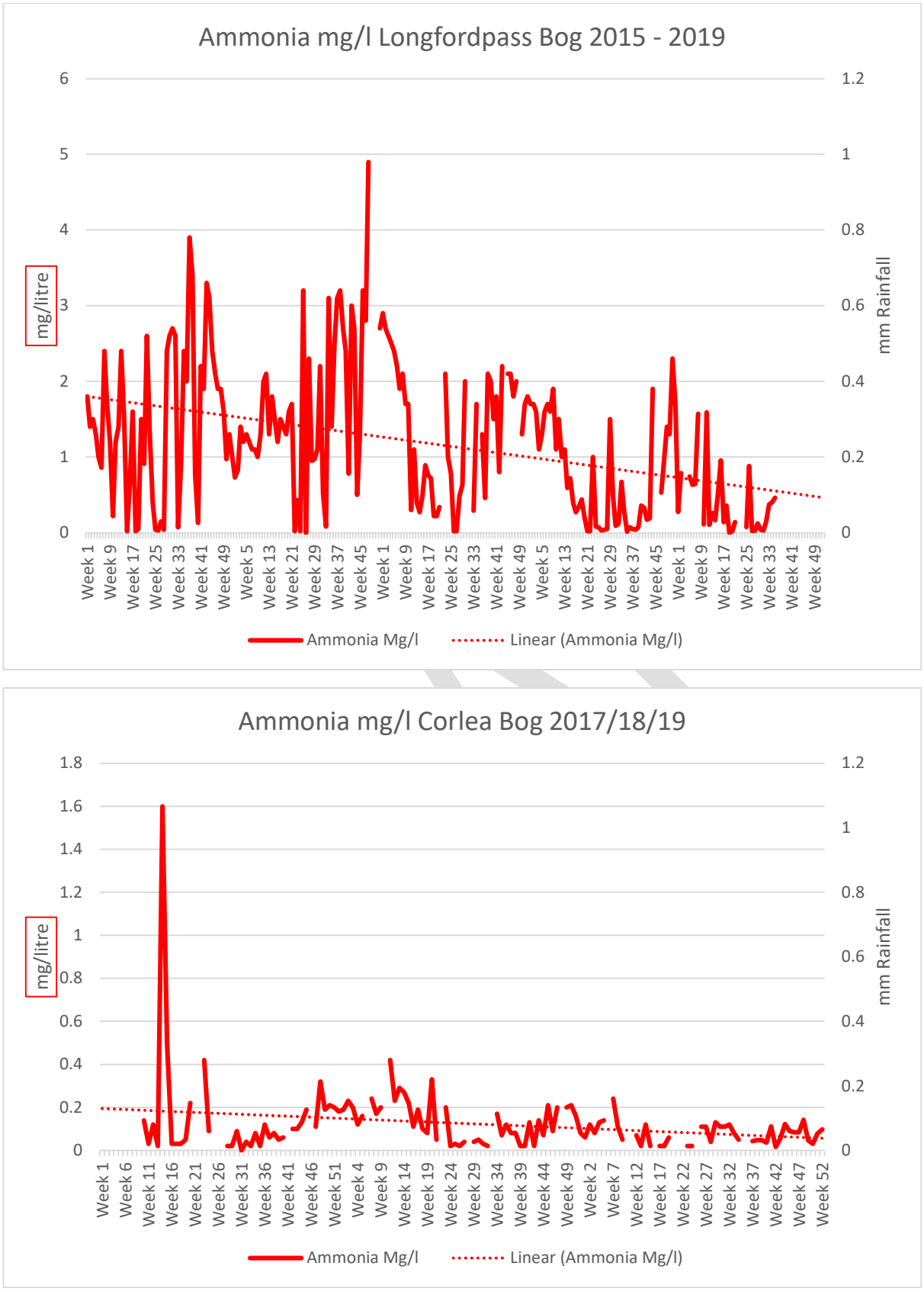

Figure 7.1. *Ammonia levels over the period 2015-2019 at Longfordpass and the period 2017-2020 at Corlea.*

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). 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, wetland, fen, Reed swamp, 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 Drinagh Bog. 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 peat production	Delivery of rehabilitation measures Reduction in bare peat.	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking) Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	2023-2025

Criteria type	Criteria	Target	Measured by	Expected Timeframe
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	2022-2024
IPC validation	Reducing pressure from peat production 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
Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions. Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2023-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a bog condition assessment and appropriate carbon emission factors.	2023-2025
Climate action verification	Setting the site on a trajectory towards establishment of a	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map Baseline monitoring to be carried out during the scheme when	2023-2025

Criteria type	Criteria	Target	Measured by	Expected Timeframe
	mosaic of compatible habitats		rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	

Meeting climate action verification criteria and monitoring of these criteria after the scheme has been completed is dependent on support from the Climate Action Fund or other sources of funding. Note that monitoring and verification of the overall scheme will be stratified – not all these criteria will be measured at each individual site. Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.

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 and external).** Bord na Móna maintains a provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence. It is expected that additional costs of enhanced rehabilitation will be supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan.
- **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 affective 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 degraded bog takes time. It may take 30-50 years for active raised bog vegetation to re-develop on suitable cutaway that was previously bare peat. However, Bord na Móna experience has demonstrated the effectiveness of these type of measures for re-wetting bog and creating carbon sinks (Renou-Wilson et al. 2018).
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation 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 and to verify the benefits of the proposed enhanced measures to optimise climate action. This will focus on a 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-24-16-21 titled **Drinagh: Aerial Imagery 2020**

BNM-DR-24-16-04 titled **Drinagh: Peat Depths**

BNM-DR-24-16-03 titled **Drinagh: LiDAR Map**

BNM-DR-24-16-09 titled **Drinagh: 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 **BNM-DR-24-16-05** titled **Drinagh: 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 enhanced measures for Drinagh will include (see Table 8.1):

- Intensive drain blocking around shallow peat areas/modelled depressions on little or no peat to create/promote the spread of wetland habitats.
- Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls.
- Regular drain blocking (3/100m) on dry cutaway along with the blocking of outfalls and management of water levels, along with organic fertiliser application.
- Deep Peat measures including field re-profiling, resulting in bunded areas suitable for *Sphagnum* inoculation, on deeper peat. Such measures will be appropriate where there are pockets of residual deep peat within the southwestern lobe of Drinagh bog.
- Targeted drain blocking on remnant high bog and areas of cutover bog at the margins to optimise hydrological conditions (AW2). This will be particularly suitable for much of the central and south-eastern part of the eastern lobe of Drinagh bog which has developed a mosaic of established Scrub and areas of bare peat.
- Targeted fertiliser applications to accelerate vegetation establishment on areas of **bare peat** on headlands, high fields and old vegetating stockpiles that cannot be removed and are considered stabilised. Areas where vegetation has established do not need fertiliser application.
- Seeding of vegetation will be undertaken where required.
- Initial hydrological modelling indicates that a small part of the site will develop a mosaic of wetland habitats with the potential for some deeper water. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths

at < 0.5 m, where possible. It is inevitable that some small sections will naturally have deeper water due to the topography at this site). Water-levels will be adjusted at outfalls and by adjusting piped drainage.

Table 8-1 Types of and areas for enhanced rehabilitation measures at Drinagh.

Type*	Rehab Code	Enhanced Rehabilitation Measure	Extent (Ha)
Deep Peat	DPT 2	More intensive drain blocking (max 7/100 m) + modifying outfalls and managing overflows	17.31
Deep Peat	DPT 3	More intensive drain blocking (max 7/100 m), + field reprofiling + modifying outfalls and managing overflows	6.52
Dry Cutaway	DCT2	Regular drain blocking (3/100m) +modifying outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	38.97
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + modifying outfalls and managing water levels with overflow pipes+ targeted fertiliser application	22.04
Wetland	WLT2	Turn off or reduce pumping to re-wet cutaway + modifying outfalls and managing water levels with overflow pipes + Targeted modifying of outfalls within a site+ targeted fertiliser application	39.37
Wetland	WLT3	Turn off or reduce pumping to re-wet cutaway + modifying outfalls and managing water levels with overflow pipes + Targeted modifying of outfalls within a site + constructing larger berms to re-wet cutaway + transplanting Reeds and other rhizomes+ targeted fertiliser application	7.40
Wetland	WLT4	More intensive drain blocking (max 7/100 m), + modifying outfalls and managing overflows + transplanting Reeds and other rhizomes	6.56
Marginal land	MLT1	No work required	23.09
Marginal land	MLT2	Drain Blocking on extant high bog	5.40
Silt ponds	Silt pond	Silt ponds	0.72
Additional works	AW1	No work required	25.71
Additional works	AW2	Targeted drain blocking with excavator (1 per 100m)	122.62
Archaeology	Constraint	Archaeology	0.25
Constraint	Constraint	Area constrained due to existing woodland and occurrence to adjacent third-party lands.	1.77
Total			**317.74**

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

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

- Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the Scheme not materialise, from the EPA.

- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator.
- Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (The Scheme PCAS) will be applied to Drinagh 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.
- A review of remaining milled peat stocks is to be carried out. There are peat stocks remaining on the bog. It is planned to remove all stock from the bogs.
- 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, the mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan.

8.2 Short-term practical actions (0-2 years)

- Carry out proposed measures as per the detailed site plan. This will include a combination of bunding and 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 is expected to commence almost immediately once peat production ceases, Phase 2 actions will be carried out in targeted areas to accelerate re-vegetation and colonisation of target species. Phase 2 actions may include seeding of targeted vegetation and inoculation of *Sphagnum*.
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential 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.

8.3 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 10.2 below).

- Decommissioning of silt-ponds will be assessed and carried out, where required.
- Reporting to the EPA will continue until the IPC License is surrendered.

8.4 Timeframe

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

8.5 Budget and costing

Bord na Móna (BnM) 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 when industrial peat extraction ceases. 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 be allocated to the site based on the area of different cutaway types across the site (See Appendix I).

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.
- **Water quality monitoring** at the bog will be established. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing 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 bogs 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 License 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 License 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 have 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 Drinagh 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. Drinagh Bog is part of the Mountdillon Bog Group.
- The current condition of Drinagh Bog. This site has a partially pumped drainage regime.
- The key objective of rehabilitation, as defined by this licence, is **environmental stabilisation** of the bog.
- To minimise potential impacts on neighbouring land. Boundary drains around Drinagh Bog will be left unblocked as blocking boundary drains could affect adjacent land.
- Land-use.

Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Drinagh Bog is environmental stabilisation of the site via wetland creation. 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 residual peat and shallow cutaway in the former area of industrial peat production to offset potential silt run off 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.
- Re-alignment of piped drainage; and management of water levels to create/enhance existing wetlands.
- No measures are planned for the majority of surrounding marginal peatland habitats.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures and enhance where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

Timeframe:

- 2023-2024. 1st phase of rehabilitation. Field drain blocking.
- 2025. 2nd phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1st phase re-wetting, as determined by ongoing monitoring of water levels and re-vegetation.
- Other enhancement measures such as fertiliser treatment will be carried out, if needed. These will be determined by ongoing monitoring.
- 2025-2026. 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)
Dry Cutaway	DCT1	Limited drain blocking, Modifying outfalls and managing water levels with overflow pipes	187.31
Deep Peat	DPT1	Regular drain blocking (3/100 m) + modifying outfalls and managing water levels with overflow pipes	23.98
Wetland	WLT1	Turn off or reduce pumping to re-wet cutaway + modifying outfalls and managing water levels with overflow pipes	75.36
Marginal land	MLT1	No work required	28.49
Other		Silt-ponds/ Constraint	2.58
Total			**317.74**

See Drawing number BNM-DR-24-16-20 titled Drinagh **Bog: 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 License 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 water quality monitoring demonstrates that water quality of discharge is stabilising or improving.
- The site has been environmentally stabilised.

APPENDIX II: BOG 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 Bog 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 License Ref. PO500-01, and current, indicative Peat Production Status, is outlined in Table Ap-2. These areas are also outlined in the Mapbook (Map of the Boora Bog Group).

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 at the bog. The majority of Boora Bog is considered a shallow peat cutaway bog. Some areas of deep peat persist at this site.	The majority of Boora bog has already been rehabilitated. A significant area of cutaway bog has been re-wetted, developed as conifer forestry (Coillte) and developed as farmland (1980s). This site now forms the core of Lough Boora Discovery Park.	2020	Finalised 2021 Rehab complete 2021

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 2021
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	Rehab undertaken in 2022
Killaranny	242.8	Cutover Bog Industrial peat production commenced at Kilaranny during the 1980's. Deep peat reserves remain on much of the bog. Kilaranny is considered a deep peat cutover bog.	Kilaranny 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	Rehab undertaken in 2022
Oughter	352.9	Cutaway 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.	The site has naturally been re-wetting and there is already significant natural colonisation. Part of the site has been developed as the Midlands National Shooting Centre of Ireland.	2012	Finalised 2021 Rehab completed 2021
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 2017
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	Derrinboy Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat.	2020	To be finalised in 2021

		horticultural peat. Only the upper layers of peat have been harvested. Derrinboy is considered a deep peat cutover bog.			
Moneitta	707.5	Cutover Bog Moneitta was first developed by BnM in the 1970's. Peat production ceased at Monietta 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
Boora Lemanaghan Rail_Link	6.9	N/A	Not applicable	N/A	N/A
Derries	368.2	Cutaway Bog 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. The Derries Bog is considered a shallow peat cutaway bog.	Wetland rehabilitation carried out over part of site in 1999. Amenity trackway development in 2015. Part of the Lough Boora Discovery Park. The site has now been extensively naturally colonised and is a mosaic of wetland and Birch woodland habitats.	2005	Finalised 2021 Rehab completed 2021
Turraun	534.5	Cutaway Bog Development of Turraun Bog commenced in the 1950's. Industrial peat production ceased in 2018. Turraun is considered a shallow peat cutaway bog.	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.	2018	Finalised 2021 Rehab undertaken in 2021/22
Derryclure	327.6	Cutover Bog 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.	Derryclure Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat.	2020	Draft 2021
Lemanaghan	1,253.7	Cutover Bog 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.	Lemanaghan Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat. There are some naturally emerging cutaway habitats.	2020	Draft 2017
Belair North	565.7	Cutover Bog Belair North was first developed by BnM in the 1960's. TPeat production ceased at Belair North in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat were harvested. Belair North is	Belair North Bog formerly supplied a range of commercial functions including; horticultural peat and fuel peat.	2020	Draft 2017

		considered a deep peat cutover bog.			
Belair South	228.8	Cutover Bog 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.	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**				

See Drawing number DR-24-16-24 titled **Boora Bog Group**, included in the accompanying Mapbook which illustrates the location of Drinagh Bog and the Boora Bog Group in context to the surrounding area.

APPENDIX III: ECOLOGICAL SURVEY REPORT

Ecological Survey Report

Note: This report outlines an ecological survey of the 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. ***Note: This report refers to the whole of Drinagh Bog including areas outside the currently proposed PCAS extent, and should be read accordingly.***

Bog Name:	**Drinagh**	**Area (ha):**	1389ha
Works Name:	Boora	**County:**	Offaly
Recorder(s):	MMC & DF	**Survey Date(s):**	22-24/09/2009

Habitats present (in order of dominance)

The most common habitats present on the Drinagh site include:

- Bare peat (BP), pioneer Poor Fen communities (pJeff, pEang, pTrig) and *Betula pubescens*-dominated scrub (eBir, oBir). A wetland complex has developed in the north-east section with a large area of open water and associated marginal and emergent habitats such as Poor fen communities (pRos, PEang), Birch scrub (eBir, oBir) and Tall Reedbed (pPhrag, pThy, pSch). (Codes refer to BnM habitat classification system. See Appendix II).
- A large block of conifer forestry (WD4) has been planted in one section of the bog (Mannins Hill).
- There are fragmented and minor patches of dry grassland (gCal,) and dry disturbed/pioneer communities (DisCF, DisWill) around the site that are associated with the dry mineral mounds. Some dry heath (dHeath) is also developing in one small area.
- The area around Derrinlough Briquette Factory can be mainly classified as built land (BL3). Habitats associated with this area include conifer plantation (WD4), scrub (WS1), disturbed vegetation (ED3), Dense Bracken (HD1), some grassland (GS1/GS2) and silt ponds (FL8). A railway crosses the site and this can also be classed as built along with some works areas with associated infrastructure (BL3). (Codes refer to Heritage Council habitat classification system, Fossitt 2000. See Appendix II).
- Other fringe habitats around the margins of the bog include Scrub (Birch dominated and Gorse dominated), Birch woodland (WN7) and Cutover Bog (active and abandoned).

Description of site

Drinagh Bog is located to the east of Derrinlough Briquette Factory near Clochan. It is largely divided into 4 main sections by the topography of the site and a railway on an embankment that crosses from the west to the east side of the site. The western section is separated from the eastern section by a ridge of high ground that partially divides the site (Mannin's Hill) and then by a block of conifer plantation that has been planted on the cutaway bog on this higher ground. This plantation is managed by Coillte (and is known as Drinagh West forest).

North-east section (Biodiversity Area)

This area is dominated by the large biodiversity area north of the railway that contains a substantial portion of open water. The open water is divided into two main sections by a railway on an embankment. This area is developing into a wetland complex and there is a diverse mosaic of wetland habitats (several Poor fen vegetation communities) developing around the margins of the lakes, particularly along the eastern side. The lakes are shallow and there are frequent patches of emergent Common Reed and Bulrush developing in some sections as well as along the margins with Common Reed. The lakes also contain frequent indicators of the old peat

production in this area with long linear islands or ridges of remnant peat vegetated with various communities. Some of the drier sections are developing Birch scrub (emergent, open and closed types). The remainder of the biodiversity area contains emerging Birch scrub and Poor fen vegetation of which Bog Cotton-dominated and Soft Rush dominated communities are the most prominent vegetation types. The wetland complex is enclosed along its northern boundary by a ridge that was developed along a natural stream (now significantly modified with sections piped along its length.

The area north of this ridge is classified as active production or production related cutaway at the time of the survey. This area is primarily bare peat with various stages of vegetation colonisation. The production-related area has primarily developed emergent and open Birch scrub with a Soft Rush dominated ground cover. The recently active production area is much more open and contains more frequent bare peat and much less scrub. There is a small area of cutover bog (inside the BnM boundary) in the north-east corner that is being cut by private individuals and is managed as private land.

South-east section

The south-east section is classified as cutaway on the Land Use Maps 2009. The south east section is primarily a mosaic of emerging and open Birch scrub and a Soft Rush-dominated pioneer community. There is also some bare peat in this area. There is a small area of Birch woodland developed along the west boundary of this area as well as a small area of remnant raised bog (PB1). This patch of high bog has a surprisingly good cover of *Sphagnum* moss in places.

North-west section

This section is mainly classified as a production-related cutaway with a small area of recently active production bog (devoid of vegetation) located at the northern end. The conifer plantation is located along the east side of this area. The main habitats in the production-related section are emerging birch scrub and a Soft-Rush dominated pioneer Poor Fen community. Other associated habitats include a Bog Cotton-dominated pioneer poor fen community and a minor amount of Common reed stands. Reedmace is also present but is relatively uncommon and confined to drains. There is a very minor area of shallow open water present. This area also contains a series of mineral ridges and mounds where glacial sub-soil is exposed in places. These mounds are quite dry and developing some other habitats such as emerging Birch scrub (eBir), disturbed vegetation dominated by Coltsfoot (DisCF) and some calcareous grassland (gCal), as well as bare sub-soil.

South-west section

This section of the site south of the railway is primarily an recently active production area with bare peat that is devoid of vegetation. A smaller block classified as production-related is recolonising with mainly emerging and open Birch scrub and Soft Rush-dominated Poor fen vegetation. There are smaller amounts of Bog Cotton-dominated Poor fen vegetation also present associated with the other vegetation communities. Small mineral mounds and ridges are also scattered through this area. These areas are also developing birch scrub and usually have some dry calcareous grassland and disturbed vegetation associated with them. Several mounds also have a small amount of dry heath dominated by Ling Heather (dHeath) developing on them. A small area of Dry Heath is also developing on somewhat higher ground near the eastern boundary of this section. There is also a remnant patch of raised bog (PB1) located along the west boundary (inside the BnM boundary) that is being actively cut from the outside by private individuals. This area is managed as private land. Of note is a drain along this high bog but at the level of the cutaway that is infilled with *Sphagnum* moss.

Derrinlough works area

This area is associated with the Briquette Factory and is dominated by built habitats (BL3). There is also some mature conifer plantation (WD4) planted around the works area. The section to the east of the works area contains a mosaic of scrub, Bracken, Bramble and disturbed vegetation that has developed on ridges built along silt ponds. The Little River crosses this area and has more diverse emergent and semi-aquatic vegetation, although the channel and riparian zone has been modified in the past.

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

The site is adjacent to Lough Coura pNHA (NPWS site code 000909) along part of the south-west boundary and there is very minor overlap (~0.2 ha) between the designated area and the BnM property containing typical fringing scrub habitats that are found around the site). Lough Coura is an old infilled lake containing wet grassland and some rich fen habitat. Some of the old lake and surrounding area has been planted with conifer plantation. Several rare species of conservation importance have been recorded at this site and it is also noted for its archaeological prominence.

Adjacent habitats and land-use

Habitats and land-use around the site include cutover bog with active peat-cutting (PB4) at several locations, the use of improved grassland (GA1) for grazing livestock and growing fodder, remnant patches of raised bog (PB1), and old cutover bog (PB4) around the margins of the site that have developed a range of habitats including scrub (WS1) and some Birch woodland (WN7).

