Bord na Móna

## Clongawney Bog

# Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2024

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

> "*The licensee shall prepare, to the satisfaction of the Agency, a fully detailed and costed plan for permanent rehabilitation of the cutaway boglands within the licensed area.*"

*This licence condition requires Bord na Móna agree with the EPA the measures that will provide for rehabilitation, i.e. stabilisation of Clongawney Bog upon cessation of peat production and complements 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 Clongawney Bog.*

*Bord na Móna have defined the key rehabilitation outcome at Clongawney Bog as environmental stabilisation.*

*Bord na Móna are currently developing a wind farm (Derrinlough Wind Farm) within parts of Clongawney Bog. This consented wind farm also includes parts of the adjacent Drinagh Bog. This development is currently under construction and the footprint of the development and associated management areas have been considered and constrained out of the rehabilitation footprint as necessary as part of this rehabilitation plan. This rehabilitation plan also outlines how the rehabilitation of the PCAS extent of Clongawney Bog will be integrated with the construction and operation of Derrinlough Wind Farm.*

*This rehabilitation plan for Clongawney Bog has been updated but not fully finalised. As such it remains a **draft** rehabilitation plan until it is fully finalised. Bord na Móna expect to finalise these rehabilitation plans in the future as part of its overall peatland rehabilitation programme.*

*Any consideration of any other future after-uses for Clongawney 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 updating the rehabilitation plan for Clongawney Bog, located south of Cloghan in west Co. Offaly, and part of the wider Boora Bog Group.
- Clongawney Bog was in industrial peat production from the 1950s up until 2019 and supplied peat to the Derrinlough Briquette Factory for many years. Industrial peat harvesting has now ceased across the whole of Clongawney Bog as of 2019.
- Clongawney Bog is proposed to undergo enhanced rehabilitation measures under the Enhanced Decommissioning, Rehabilitation and Restoration Scheme (EDRRS) also know colloquially as the Peatlands Climate Action Scheme (PCAS).
- The PCAS extent of Clongawney is contiguous with the area occupied by the footprint of the consented Derrinlough Wind Farm, which is currently under construction. Cognisance has been given to the integration of proposed rehabilitation with the ongoing construction in this regard. Construction of the consented wind farm is expected to continue until 2025.
- The majority of Clongawney Bog comprises cutaway bog habitat, with areas of establishing pioneer vegetation. Some of the higher ground was developed as conifer forestry in the past that are leased to and managed by Coillte. Clongawney contains several mineral islands (areas of glacial material that were never covered with peat) which developed as native Oak-Ash-Hazel woodland or were used as farmland in the past. These relic woodlands are still present and add significantly to the overall biodiversity value of the site.
- Several areas of Clongawney have been rehabilitated in the past, including the area referred to as Clongawney Lake, which was created in 2000. Clongawney Bog is gravity-drained. There are no existing pumps within Clongawney Bog. There was one number diesel pump in operation on this site during peat production operation, which has since been removed.
- This rehabilitation plan has been prepared by Bord na Móna as part of obligations to carry out peatland rehabilitation via an IPC Licence issued by the Environmental Protection Agency.
- The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat (putting a “skin” back onto the peat), and minimising effects to downstream waterbodies.
- It will take some time for vegetation and habitats to fully develop at Clongawney, and a peatland ecosystem to be restored. However, it is expected that any bare peat will be developing pioneer habitats after 5-10 years.
- Rehab measures will include drain-blocking and other measures to raise water levels to the surface of the bog, thus encouraging the development of naturally functioning cutaway peatland habitats.
- Areas with deeper residual peat have the capacity to regrow *Sphagnum* moss again, where there are suitable hydrological conditions. *Sphagnum* is a key species for restoring naturally functioning raised bog conditions.
- These rehabilitation measures will be planned by a team consisting of expert ecologists, hydrologists and engineers. It is a guiding principle of Bord na Móna rehabilitation planning that no actions or activities will be undertaken that would negatively impact on adjacent land. No boundary drains will be blocked. Water will still leave the bog via the existing outlets.
- Peatland rehabilitation of this bog will bring a range of benefits to the local community via improvements to the local landscape and is also important for supporting national policies and strategies in relation to reduction of carbon emissions from these peatlands, supporting biodiversity and improvements to water quality.