Watercourses (major water features on/off site)

The drainage system of the west side is linked to a series of silt ponds near the back of the Derrinlough Factory. These silt ponds have some semi-natural features and some aquatic vegetation.

- The Silver River flows along the eastern side of the site. Several streams and drains including the Black Brook in the east side flow into this river, which flows north and is part of the River Brosna catchment. The Black Brook was a natural stream that has had its channel modified in the past and used to drain from the SE corner of the wetland complex. This channel is still present. A second drainage channel drains the northern section of this area. An outflow from the open water complex into a large drain connected to this network is present in the north-east section.
- The Little River flows close to the west side of the site and along the back of the Derrinlough factory. This river drains the Lough Coura complex and flows north linking to the River Brosna. A former stream flowed off the bog into this river near the site of the silt ponds close to the factory. Parts of this channel are still visible.

The OSI second edition 6 inch map indicates several small lakes and pools of open water that were formerly present in the south-east corner of the SW section (Lough Laweclawn).

Fauna biodiversity

Several birds were noted around the site. Snipe were widespread around the site roosting in the wet grassland and scrub (22 sightings around site). Meadow Pipit also widespread around site using cutaway areas and areas with established vegetation cover (9 occurrences). Wren (7 occurrences) and Robin (5 occurrences) noted using patches of scrub around the site. A group of about 30 Redpoll were feeding on Birch scrub in the north-east section of the site. Other species include Blackbird (2), Magpie (1), Rook () (over-flying site), Swallow (5) (over-flying site), Wood pigeon (2), Pheasant (1), Pied Wagtail (1).

Two groups of Mallard were noted on the open water on different days (10 and 7). 1 pair of Mute Swan using open water and a separate family of 1 adult and 3 juveniles also present). A small flock of unidentified waders (possibly Lapwing) were also recorded around a small water body in the west side of the site.

- Signs of Rabbits are widespread and common around the site on many of the mineral islands and one the drier ridges. Signs of Hares widespread around site, especially on younger cutaway with establishing vegetation and some bare peat (3 adults recorded).
- Frequent signs of Deer activity (tracks), mainly single animals, particularly in southern part of the site.

- Pine Marten droppings noted in north-west section and tracks noted in south-east section.
- Signs of Badger activity in the north-east section (woodland adjacent to open water).
- Fox droppings recorded at several locations.
- Pine Marten droppings noted at one location.
- A group of 17 pie-bald ponies including fowls and mature males and females were noted on the site.
- Frogs recorded on the small patch of raised bog and in some Birch woodland around margins of site.
- Sticklebacks (fish) noted in one drain and in some open water (north-west section)
- One Peacock Butterfly noted, associated with Derrinlough works area. Some Dragonfly and Damselfly activity.
- Painted Lady recorded in north-east section.

Fungal biodiversity

Fungal species found on this site included *Russula exalbicans* (Bleached brittle gill), *Lactarius uvidus*, *Lycoperdon perlatum* (Common puffball), *Leccinum scabrum* (Birch bolete), *Boletus badius* (Bay Bolete) *Hygrocybe miniata* (Vermilion waxcap), *Clitocybe ericetorum* (Funnel cap), *Laccaria purpureobadia* and *Clitocybe flaccida* (Tawney funnel cap).

Activities on the site

A small part of the site contains forestry and is managed by Coillte as a commercial plantation.

HABITAT DESCRIPTIONS

(See Habitat Description Document for detailed description of each vegetation community not described in this section.)

Habitats developed on industrial cutaway

Pioneer Poor Fen communities (pJeff)

This pioneer community is generally the most common vegetation community found on the site and is usually associated with emergent *Betula pubescens*-dominated scrub, which is the next stage in the succession of these communities. The vegetation is dominated by *Juncus effusus*. *Phragmites australis* and *Typha latifolia* are sometimes present along the drains within this habitat and occasionally spread out to form small patches of single-species sward or a mixed community with the *Juncus effusus*. Lemna sp. was also noted in a drain at several locations. Other species found in this vegetation type include *Juncus articulatus*, *Centaurea nigra*, *Triglochin palustre*, *Hydrocotyle vulgaris*, *Hypochaeris radicata*, *Tussilago farfara*, *Taraxacum* sp., *Potentilla anserina*, *Dactylis glomerata*, *Agrostis stolonifera*, *Pulicaria dysenterica*, *Eupatorium cannabinum*, *Cirsium palustre*, *C. arvense*, *Osmunda regalis*, *Carex panicea* , *Rumex acetosa*, *Sonchus arvensis*, *Mentha aquatica*, *Hieracium pilosella*, *Cerastium fontanum*, *Daucus carota*, *Carex demissa*, *Molinia caerulea*, This habitat is also regularly associated with other Poor fen communities such as pEang and pTrig, but these usually make up a small proportion of the vegetation cover. Some of this grassland can be quite variable and drier sections are more typical of Disturbed vegetation (DisCF) and can be dominated by *Equisetum* sp.

This habitat is found associated with the maturing woodland near the open water complex in the north-east section. This area is notable for the large hummocks of *Calliergonella cuspidata* that are developing in the grassland and the abundant cover of *Agrostis stolonifera*, which dominates in places.

Pioneer Poor Fen communities (pEang)

This community is widespread throughout the site, although it does not cover as great a proportion of the site as pJeff. It can be found in a variety of situations, mainly in mosaic with pJeff, pTrig and eBir in production-related areas that are rapidly re-vegetating. It can also be found in a variety of conditions including with standing water at the edge of an open water body.

This community is typically found vegetating bare peat and is dominated by *Eriophorum angustifolium*. Other species may include *Mentha aquatica*, *Juncus effusus*, *Juncus articulatus*, *Hypochaeris radicata*, *Rubus fruticosus*, *Lycopus europaeus*, *Triglochin palustre*, *Juncus bulbosus*, *Carex demissa* and *Veronica beccabunga*.

This community is also found around the edge of the open water in mosaic with pRos, pPhrag and pTyph. The vegetation is dominated by *Eriophorum angustifolium* and also contains *Mentha aquatica*, *Molinia caerulea*, *Triglochin palustre, Lythrum salicaria, Hydrocotyle vulgaris, Chamaerion angustifolium, Epilobium hirsutum, Juncus effusus, Typha latifolia, Juncus bulbosus, Galium palustre, Carex nigra*, *Ranunculus flammula, Taraxacum sp., Pulicaria dysenterica*, *Eupatorium cannabinum, Salix aurita, Holcus lanatus* and *Cirsium arvense*. This community can have extensive patches of *Calliergonella cuspidata* moss associated with it, sometimes forming large hummocks in the older more established areas. *Utricularia* sp. is sometimes present in the standing water within this community and other semi-aquatic species typical of aquatic margins such as *Hippuris vulgaris*, *Equisetum fluviatile* and *Typha latifolia* are present.

Pioneer Poor Fen communities (pRos)

This community is mainly found around the margins of the large area of open water in the north-east section, with small patches appearing in other parts of the site, usually associated with wetland areas with open water. It forms a complex mosaic in places with the open water and with other pioneer Poor fen habitats such as pEang and sections are beginning to resemble mature marginal vegetation of lakes (but their diversity is probably still somewhat lower). There is some typical zonation on plant communities in places around the open water from wet to dry habitats.

This habitat is dominated by *Carex rostrata* in places but can be relatively diverse. Other species present include *Eriophorum angustifolium*, *Carex echinata*, *Hippuris vulgaris* , *Hydrocotyle vulgaris*, *Mentha aquatica*, Utricularia sp., *Typha latifolia*, *Juncus effusus*, *Juncus articulatus*, *Ranunculus flammula* and *Carex demissa.* Some large hummocks of *Calliergonella cuspidata* are developing in this community where it is well-established.

Pioneer Poor Fen communities (pPhrag, pTyph, pSch)

These communities are presently encountered in the open water complex in the north-east section. *Phragmites australis*, *Typha latifolia* and *Schoenoplectus lacustris* can all form dense mono-specific stands around the margins of the open water or in shallow areas where the stands are emergent from the open water. Stands of *Schoenoplectus lacustris* are generally not found in association with the marginal vegetation but rather as small stands of emergent vegetation within the open water. The majority of these stands are relatively small in size at present apart from a large area of Tall Reed swamp dominated by *Typha latifolia* (pTyph) that is located at the south-east corner of the open water complex. This community is somewhat more diverse and open, with patches of open water within it and occasional *Salix* spp. trees developing in it.

Open Water complexes (OW)

A large area of open water is found within the Biodiversity Area in the north-east section of the site. This open water has a complex topography and is found in mosaic with other wetland habitats such as pEang, pRos, pPhrag, pTyph and eBir. Typical emergent species found in the open water near the margins include *Equisetum fluviatile* and *Triglochin palustre.* Patches of *Potamogeton* sp. are frequently found floating in the open water. The open water also contains frequent 'islands' and elongated ridges of remnant peat that are covered with various communities of which pJeff is most frequent.

***Betula pubescens* scrub (eBir, oBir)**

These habitats are the most frequently encountered pioneer habitats at this site. *Betula pubescens* saplings and young trees are generally emerging from Poor fen vegetation dominated by *Juncus effusus*. However, *Betula pubescens* dominated scrub can develop from a range of different communities including dry grassland and disturbed vegetation, which is found on many of the mineral mounds and ridges scattered through the site.. *Salix cinerea* and *Salix aurita* are also frequently present and sometimes become dominant. *Ulex europaeus* is also present on some drier areas on mineral ridges and on shallower peat near the margins of the site.

The underlying or ground vegetation generally reflects the surrounding conditions and pJeff is the most common community that is associated with the *Betula pubescens*-dominated scrub. The ground cover may also be dominated by *Chamaerion angustifolium* or *Agrostis stolonifera* in places. *Salix repens* is also present in places but is never very prominent. The *Betula pubescens*-dominated scrub sometimes develops from a *Calluna vulgaris*-dominated ground cover (dHeath).

Other species associated with the scrub habitat include *Dryopteris dilatata*, *D. carthusiana, D. felix-mas*, *Equisetum sylvaticum* and *Campylopus introflexus.*

Open *Betula pubescens*-dominated scrub is generally classified where the scrub is somewhat denser and taller, but has still not filled all the gaps and is not developing a woodland canopy.

Closed *Betula pubescens* scrub (cBir)

Closed *Betula pubescens*-dominated scrub is generally classified where the scrub is denser and taller, and has patches that are developing a woodland canopy. This community is generally difficult to access as it is so dense. The species composition is quite similar to the other forms of *Betula pubescens*-dominated scrub described above. It can have some open patches that contain species typically found in pJeff or gCal in drier areas including *Chamaerion angustifolium*, *Tussilago farfara*, and *Rubus fruticosus*.