- Rehabilitation at Clongawney will result in improved water quality, climate benefits with the reduction of carbon emissions and enhanced biodiversity when the residual peat is re-wetted.
- Many Bord na Móna bogs cannot be restored back to raised bog, as the majority of peat has been removed and the environmental conditions have been modified. However other natural habitats will develop, like poor fen and regenerating wet deep peat vegetation (on deeper peat); and wetlands with reedbeds and birch woodland on shallower peat. In time, a naturalised peatland can be developed.
- The development of a range of habitats at Clongawney Bog will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. Rehabilitation 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.
- This peatland rehabilitation plan does not outline current or future after-use or development. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments. Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the bog.

# 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). As part of Condition 10.2 of this licence, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Clongawney Bog is a part of the Boora bog group (see Appendix II for details of the bog areas within this Group), located within western County Offaly.

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 (Appendix VI).
- The planned rehabilitation goals and outcomes.
- The scope of the rehabilitation plan.
- Criteria which define the successful rehabilitation and key targets to validate rehabilitation.
- Proposed rehabilitation actions.
- Proposed timeframe to implement these measures.
- Budget and Costings.
- Associated aftercare, maintenance, and monitoring.

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

Bord na Móna announced the complete cessation of industrial peat production across its estate in January 2021. This document seeks to address the requirements of Condition 10.2 of IPC Licence Ref. P0500-01:

> "*The licensee shall prepare, to the satisfaction of the Agency, a fully detailed and costed plan for permanent rehabilitation of the cutaway boglands within the licensed area.*"

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

This draft rehabilitation plan outlines the proposed approach to be taken for IPC compliance in respect of Clongawney Bog, and how the site will be rehabilitated. Notably Bord na Móna are in the process of constructing a wind farm (Derrinlough Wind Farm) within Clongawney Bog. This wind farm development also includes part of the adjacent Drinagh Bog. This rehabilitation plan outlines how the area to be rehabilitated within Clongawney Bog (excluding Drinagh) will be integrated with the construction and operation of the wind farm.

For the avoidance of doubt this draft rehabilitation plan now supersedes any previous draft rehabilitation plan submitted in support of the planning application for Derrinlough Wind Farm.

Further details of the Derrinlough Wind Farm development can be obtained at the project website: www.derrinloughwindfarm.ie. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control (IPC) Licence.

It has been proposed by the Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme (EDRRS) on a number of its peatlands. This proposal is also known colloquially as the 'Peatlands Climate Action Scheme' (PCAS). The additional costs of the scheme will be supported by the 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. The Peatlands Climate Action Scheme is expected to operate between 2021-2025. Over 15,000 ha of cutaway peatlands have been rehabilitated as part of this scheme to date across multiple Bord na Móna peatlands. 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.

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 bunding,
- re-profiling that will deliver suitable conditions for development of wetlands, fens and bog habitats,
- targeted fertiliser applications,
- seeding of targeted vegetation, and
- proactive inoculation of suitable peatland areas with *Sphagnum.*

These are collectively designed to optimise hydrological conditions (ideally and where possible water-levels <10 cm) for climate action benefits and to accelerate the trajectory of a given bog 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 bog (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 bog returns to a naturally functioning peatland ecosystem. 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.

Clongawney Bog is proposed to be part of this Scheme (PCAS) and this Rehabilitation Plan outlines the specific approach to be taken.

## 1.1 Constraints and Limitations

This document covers the area within the **Clongawney Bog** boundary.

Bord na Móna are developing a wind farm (Derrinlough Wind Farm) within Clongawney Bog. The previously consented wind farm also includes part of the adjacent Drinagh Bog. Further details and the EIAR of the development, which is currently under construction, can be obtained at www.derrinloughwindfarm.ie. The PCAS

extent of Clongawney is contiguous with the area occupied by the partial footprint of the wind farm development. Cognisance has been given to the integration of proposed rehabilitation with the ongoing construction in this regard. Construction of the wind farm is expected to continue until 2025. The rehabilitation plan outlines how the area to be rehabilitated within Clongawney Bog will be integrated with the construction and operation of the wind farm.

Pockets of Clongawney Bog toward the northern and western perimeters 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 Clongawney Bog. Nevertheless, Bord na Móna are aware of such issues which may constrain the proposed rehabilitation actions, and this rehabilitation plan considered potential impacts of these on the delivery of the stated objectives.

Rehabilitation in parts of the bog may be constrained due to property issues or archaeological features. There are known rights of way around the margins of Clongawney bog, with amenity trails also proposed as part of the Derrinlough Wind Farm. Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remains intact where possible. In some instances, depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies during the consultation work associated with the decommissioning and rehabilitation work described here.

A small area of the bog has been excluded from the PCAS rehabilitation plan due to archaeological constraints.

The plantation forestry on the bog is managed by Coillte, with both commercial production of timber and biodiversity as the main management objectives. Coillte woodland has been identified as constrained land on the rehab plan and will not be affected by rehabilitation measures.

A native woodland comprised of oak (1.2ha) was planted in the southwest area of in Clongawney bog, just north of the Madden Derries mineral island, in 2007 as part of a Bord na Móna Native Woodland Scheme. These areas are considered rehabbed and have been excluded from the rehab plan.

# 2 METHODOLOGY

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

The ecological information and general bog information collected during the Bord na Móna ecological baseline surveys, additional site visits (covering the period 2009 to 2024 inclusive) and monitoring and desktop analysis, forms the basis for the development of this rehabilitation plan for the bog along with:

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016);
- Significant international engagement during this period with other counties in relation to best-practice regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al*., 2019);
- Consultation and engagement with internal and external stakeholders;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and peat depth data;
- Hydrological modelling;
- The development of a Methodology Paper 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 Cloonshannagh Bog, in particular, optimising climate action benefits.

## 2.1 Desk Study

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

- Anderson *et al*. (2017). An overview of the progress and challenges of peatland restoration in Western Europe.
- Barry, T.A. et al (1973). A survey of cutover peats and underlying mineral soils. Soil Survey Bulletin No. 30. Dublin, Bord na Móna and An Foras Taluntais.
- Bonn *et al*. (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al*. (2009). *Sphagnum* in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al*. (2003). The Wetland Restoration Manual.
- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Feehan, J. (2004). A long-lived wilderness. The future of the north midlands peatland network. Department of Environmental Resource Management, UCD.

- Foss, P.J., Crushell, P. & Gallagher, M.C. (2017) Title: Counties Longford &Roscommon Wetland Study. Report prepared for Longford and Roscommon County Councils.
- Gann *et al*. (2019). International Principles and Standards for the practice of Ecological Restoration.
- Hinde *et al*. (2010). *Sphagnum* re-introduction project: A report on research into the re-introduction of *Sphagnum* mosses to degraded moorland. Moors for the Future Research Report 18.
- Joosten & Clarke (2002). Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making.
- Lindsay (2010). Peatbogs and Carbon: A Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al*. (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al*. (2011). The Fen Management Handbook (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Pschenyckyj et al., 2021, Optimising Water Quality Returns from Peatland Management while Delivering Co-Benefits for Climate and Biodiversity. An Fóram Uisce.
- 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 bog group Integrated Pollution Control Licence;
- Boora bog group Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) webmapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database (www.epa.ie);
- EPA Guidance on Requests for Alterations to a Licensed Industrial or Waste Activity;
- BirdWatch Ireland online data (including I-WeBS and CBS datasets; www.birdwatchireland.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);

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

## 2.2 Consultation

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

## 2.3 Field Surveys

Bord na Móna carried out a baseline ecological survey of all of its properties in 2009-2012 and developed habitat maps. As part of this exercise, Clongawney Bog was surveyed in 2009 and 2010. Habitat maps were updated in 2017. Additional ecological walkover surveys and visits have taken place between 2010-2024, in advance of the preparation of this rehabilitation plan. Habitat maps have been updated, where required. This rehabilitation plan is informed by the original baseline survey as well as subsequent confirmatory site walk-over surveys and visits, and updates to baseline data.

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

A detailed ecological survey report for Clongawney Bog is contained in Appendix III.

# 3 SITE DESCRIPTION

Clongawney Bog is located south of Cloghan in west Co. Offaly. Clongawney is approximately 3km south of Cloghan and 6km north of Birr town (Grid reference: N 06440 14303). It is part of the wider Boora Bog Group (Ref. P0500-01).

The surrounding landscape is dominated by a mosaic of farmland, largely consisting of improved grassland, along with small areas of commercial forestry, and other raised bogs, including Drinagh to the east and Galros to the south, both of which are owned and managed by Bord na Móna. The bog is divided into several sections by the blocks of forestry located at the centre of the site and a railway which crosses the site in a northwest - southeast orientation.

Clongawney bog has a heterogeneous topography, with a mosaic of ridges, mounds and basins. Some of the higher ground within Clongawney was developed as conifer forestry in the past, managed by Coillte, with both commercial production of timber and biodiversity as the main management objectives. Clongawney contains several mineral islands (areas of glacial material that were never covered with peat) which have developed as small areas of native Oak-Ash-Hazel woodland (>180 years old) or were used as farmland in the past. These relic woodlands are still present and add significantly to the overall biodiversity value of the site.