Birch-Willow woodland (BirWD)

This habitat is found in the north-east section on the small raised area that extends into the open water wetland complex from the railway. This area is a mosaic of developing woodland, patches of younger scrub and open areas containing pJeff. The woodland areas contain frequent *Salix cinerea* in places and this dominates some of the canopy. Some of the woodland is quite dry and the ground cover is dominated by *Rubus fruticosus*. Other species present in the understorey and canopy include *Betula pubescens*, *Ulex europaeus* and *Sorbus aucuparia*. The ground cover also contains *Eurhynchium praelongum* and *Rhytidiadelphus squarrosus* along with many of the species recorded above in the other scrub habitats and in pJeff.

***Calluna vulgaris*-dominated community (dHeath)**

This community is found in several different locations around the site but it is generally not very extensive in cover. It is associated with drier areas around the margins of the bog. The vegetation is dominated by *Calluna vulgaris*

and is not very diverse. Some of the vegetation can be quite open with extensive bare peat cover. Other species associated the older, better developed sections include *Molinia caerulea*, *Anthoxanthum odoratum*, *Betula pubescens*, *Rubus fruticosus*, *Chamaerion angustifolium, Campylopus introflexus*, *Hypnum cupressiforme*, *Potentilla erecta and Erica tetralix.*

This community is associated with emergent *Betula pubescens* and *Ulex europaeus* scrub, and also with Birch woodland on the site. A larger area of this habitat is developing on the east side of the south-west section on a somewhat raised area. This area also contains some occasional young *Pinus contorta* trees as well as *Ulex europaeus* and *Betula pubescens*.

***Ulex europaeus*-dominated community (eGor)**

This scrub community is found in some locations around the site and is mainly associated with some of the drier ridges around the site, particularly the main ridge that divides the north-east section and confines the open the water complex. Overall it forms a relatively minor part of the vegetation in the site. Small amounts of this habitat can be found around the margins of the site associated with drier areas. ‘

This ridge is associated with a drain/stream that flows of the bog in this area. The community is dominated by dense *Ulex europaeus* scrub in places and it can also be associated with dense stands of *Pteridium aquilinum* that also form on these ridges in response to the drier conditions. Other species found in this community includes occasional *Betula pubescens*, *Pinus contorta* and *Salix* spp. trees and saplings.

This community can also be found in associated with small amounts of gCal and disCF, which also develop in these drier areas.

Dry grassland communities (gCal)

This community is most frequently encountered on the drier mineral mounds that are scattered around the site. It is usually associated with dry bare sub soil. This habitat can be found with disturbed vegetation (DisCF) and with emergent *Betula pubescens*-dominated scrub. Some of these mounds that been used to collect Pine debris from the surrounding production area. The grassland is dominated by *Anthoxanthum odoratum*, *Agrostis stolonifera* and *Centaurea nigra,* and it also contains *Carex flacca*, *Filipendula ulmaria*, *Hypochaeris radicata*, *Bellis perennis*, *Dactylis glomerata*, *Cirsium arvense*, *Holcus lanatus*, *Calluna vulgaris*, *Equisetum* sp., *Hypericum pulchrum*, *Cerastium fontanum, Leucanthemum vulgare, Achillea millefolium, Chamaerion angustifolium, Rubus fruticosus, Potentilla erecta, Potentilla anglica, Cirsium arvense* and *Cirsium vulgare. Carlina acaulis* was noted on several mounds.

Wet and dry grassland communities (gMol, gCo-An)

A small amount of diverse grassland of this type is present at the northern end of the north-east section, close to the access point onto the bog. This grassland has developed in an area that has not been disturbed for some time and usually appears near the periphery of the bog. The grassland is dominated by *Molinia caerulea* and also contains frequent *Anthoxanthum odoratum*, *Centaurea nigra*, *Potentilla anserina*, *Agrostis stolonifera*, *Plantago lanceolata* and *Dactylis glomerata.* Other species present include *Rubus fruticosus*, *Lotus corniculatus*, *Calystegia sepium*, *Equisetum* sp., *Arrhenatherum elatius*, *Mentha aquatica*, *Sonchus arvensis*, *Lythrum salicaria*, *Holcus lanatus*, *Carex flacca*, *C. demissa*, *C. nigra*, *Linum catharticum*, *Triglochin palustre*, *Potentilla erecta*, *Calluna vulgaris*, *Rhinanthus minor*, *Hypochaeris radicata*, *Pedicularis sylvatica*, *Hypericum pulchrum*, *Succisa pratensis*, *Lathyrus pratensis*, *Juncus articulatus*, *Trifolium* sp., *Stachys sylvatica*, *Stellaria* sp., *Juncus effusus*, *J. inflexus*, *Dactylorhiza* sp., *Cirsium arvense*, *C. vulgare*, and *Centaurium erythraea.* A small amount of *Betula pubescens*, *Ulex europaeus* and *Salix aurita* is spreading into this grassland type and this community transitions to an

emergent *Betula pubescens*-dominated community. There is a subtle change from this community to a more typical mosaic dominated by eBir and pJeff on deeper peat and more low-lying areas.

Some of this grassland is drier and is dominated by *Dactylis glomerata* and *Anthoxanthum odoratum* and is somewhat more tussocky. However, the extent of this vegetation type is quite minor in relation to the site area.

Similar gMol grassland dominated by *Molinia caerulea* (to the community described above) is found in small patches around the margins of the site on drier peat.

Rich fen community

A very small pocket of grassland found along the margins of the north-east section contained some *Schoenus nigricans*, an indicator of developing rich fen. This species was found in a disturbed area in association with *Molinia caerulea*, *Rhinanthus minor*, *Juncus inflexus*, *Carex demissa*, *Equisetum* sp, *Juncus articulatus*, *Centaurea nigra*, *Hypericum pulchrum*, *Sonchus arvensis*, *Mentha aquatica*, *Eriophorum angustifolium*, *Cirsium palustre*, *Carex flacca*, *Galium palustre*, *Calliergonella cuspidata* and *Ajuga reptans*. Some of this vegetation has developed on a spoil heap.

Conifer Plantation (WD4)

This plantation is located in the central part of the site on somewhat higher ground compared the rest of the cutaway. The plantation is managed by Coillte. It is predominantly planted with Sitka Spruce (*Picea sitchensis*) although there is a small amount of Lodgepole Pine (*Pinus contorta*) also planted in several blocks. This plantation is mainly at post-thicket stage with the relatively young trees having closed to forma dense canopy with very little vegetation cover underneath. There are some failed patches with stunted trees that would be considered pre-thicket plantation. These stunted areas are mainly vegetated by *Calluna vulgaris*, which is probably having a negative impact on the nutrient status of the soil and the condition of the trees. Overall, the plantation is in poor condition, although there are some pockets where the Spruce is growing at a fast rate and is in need of thinning.

Dry Disturbed/Pioneer communities (DisCF, DisWill)

Dry disturbed vegetation (DisCF) is found frequently on the small mineral mounds of sub-soil made up of glacial deposits that are found around the production area. It is frequently associated with emergent scrub (eBir) and dry grassland (gCal), which also are found on these mounds. This vegetation is dominated by *Tussilago farfara* and also contains *Rubus fruticosus*, *Molinia caerulea*, *Potentilla anserina*, *Daucus carota*, *Taraxacum* sp., *Agrostis* sp., *Carex flacca*, *Bellis perennis*, *Equisetum* sp., *Dactylorhiza* sp., *Cirsium arvense*, *Cirsium palustre*, *Salix aurita*, *Leucanthemum vulgare*, *Hypochoeris radicata* and *Centaurium erythraea.*

Other Habitats (around the fringe of the bog)

Birch woodland (WN7)

This habitat is located along the western boundary of the south-east section. The woodland is in the initial stages of development and is immature, although it does contain some mature trees. The canopy is dominated by *Betula pubescens* with a minor amount of *Salix cinerea* present. The canopy is about 8 m high and some of the largest trees reach a dbh of 40 cm. The woodland contains shrubby *Betula* of different ages. *Ulex europaeus* is also present in the understorey. The ground cover is relatively dry and dominated by leaf litter, patches of *Rubus fruticosus* and some moss cover. Other species present in the ground layer include *Hypericum humifusum*, *Dryopteris dilatata*, *Ilex aquifolium*, *Juncus effusus*, *Agrostis* sp., *Calluna vulgaris* and *Molinia caerulea.* Moss species present in the ground layer include *Thuidium tamariscinum*, *Polytrichum commune*, *Eurhynchium striatum*

and *Hypnum* sp. There are some open patches within the woodland that would be described as scrub and are vegetated with *Ulex europaeus* and *Pteridium aquilinum*. The woodland also contains small stagnant pools of water associated with old drains.

There are signs of Deer-browsing in the woodland.

Raised Bog (PB1)

Small patches of remnant high bog are found at several locations around the site. The largest area is in the south-east section (about ~ 5 ha) and is positioned along the western boundary. This bog is in quite good condition and there is a surprisingly high cover of *Sphagnum* moss including *S. capillifolium*, S. *papillosum*, *S. subnitens*, *S. magellanicum* and some and hummocks of *S. imbricatum*. The majority of the bog could be classified as sub-marginal with small patches in the northern section considered as sub-central quality. The cover of *Sphagnum* decreases towards the southern boundary.

The bog is surrounded by a tall face-bank with dense *Calluna vulgaris* that is almost 3 m high along the east side. A drain in a trench marks the northern boundary while there is some drainage along the southern boundary that is associated with peat cutting on adjacent private land. The vegetation is typically dominated by *Calluna vulgaris* and *Eriophorum vaginatum*. Other species present include *Eriophorum angustifolium*, *Narthecium ossifragum*, *Trichophorum cespitosum*, *Drosera rotundifolia*, *Carex panicea* and *Rhynchospora alba*. There is also extensive cover of *Cladonia portentosa*. Other mosses present include *Leucobryum glaucum* and *Hypnum jutlandicum*. There are some typical hummock-hollow complexes but for the most part the surface of the bog is relatively flat with few features. No pools were present and there is no standing water. A very small damp hollow was the only location on the intact bog where *S. cuspidatum* was recorded. Several *Betula pubescens* and *Pinus contorta* are present on the high bog. There was some high *Sphagnum* cover, mainly in hummocks, and there was also some minor lawn development. Some of the larger hummocks do display signs of degradation and drying out in places. An old drain crosses through the centre of the bog (N-S direction) and is infilling with *S. cuspidatum*.

Improved grassland (GA1)

This habitat is found in the south-east section along the western margin. A section of land within the BnM boundary has been improved in the past by private individuals and managed as agricultural grassland. The margins of this area are disturbed and there is some development of patches of *Rubus fruticosus*, *Pteridium aquilinum*, *Urtica dioica* and *Chamaerion angustifolium.* A deep drain separates this area from adjacent habitats on the periphery of the bog.

Cutover Bog (PB4)

This habitat is found around the margins of the site at several locations. Patches of cutover bog within the BnM site boundary, but managed by private individuals, are begin cut privately for peat and are typical of Turbary with several different individual plots being found in the same unit. Various stages of development are present, from active peat cutting where there is very little vegetation development (dominated by bare peat) and freshly cut turf is being dried, to abandoned sections that are developing *Calluna vulgaris*-dominated vegetation (dHeath), *Juncus effusus*-dominated vegetation (pJeff), dense *Pteridium aquilinum* (dPter) or *Betula pubescens*-dominated scrub (eBir). Some units of cutover bog have a mosaic of these communities that are related to the time since the different plots were last cut for peat.

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

No invasive flora species have been recorded at Drinagh Bog.

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'. Other ecological survey work completed as part of the Derrinlough Wind Farm was also reviewed to inform this rehabilitation plan. No records of non-native plant species listed in the Regulations were recorded within the windfarm study area, including the rehabilitation area.

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).

In addition to the above, Best Practice measures around the prevention and spread of Crayfish plague[4] will be adhered with throughout all rehabilitation measures and activities.

[4] 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. PO-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 group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

2 The Peatlands Climate Action Scheme (PCAS)

Bord na Móna (BnM) understand that it is the Minister's (DECC) intention to impose an obligation on Bord na Móna to develop a programme of measures, 'the Scheme', for the enhanced decommissioning, rehabilitation and restoration of boglands previously used to supply peat for electricity generation within the State. The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the Scheme (PCAS) 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.

It is envisaged that Bord na Móna carry out an enhanced decommissioning, rehabilitation and restoration, under the Scheme (PCAS), and supported by the Climate Action Fund and Ireland's National Recovery and Resilience Plan across a footprint of 33,000 ha. This scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and measures 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. However, only the additional costs associated with the additional

and enhanced rehabilitation, i.e., those activities which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support under the Scheme.

The proposed enhanced rehabilitation detailed in this document, are predicated on the understanding that the element of the activities, over and above the 'standard' rehabilitation necessary to comply with pre-existing Condition 10 IPC Licence requirements, will be deemed eligible costs by the Scheme regulator and funded by the Climate Action Fund and Ireland's National Recovery and Resilience Plan.

For the avoidance of doubt, should the Scheme and the associated statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete an adapted standard decommissioning and rehabilitation measures required under Condition 10 and outlined in Appendix I.

3 National and EU Climate and Biodiversity 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.

Peatlands rehabilitation and restoration is referenced in Section 17.3.3 of the Land Use, Land Use Change, Forestry and Marine Chapter of the National Climate Action Plan 2021 as follows:

"The rehabilitation of degraded peatlands to a condition in which they regain their ability to deliver specific ecosystem services has considerable potential for initial mitigation gains, and future carbon sequestration. Additional benefits of peatland restoration include positive socio-economic outcomes for the Midlands, increased natural capital, enriched biodiversity, improved water quality, and flood attenuation."

The scheme is included as Action 33 in the Climate Action Plan 2021 Annex of Actions - Deliver the Enhanced Decommissioning, Rehabilitation and Restoration (EDRR) Scheme for Bord na Mona Peatlands.

EDRRS is also referenced in the Climate Action Plan 2021 as a measure to deliver a Just Transition in the Midlands.

International research and scientific understanding of peatlands is now reflected in key Irish national policy and strategy documents such as the National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017 - 2022 (Department of Arts, Heritage and the Gaeltacht 2017), The National Peatland Strategy (Department of Arts, Heritage and the Gaeltacht 2015), The National Biodiversity Action Plan (National Parks and Wildlife Service 2017), The River Basin Management Plan for Ireland 2018-2021 (Department of Housing, Planning and Local Government 2018), and the Biodiversity – Climate Change Sectoral Action Plan (Department of Arts, Heritage and the Gaeltacht 2019). Each of the national plans, which are also complemented with the recently published EU Green Deal communication on Biodiversity Strategy for 2030 (COM 2020) have overlapping objectives and actions that focus on the restoration of peatlands damaged by turf-cutting, drainage and other impacts, as well as the re-wetting of Bord na Móna industrial peat extraction bogs.

While not specifically identified as a restoration implementor, EDRRS objectives are in line with those of the United Nations Decade on Ecosystem Restoration 2021-2030 of Preventing, Halting and Reversing the Degradation of Ecosystems worldwide.

EDRRS is also in line with the EU Commission proposal for a Nature Restoration Law which will apply legally binding targets for nature restoration in different eco-systems to every Member State. The aim is to cover at least 20% of the EU's land and sea areas by 2030 with nature restoration measures and eventually extend these to all ecosystems in need of restoration by 2050.

4 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 principal 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.

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

The National River Basin Management Plan (Department of Housing, Planning, Community and Local Government 2017) 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 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 NWBMP 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 NWBMP 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 is 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 NWBMP 2022-2027.

6 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.

The delivery of rehabilitation via PCAS 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.

A new National Biodiversity Action Plan is currently being developed.

7 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.

8 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. PCAS 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.

9 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.

10 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.

11 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.

12 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 EUs 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 polices.

13 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.

14 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.

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

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.

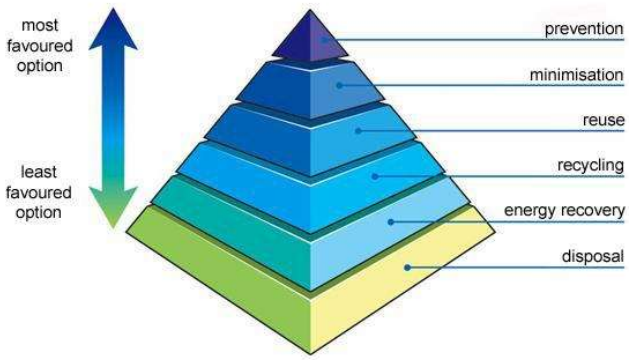
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

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 Annual Environmental Report (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.

2. Enhanced Decommissioning.

The remaining infrastructure does not constitute a risk to the environment and would not be a requirement of condition 10 of the license. The removal of these are deemed as enhanced measures. These may enhance the future afteruse of the bog for amenity value, security against access for illegal and unsocial activities and general State and community benefit. In relation to this bog, this would include the infrastructure defined below:

Item	Enhanced Decommissioning Type	Drinagh Decommissioning Plan
1	Removal of Railway Lines	Removal of Railway Lines
2	Decommissioning Bridges and Underpasses	Rail bridge over Silver River to be decommissioned
3	Decommissioning Railway Level Crossing	Decommissioning Railway Level Crossing
4	Restricting Access (bogs and silt ponds)	Restricting Access to Bog.
5	Removal of High Voltage Power Lines	Not Applicable

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 cutaway 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 *Sphagnum*-rich plant communities in these conditions if the peat can be re-wetted. This brings the opportunity of re-developing *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 (ie. at the margin) where the peat can not 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.

Enhanced decommissioning: This is defined as decommissioning carried out under the Scheme, which is proposed to externally funded.

Enhanced rehabilitation: This is defined as rehabilitation carried out under the Scheme, which is proposed to be externally funded. It is proposed by Government that Bord na Móna be obligated to carry out enhanced decommissioning, rehabilitation and restoration on peatlands. This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and activities 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. However, only the costs associated with the additional, enhanced and accelerated measures, i.e., those interventions which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support under the Scheme.

Environmental stabilisiation: 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 Lisence. 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 stabilisiation.

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). The Scheme will consider potential rehabilitation and restoration actions (e.g. drain blocking) within marginal land zones, where appropriate.

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 in 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 IPPC Licence's Ref. P0500-01, Boora Bog Group 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 in Boora are serviced by a silt lagoons/ponds. During the excavation of these silt ponds, pre IPPC Licensing in 1999 and since licensing, the excavated material is stored adjacent to the silt pond, where it either remains in situ ores 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 that 2-3 metres.

1.2 Power Station screenings:
Peat from the bogs is screened prior to processing. This screening removes oversized peat, stones and bogs timbers. Schedule 3 (ii) of the IPPC 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 IPPC 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 P0502-01 IPPC 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 31' December2012. 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.
IPPC 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 IPPC 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 out 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 IPPC 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	**C**lassification	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 stabilized 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 IPPC 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 IPPC 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 IPPC 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 there 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, the first review to take place in September 2017. 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 IPPC Licence Ref. PO500-01.

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.
- Buffer zones in respect of waterbodies, as specified on https://www.epa.ie/about/faq/name,57156,en.html, will be adhered with at all times with regard to fertiliser application.
- No fertiliser will be spread within or in proximity to European Sites. Fertiliser will not be spread within 25m of a hydraulic break (where slope indicates runoff potential); 25m of an area subject to annual winter inundation, 25m of a natural watercourse, or 25m of any drains where conveyance is to be retained through the proposed rehabilitation extent.
- Fertiliser will be applied to headlands and bare fields where the surface slope indicates runoff is directed away from the above areas, and to within 2m of internal drainage channels within the cutover high field areas. These drainage channels will be blocked in advance of fertiliser application, restricting potential run-off to downstream drainage channels

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

Table APX -1 Consultees contacted

To follow

Table APX -2 Response summary from Consultees contacted

To follow

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

22

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.

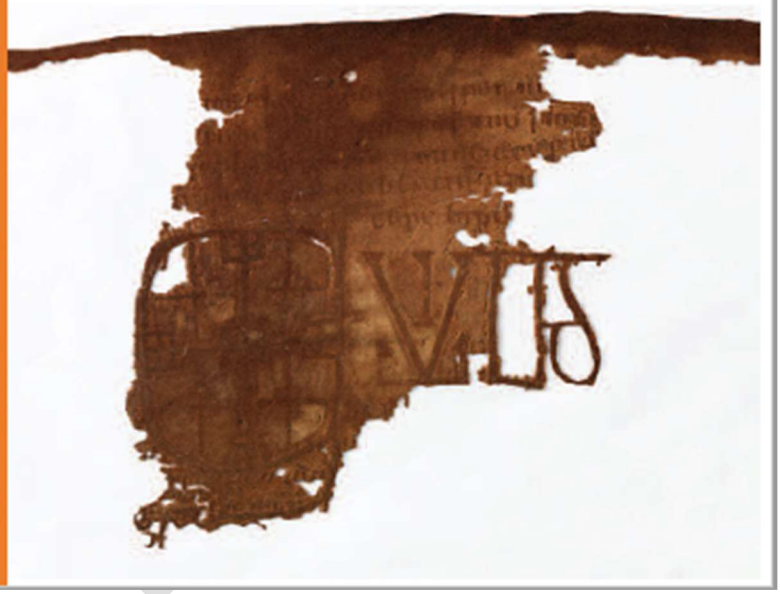
6. To complete the Report of Discovery of Archaeological Object(s) in Bogs (Appendix V), as directed by the Duty Officer of the National Museum of Ireland.

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**	**Date: 13/10/2020**

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	13/10/2020	First release	EMcD

Archaeological Impact Assessment of Proposed Bog Decommissioning and Rehabilitation at Drinagh Bog, Co. Offaly

Report For

Bord Na Móna Energy Ltd.