Several areas of Clongawney have been rehabilitated in the past including the area referred to as Clongawney Lake, which was created in 2000. Since the cessation of peat extraction the cutaway has been developing a typical heterogeneous mosaic of pioneer cutaway habitats that reflect the underlying environmental conditions of the bog.

The total combined area of Clongawney bog is 991 ha, however the extent included in the PCAS rehabilitation is 743 ha. The remainder of the site is constrained out for the Derrinlough Wind Farm, which is currently under construction at the site, as well as several areas leased to Coillte for conifer plantation forestry, areas of native tree-planting, known archaeology, turbary/turfcutting and existing silt ponds. Notably the PCAS rehabilitation footprint does not overlap the Derrinlough Wind Farm development footprint.

See Drawing number *BNM-DR-25-04-RP-01: Site Location Map*, included in the accompanying Mapbook[1], which illustrates the location of Clongawney Bog in context to the surrounding area.

## 3.1 Status and Situation

### *3.1.1 Site history*

Clongawney Bog was brought into industrial peat production in the 1950s and supplied the Derrinlough Peat Briquette Factory for many years. The bog was in industrial peat extraction up until 2019. Industrial peat extraction has ceased over the whole of the bog.

Several conifer plantations were established on this site in the 1980's by Coillte, with the forestry being leased by Coillte. Stands of mainly Lodgepole Pine and Sitka Spruce were planted, with Oak and Birch also planted on part of the plantation. No management practices such as thinning or weed control has been carried out since planting took place. A native woodland scheme has also been planted in Clongawney in 2007 comprising Oak (1.2 ha).

[1] Cutaway Bog Decommissioning and Rehabilitation Plan – Clongawney Bog Map Book

Several areas of Clongawney have been rehabilitated in the past. Notably Clongawney Lake was created along the eastern boundary in 2000 by blocking an outfall and allowing a basin that had formed through peat extraction to fill with water. In addition, a small area of residual deep peat within the south-east was re-wetted in 2017 using an intensive drain blocking programme.

The majority of Clongawney Bog is now cutaway, with most of the original raised bog now removed. Some small remnant areas of raised bog remain around the fringes.

### 3.1.2 Current land-use

All industrial peat production at Clongawney Bog has ceased as of 2019. It is noted that there is some private sod-peat production around the margins of the high bog, both inside and outside the ownership of Bord na Móna. Turbary is ongoing within areas near the northern and western perimeters.

Some peat stocks are still present on the bog. An active rail line is operational between Clongawney and other bogs in the Boora Group. Decommissioning of this infrastructure will take place when the remaining peat stocks have been removed from the bog.

Clongawney Bog will be part of the Derrinlough Wind Farm. This project is currently under construction. Any proposed rehabilitation measures will be integrated to enable this and any future renewable energy development.

There are known rights of way around the margins of Clongawney bog, with amenity trails also proposed as part of the Derrinlough Wind Farm.

Parts of the bog are used for commercial conifer plantation by Coillte, with both commercial production of timber and biodiversity as the main management objectives.

### *3.1.3 Site Development*

As of February 2024, construction of the Derrinlough Wind Farm is underway, consisting of 21 wind turbines, a 110kv substation, two met masts and all associated infrastructure across both Clongawney and the adjacent Drinagh bogs. Details of this planning application are available at www.derrinloughwindfarm.ie. Within Clongawney, a total of 11 turbines are proposed as part of the Derrinlough Wind Farm, along with temporary construction compounds, a met mast, internal site roads and amenity pathways, two permanent underpasses in the townland of Derrinlough, one beneath the N62 and one beneath an existing railway line and ancillary works.

The remaining cutaway of the site will be left relatively undisturbed by the development. This draft rehabilitation plan will be applicable to those areas outside of the windfarm footprint and has also been considered in the context of the design, layout and construction of the proposed wind farm infrastructure.

An amenity plan was also included as part of the proposed Derrinlough Wind Farm planning application. This will consist of pathways (walking/cycling) through parts of Clongawney Bog.

### *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.

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In respect of Clongawney Bog, jobs included in the above study would have included those to facilitate peat extraction for the supply of peat for West Offaly Power and Derrinlough Briquette Factory.

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

## 3.2 Geology and Peat Depths

### *3.2.1 Sub-soil geology*

GSI[2] data indicates that Clongawney Bog is underlain entirely by Waulsortian Limestones (massive unbedded lime-mudstone). Geological Survey of Ireland (GSI) mapping also identifies several karst features (spring, swallow hole and superficial solution feature) within 1km of the bog (north and east). No data exists concerning depth to bedrock, however, there are some small pockets of bedrock outcrop identified within 1km of the bog (to the west and north-west).