Author

Dr. Charles Mount

Bord Na Móna Project Archaeologist

Introduction

The EPA (2002) *Guidance on the process of preparing and implementing a bog rehabilitation plan* notes that the licensee should characterise the bog prior to embarking on detailed planning and implementation. This characterisation should detail how the land is classified in terms of statutory protections, e.g. as European sites, world heritage sites, RAMSAR sites, National Heritage Areas, national monuments, archaeological heritage, etc. This archaeological impact assessment report was prepared by Dr. Charles Mount for Bord na Móna Energy Ltd to fulfil this characterisation in relation to archaeological heritage. It represents the results of a desk-based assessment of the impact of proposed bog rehabilitation on c.318 hectares at Drinagh Bog, Co. Offaly on the known archaeological heritage of the bog. The proposed rehabilitation actions will be a combination of measures to create wetlands and re-wet deep peat as outlined in the draft Methodology Paper for the proposed Bord na Móna Decommissioning, Rehabilitation and Restoration Scheme. These enhanced measures for Drinagh Bog will include:

- Intensive drain blocking around shallow peat areas/modelled depressions on little or no peat to create/promote the spread of wetland habitats.
- Modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls.
- Regular drain blocking (3/100m) on dry cutaway along with the blocking of outfalls and management of water levels, along with organic fertiliser application.
- Deep Peat measures including field re-profiling, resulting in bunded areas suitable for Sphagnum inoculation, on deeper peat. Such measures will be appropriate where there are pockets of residual deep peat within the southwestern lobe of Drinagh bog.
- Targeted drain blocking on remnant high bog and areas of cutover bog at the margins to optimise hydrological conditions (AW2). This will be particularly suitable for much of the central and south-eastern part of the eastern lobe of Drinagh bog which has developed a mosaic of established Scrub and areas of bare peat.
- Targeted fertiliser applications to accelerate vegetation establishment on areas of bare peat on headlands and high fields, and within certain areas of dry cutaway. Areas where vegetation has established do not need fertiliser application.
- Seeding of vegetation and inoculation of Sphagnum will be undertaken where required.
- Initial hydrological modelling indicates that a small part of the site will develop a mosaic of wetland habitats with the potential for some deeper water. Hydrological management will look to optimise summer water levels to maximise the development of wetland vegetation (by looking to set water depths at < 0.5 m, where possible. It is inevitable that some small sections will naturally have deeper water due to the topography at this site). Water-levels will be adjusted at outfalls and by adjusting piped drainage..

Drinagh Bog is located c.1.5km south-east of Cloghan, Co. Offaly The bog rehabilitation area occupies the townlands of Aghagoogy, Derryad, Derrinlough, Derrymullin and Loughderry, Drinagh, Kilcamin, and Stonestown, on OS 6 inch sheets Offaly No. 30.

Methodology

This is a desk-based archaeological assessment that includes a collation of existing written and graphic information to identify the likely archaeological potential of Drinagh Bog. The extent of the rehabilitation area is indicated in Fig. 1. This area was examined using information from:

- The IAWU Peatland Survey
- The 2009 Bord na Móna Re-assessment Survey

- The Record of Monuments and Places
- The Sites and Monuments Record (SMR) that is maintained by the Dept of Housing, Local Government and Heritage
- Previous assessments

An impact assessment has been prepared and recommendations have been made.

Desktop assessment

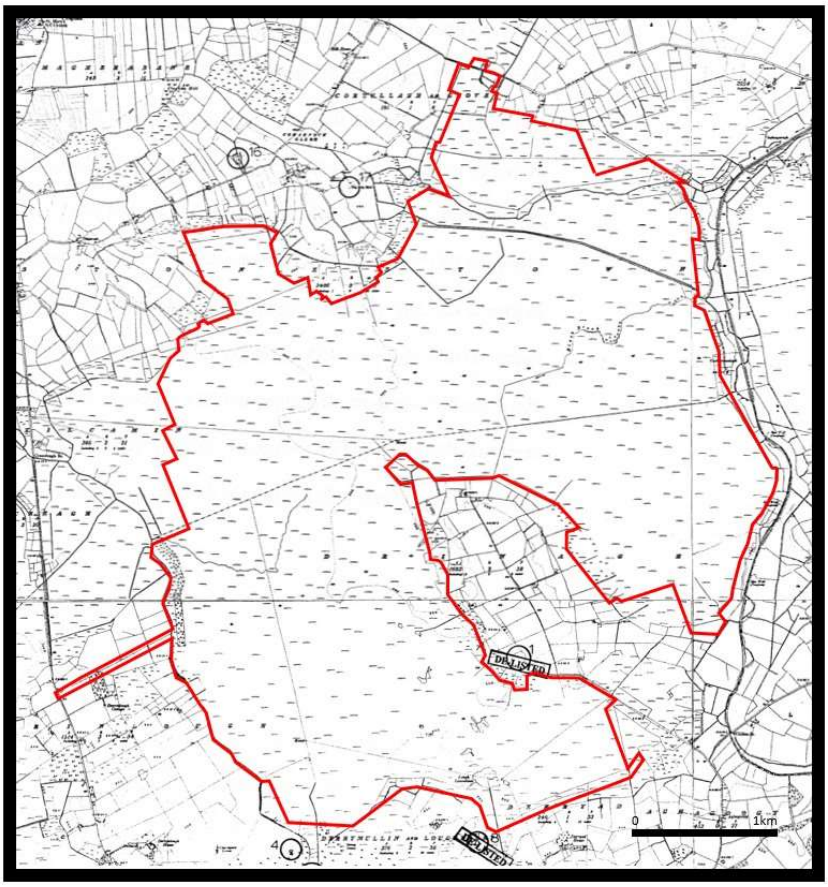


Fig. 1. Drinagh Bog, Co. Offaly, detail of the Record of Monuments and Places map sheets Nos. 22, 23, 30, and 31. The proposed rehabilitation area is outlined with the red line.

Peatland survey

Drinagh Bog was surveyed by the Irish Archaeological Wetland Unit (IAWU) in 1997 as part of the Archaeological Survey of Ireland Peatland Survey (unlicensed). Eighteen sightings of archaeological material were made in the rehabilitation area (see Table 1). These archaeological sightings were notified to the Archaeological Survey of Ireland and included in the SMR.

SMR No	SMR Class	Cat No	IAWU Class	Townland	ITN E	ITN N	Depth BS M
OF030-050----	Structure - peatland	OF-DYD 0002	WWIS	Derryad	611664	714342	0.25
OF030-051----	Structure - peatland	OF-DYD 0003	WWNIS	Derryad	611672	714347	0
OF030-052----	Structure - peatland	OF-DYD 0004	WWIS	Derryad	611683	714485	0

OF030-053----	Road - class 3 togher	OF-DYD 0005	PUTO	Derryad	611686	714486	0.56
OF030-054----	Structure - peatland	OF-DYD 0006	WWIS	Derryad	611668	714468	0
OF030-055----	Structure - peatland	OF-DYD 0007	WWIS	Derryad	611668	714457	0
OF030-056----	Structure - peatland	OF-DYD 0008	WWIS	Derryad	611622	714427	0.29
OF030-057----	Structure - peatland	OF-DYD 0009	WWIS	Derryad	611665	714381	0
OF030-060----	Road - class 1 togher	OF-DNH 0001	TOGH	Derryad	611655	714440	0
OF030-061----	Road - class 3 togher	OF-DNH 0002	PUTO	Drinagh	611655	714628	0.1
OF030-062----	Road - class 3 togher	OF-DNH 0003	PUTO	Drinagh	611670	714580	0
OF030-063----	Road - class 3 togher	OF-DNH 0004	PUTO	Drinagh	611674	714526	0
OF030-064----	Structure - peatland	OF-DNH 0005	WWIS	Drinagh	611653	714476	0
OF030-065----	Structure - peatland	OF-DNH 0006	UWWNIS	Drinagh	611667	714631	0
OF030-066----	Structure - peatland	OF-DNH 0007	WWIS	Drinagh	611082	714738	0
OF030-067----	Structure - peatland	OF-DNH 0008	UWWIS	Drinagh	611198	714455	0
OF030-068----	Structure - peatland	OF-DNH 0009	UWWIS	Drinagh	611653	714486	0
OF030-069----	Road - class 3 togher	OF-DNH 0010	PUTO	Drinagh	611704	714531	1.4

Table 1. List of all sightings of archaeological material in the rehabilitation made by the IAWU with SMR concordance.

Recorded Monuments

The Record of Monuments and Places (RMP) for Co. Offaly which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1994). This record was published by the Minister in 1994 and includes sites and monuments that were known in Drinagh Bog before that date. This review established that there are no RMPs located in the proposed rehabilitation area (see Fig. 1).

2009 Bord na Móna Re-assessment Survey

Drinagh Bog was surveyed (licence No. 09E0413) by ADS Ltd in 2009 as part of the Bord na Móna re-assessment survey (Rohan 2009, 32-39). Only two of the sightings made by the IAWU in 1997 were identified by the fieldwork. A Road - class 1 togher (OF030-060---) and a Road - class 3 togher or Platform (OF030-063----) were previously recorded by the IAU in 1997. The Road - class 1 togher was recorded as extending for 225m in a north-south alignment. Only two coordinates for the monument were recorded in the survey report. These coordinate disagree with IAWU coordinate included in the SMR, they are too far east, and therefore only the SMR coordinate from the IAWU survey is used here. Thirteen previously unrecorded sightings including 12 sightings of archaeological wood and a possible togher were recorded during the re-assessment survey. These additional sightings are included in Table 2.

SMR No.	SMR Class	IAWU No.	ADS No.	ADS Class	Townland	ITM E	ITM N	NGR E	NGR N	Depth BSM
			OF-WDNH002	Archaeological wood	Drinagh	611695	714573	211747	214542	0.06
			OF-WDNH003	Togher Poss	Drinagh	611704	714576	211756	214545	0.15
			OF-WDNH004	Archaeological wood	Drinagh	611708	714600	211760	214569	0.006
			OF-WDNH005	Archaeological wood	Drinagh	611713	714603	211765	214572	0.08
			OF-WDNH006	Archaeological wood	Derryad	611776	714554	211828	214523	0.08
			OF-WDNH007	Archaeological wood	Derryad	611774	714541	211826	214510	0.08
			OF-WDNH008	Archaeological wood	Derryad	611871	714221	211923	214190	0.06
			OF-WDNH009	Archaeological wood	Derryad	611861	714243	211913	214212	0.06
			OF-WDNH010	Archaeological wood	Derryad	611763	714153	211815	214122	0.06
			OF-WDNH011	Archaeological wood	Derryad	611857	714360	211909	214329	0.06
			OF-WDNH012	Archaeological wood	Derryad	611851	714360	211903	214329	0.03
			OF-WDNH013	Archaeological wood	Derryad	611803	714487	211855	214456	0.60
			OF-WDNH014	Archaeological wood	Derryad	611800	714486	211852	214455	0.15
OF030-060---	Road - class 1 togher	OF-DNH 0001	OF-WDNH015a	Plank Trackway	Derryad	611655	714440	-	-	0.40

		OF-DNH 0001	OF-WDNH015b	Plank Trackway	Derryad	611833	714346	211885	214315	0.40
OF030-063----	Road - class 3 toghe r	OF-DNH 0004	OF-WDNH016	Platform	Derryad	611783	714516	211835	214485	0.10

Table 2. List of all sightings of archaeological material in the rehabilitation area made by the 2009 Bord na Móna Re-assessment Survey with SMR concordance.

Sites and Monuments Record

The Sites and Monuments Record (SMR) which is maintained by the Department of Housing, Local Government and Heritage was examined as part of the assessment on the 6th of March 2023. The SMR consists of records of sightings made by the IAWU Survey notified to the Dept. This review established that there are 18 sightings entered in the SMR in the proposed rehabilitation area. These are the sightings made by the IAWU survey in 1997 and are indicated in Table 1.

Fig. 2. Drinagh Bog, Co. Offaly, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the red line.

Previous assessments

Drinagh Bog has been the subject of an Environmental Impact Assessment Report (EIAR) carried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01. This assessment included a review of the topographical files and finds registers of the National Museum of Ireland intended to identify all finds from the bog reported to the Museum by that date and

these are included below in Table 4 (Pers Comm. Jane Whitaker). The assessment noted the archaeological material identified in the surveys of the bog and noted that there was a moderate to high potential for archaeological features to be uncovered during the course of any future development works in Drinagh Bog.

Monitoring 2019

Monitoring of site investigation works for renewable energy was carried out at Clongawney and Drinagh Bogs, County Offaly over a period of eight days between January and November 2019 by Tobar Archaeological Services (Licence No. 19E0095). The excavation of a total of 59 trial pits was monitored over this period within an area of predominantly cut-over bog, some parts of which are colonised with vegetation. At Compound 6 (TPCC4, now Construction Compound 4) four horizontal pieces of wood were observed within the trial pit at a depth of 0.65m (see Table 3). Two of the longer pieces were exposed for a distance of 2.4m and 1.2m (NE/SW) and had widths of 0.31m and 0.25m respectively and were 0.80m apart. Between the aforementioned pieces of wood two shorter pieces of wood were noted and measured 0.5m and 0.7m in length NW/SE. While it was not possible to discern a definitive archaeological structure from the wood observed within the limits of the trial pit, it is possible that they have some archaeological potential. The timbers were preserved *in situ*.

SMR No.	SMR Class	ID	Class	Townland	ITM E	ITM N	Depth BS M
-	-	TPCC 4	Archaeological wood	Clongawney	610305	715713	0.65

Table 3. Archaeological features identified during monitoring in 2019.

Reported finds

As noted above the EIAR carried out by Irish Archaeological Consultancy LTD in in relation to IPC Licence P0500-01 contains a complete list of known finds from Drinagh Bog reported to the National Museum of Ireland up to 2018. Finds made by the IAWU are also included in Table 4.

Townland	Museum No./ catalogue No.	Description
Drinagh	1954:71	a wooden vessel
Drinagh	1954:72	a socketed bronze dagger or knife
Drinagh	1960:647 s	several lumps of bog butter with traces of bark wrapping
Drinagh	1977:2176	six fragments of a wooden tray
Drinagh	1977:2178 & 2179	half of a circular base of a wooden vessel
Drinagh	1977:2180	a possible wooden paddle
Drinagh	1977:2181	a stone D-shaped saddle quern
Drinagh	1979:107	the right femur of a human skeleton
Drinagh	1982:71 a	D-shaped wooden object with axe marks that may have been the seat of a chair or stool
Drinagh	1988:127	a portion of a wooden beetle
Drinagh	1988:128 ,	two wooden board with toolmarks
Drinagh	1988:129 & 130	a thick oak plank with a mortice
Drinagh	2013:323	a wooden beetle
Drinagh	2013:324	a bog butter in two pieces with traces of hazel rods from a possible wicker container
Drinagh	2001:71 & 72 .	half of a circular base of a wooden vessel

Table 4. List of archaeological finds from Drinagh Bog reported to the National Museum of Ireland.

Impact assessment

There are 31 known sightings of archaeological material in the rehabilitation area. Sixteen of the sightings made by the IAW in 1997 were not identified in 2009 and had been removed. The 13 sightings made in 2009 and the single sighting made in the 2019 monitoring are included in Table 5. The 2009 sightings are mostly surface or near-surface finds and apart from OF-WDNH006 and OF-WDNH013 have been removed. There is only one coordinate available for OF030-060--- which was noted as 0-0.40m below the surface but this togher appears to have been removed.

SMR No.	SMR Class	ID No.	ADS Class	Townland	ITM E	ITM N	Depth BS M	2008 Depth	2020_ Depth	Peat removed (m)	Status
		OF-WDNH002	Archaeological wood	Drinagh	611695	714573	0.06	2.46	1.27	1.19	gone
		OF-WDNH003	Togher Poss	Drinagh	611704	714576	0.15	2.47	0.84	1.63	gone
		OF-WDNH004	Archaeological wood	Drinagh	611708	714600	0.006	2.33	0.89	1.44	gone
		OF-WDNH005	Archaeological wood	Drinagh	611713	714603	0.08	2.60	0.99	1.61	gone
		OF-WDNH006	Archaeological wood	Derryad	611776	714554	0.08	2.78	2.78	0.00	survives
		OF-WDNH007	Archaeological wood	Derryad	611774	714541	0.08	3.07	2.77	0.30	gone
		OF-WDNH008	Archaeological wood	Derryad	611871	714221	0.06	3.14	1.58	1.56	gone
		OF-WDNH009	Archaeological wood	Derryad	611861	714243	0.06	2.84	0.99	1.85	gone
		OF-WDNH010	Archaeological wood	Derryad	611763	714153	0.06	3.10	1.81	1.29	gone
		OF-WDNH011	Archaeological wood	Derryad	611857	714360	0.06	3.18	2.75	0.43	gone
		OF-WDNH012	Archaeological wood	Derryad	611851	714360	0.03	3.16	2.71	0.45	gone
		OF-WDNH013	Archaeological wood	Derryad	611803	714487	0.60	2.97	2.67	0.30	survives
		OF-WDNH014	Archaeological wood	Derryad	611800	714486	0.15	2.97	2.72	0.25	gone
OF030-060---	Road - class 1 togher	OF-WDNH015a	Plank Trackway	Derryad	611655	714440	0.40	1.99	0.93	1.06	gone
		OF-WDNH015b	Plank Trackway	Derryad	-	-	0.40	-	-	-	gone
OF030-063----	Road - class 3 togher	OF-WDNH016	Platform	Derryad	611783	714516	0.10	2.94	2.68	0.26	gone
-	-	TPCC 4	-	Clongawney	610305	715713	0.65	-	-	-	survives

Table 5. Sightings of archaeological material identified in in Drinagh Bog since 2009. With depth of bog removed at each location since 2008.

Recommendations

There are 31 known sightings of archaeological material in the rehabilitation area. Analysis of harvesting data indicated that three of the sightings survive *in situ* (see Table 6). Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should also be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

SMR No.	SMR Class	ID No.	ADS Class	Townland	ITM E	ITM N	Depth BS M	2008 Depth	2020_ Depth	Peat removed (m)	Status
		OF-WDNH006	Archaeological wood	Derryad	611776	714554	0.08	2.78	2.78	0.00	survives
		OF-WDNH013	Archaeological wood	Derryad	611803	714487	0.60	2.97	2.67	0.30	survives
-	-	TPCC 4	-	Clongawney	610305	715713	0.65	-	-	-	survives

Table 6. Surviving sightings of archaeological material in Drinagh Bog.

Conclusion

This is a desk-based archaeological assessment and includes a collation of existing written and graphic information to identify the likely archaeological potential of the proposed rehabilitation area. There are 31 known sightings of archaeological material in the rehabilitation area. Analysis of harvesting data indicated that three of the sightings survive *in situ* (see Table 6). These sightings should be protected within a 20m buffer zone. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should also be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

References

Carroll, M. 2020. Archaeological Monitoring of Site Investigations at Clongawny More and Drinagh Bogs, County Offaly. Report for Bord na Mona.

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Dr. Charles Mount
15 March 2023

APPENDIX XIII. INITIAL WATER QUALITY DATA FROM DRINAGH

Table AP13.1. Water quality data for November 2020 to January 2023 at Drinagh.

PCAS SW Sampling Scheme				Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids
Bog Group	Licence No	Bog Name	SW Code -GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	2/2/22	2/3/22	2/4/22	1/5/22	1/6/22	1/7/22	1/8/22	1/9/22	1/10/22	1/11/22	1/12/22	1/1/23				
Boora	P0500-01	Drinagh	SW7				3	3		2	4	2	2	2	2	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Boora	P0500-01	Drinagh	SW8	2			3	4	6	6	3	2	2	2	2	3	2	2	2	2	2	2	3	2	2	6	2	2	2	2	2	2	2
Boora	P0500-01	Drinagh	SW9				4	12	6	7	4	2	2	2	2	3	2	2	2	2	3	4	2	2	2	2	2	2	2	2	2	2	2
			Monthly Rainfall (mm)	79.4	99.7	90.9	87.8	64.6	13.4	96.5	22	110.4	58.2	55.8	81.1	34.3	78.4	46.6	133.6	47.4	50.1	56.2	90.5	33.2	25.1	106.7	159.8	106.9	82.9	85.4				

PCAS SW Sampling Scheme				Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour
Bog Group	Licence No	Bog Name	SW Code -GIS	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co
				1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	1/4/22	1/5/22	1/6/22	1/7/22	1/8/22	1/9/22	1/10/22	1/1/22	1/12/22	1/1/23				
Boora	P0500-01	Drinagh	SW7	N/S	N/S	N/S	554	178	N/S	242	161	339	191	82.1	186	310	148	170	170	248	119	131	81.1	206	88	79.4	243	308	158	270				
Boora	P0500-01	Drinagh	SW8	197	N/S	N/S	375	168	112	107	212	178	223	187	238	246	20	228	147	225	135	105	124	168	156	127	191	294	253	250				
Boora	P0500-01	Drinagh	SW9	N/S	N/S	N/S	145	163	151	138	98.4	241	198	168	93.1	130	125	198	112	124	114	107	85.4	131	71.9	123	157	172	127	118				

PCAS SW Sampling Scheme				COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD
Bog Group	Licence No	Bog Name	SW Code -GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	1/4/22	1/5/22	1/6/22	1/7/22	1/8/22	1/9/22	1/10/22	1/11/22	1/12/22	1/1/23				
Boora	P0500-01	Drinagh	SW7	N/S	N/S	N/S	89	53	N/S	68	66	89	67	47	68	85	61	66	49	50	42	54	19	67	34	42	71	82	59	68				
Boora	P0500-01	Drinagh	SW8	53	N/S	N/S	55	48	41	43	80	63	77	84	82	61	65	87	51	36	47	57	48	65	68	48	70	67	61	48				
Boora	P0500-01	Drinagh	SW9	N/S	N/S	N/S	46	59	38	44	47	72	81	79	39	53	58	55	48	34	43	45	31	50	30	26	44	54	41	35				

PCAS SW Sampling Scheme				pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
Bog Group	Licence No	Bog Name	SW Code -GIS	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units
				1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	1/4/22	1/5/22	1/6/22	1/7/22	1/8/22	1/9/22	1/10/22	1/11/22	1/12/22	1/1/23				
Boora	P0500-01	Drinagh	SW7				7.5	7.5		7.5	7.8	7.3	7.6	7.7	7.4	7.1	7.5	7.6	7.7	7.5	7.6	7.7	8	7.5	7.8	7.5	7.1	7.2	7.3	7.3				
Boora	P0500-01	Drinagh	SW8	7.4			7.3	7.5	8	8.1	7.6	7.8	7.5	7.4	7.4	7.1	7.5	7.3	7.6	7.3	7.7	7.9	7.7	7.7	7.7	7.9	7.4	7.2	7	7.4				
Boora	P0500-01	Drinagh	SW9				7.2	7.3	7.4	7.6	7.8	7.4	7.7	7.9	7.4	7.3	7.4	7.5	7.5	7.4	7.4	7.4	7.5	7.4	7.5	7.5	7.4	7.3	7.1	7.2				
			Monthly Rainfall (mm)	79.4	99.7	90.9	87.8	64.6	13.4	96.5	22	110.4	58.2	55.8	81.1	34.3	78.4	46.6	133.6	47.4	50.1	56.2	90.5	33.2	25.1	106.7	159.8	106.9	82.9	85.4				

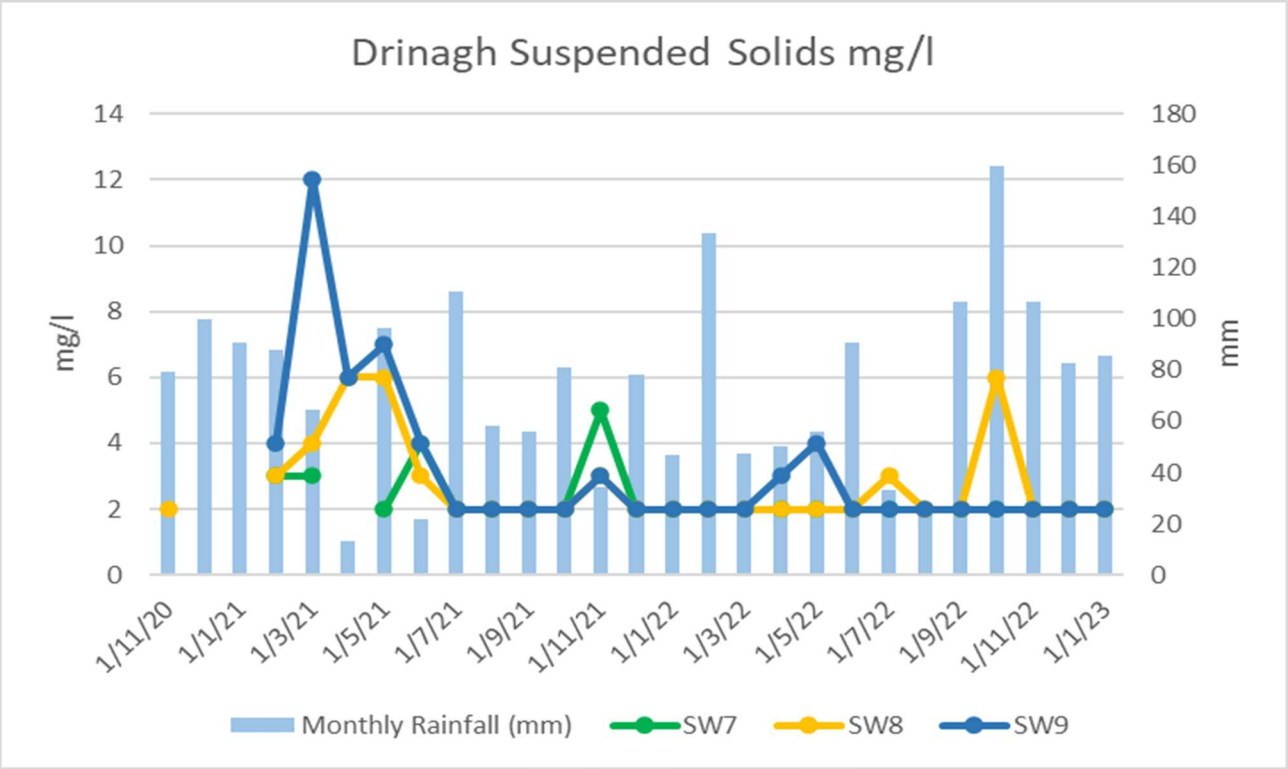

Figure AP13.1. Suspended solids in water sampling at Drinagh from different discharge points.35 mg/l is the emission limit value.

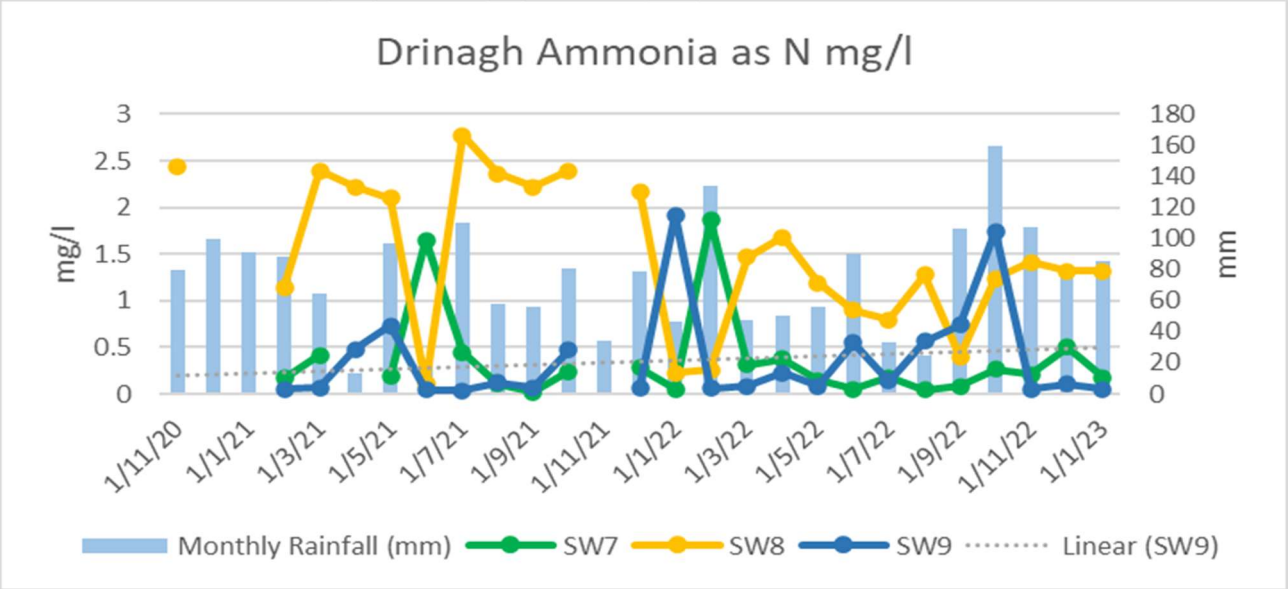

Figure AP13.2. Ammonia concentrations in water sampling from Drinagh from different discharge points. The main trigger level for ammonia is 4.53mg/l for reporting to EPA.

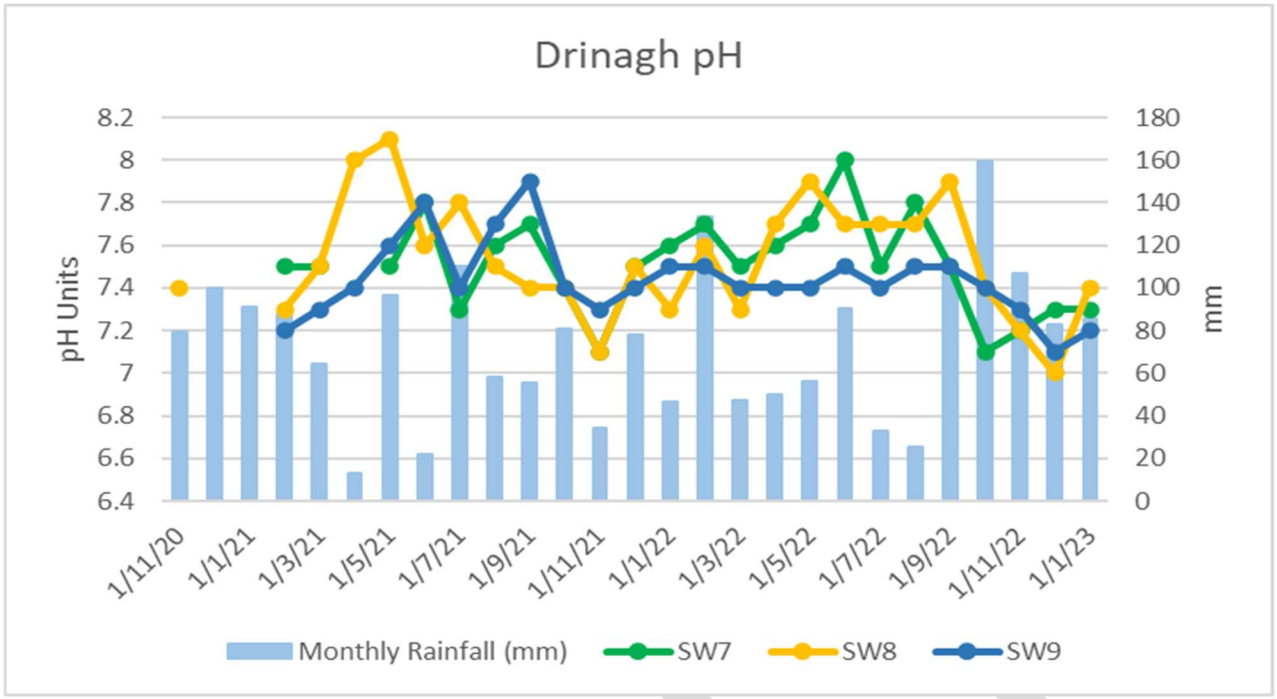

Figure AP13.3. pH concentrations in water sampling from Drinagh from different discharge points.