Quaternary Sediment maps show Clongawney underlain by peat and several pockets of limestone till in the centre and south of the site with the majority of the site surrounded by inorganic deposits, most notably limestone till,

[2] https://www.gsi.ie/en-ie/data-and-maps/Pages/Bedrock.aspx

although there are some pockets of gravels derived from limestones to the north-west, south-west and south-east.

#### 3.2.2 *Peat type and depths*

Much of Clongawney Bog is now cutaway and the majority of the original raised bog now been removed. Clongawney is considered to have relatively shallow residual peat, and the majority of the bog is estimated to have peat deposits remaining of between (<1m). However pockets of deep peat remain, with peat thickness of up to 4.5m recorded in some areas. Pockets of deeper peat are present in the south/south-east, east and north-west.

## 3.3 Key Biodiversity Features of Interest

#### *3.3.1 Current habitats*

The most common vegetation communities/ habitats[3] within the PCAS rehabilitation extent include:

- Bare peat (0-50% vegetation cover) (BP) (plate 3-1)
- Pioneer poor fen communities (pJeff, pEang, pTrig, pJbulb) (plate 3-2)
- Dry grassland dominated by Purple Moorgrass (gMol) (plate 3-5)
- *Betula pubescens*-dominated scrub (eBir, cBir).
- Conifer plantation forestry (WD4) (plate 3-5)
- Dry heath dominated by Ling Heather (*Calluna vulgaris*) (dHeath) (plate 3-4)
- Open water (OW) (plate 3-6)
- Disturbed vegetation (DisWill, DisCF)
- Silt-pond areas (Silt) with silt ponds and associated spoil heaps and access tracks
- Oak-Ash-Hazel Woodland (WN2)

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

- Other fringe habitats around the margins of the bog include scrub (Birch-dominated with some Scots Pine)
- Birch woodland (WN7) and cutover bog (active and abandoned)
- Conifer plantation forestry (WD4)

In addition to the above, there is one large lake, created in 2000 by blocking an outfall and allowing a basin that had formed through peat extraction to fill with water (plate 3-6). Clongawney also has note-worthy relatively acidic water chemistry, which has influenced the re-colonisation of *Sphagnum* moss species in drains connected to the lake (the majority of Boora lakes are mesotrophic or developing marl lakes).

Birch and Willow scrub is prominent in the drier areas along with pioneer fen containing Soft Rush and Common Bog Cotton (see Plate 3-5). Pockets of wetlands are developing across Clongawney where drainage has been impeded. Indicators of rich fen are also present, which add to the overall biodiversity value. A small wetland area

[3] Codes refer BnM classification of pioneer habitats of production bog, or Heritage Council habitat classification, Fossitt 2000, where relevant.

in the centre of the site has developed some rich fen indicators (see Plate 3-3). This area is of particular biodiversity interest. This area has significant potential to develop habitats with important nature conservation interest and potential to qualify as EU habitats Directive Annex I alkaline fen habitat in the future.

Other fragmented and minor patches of Open water (OW), Reedbeds (pTyp, pPhrag), Dry Heath (dHeath) and dry disturbed/pioneer communities (DisCF, DisWill) occur around the site (plates 3-2 – 3-6).

There is some built land (BL3) with paths accessing works areas and a mobile phone mast in the SE section. Rail-lines crossing Clongawney can also be classified as BL3. Silt Ponds are located to the NE and SW of the bog. Alongside the silt ponds are linear mounds of excavated material that run parallel to the ponds. This spoil is a mixture of glacial material, limestone and marl.

Several large areas of conifer forestry (WD4) (approximately 98ha in total) have been planted at various locations around Clongawney, on peat and on some of the mineral mounds, some of which has failed and is beginning to develop native scrub.

Clongawney also contains four relatively small areas of native woodlands (180yrs +) with mature Oak, Ash and Hazel and Bluebell ground cover, which developed on glacial 'islands' that were never covered with peat. Oak-Ash-Hazel Woodland (WN2) is present on several small mineral mounds and another mound contains some mature dense Hazel and Blackthorn scrub (WS1). There are small areas of grassland (gCal) associated with these mineral mounds, and also with the access routes such as the railways and around the mobile phone mast area.

See Appendix III for more detail on site, habitats and local features.

See Drawing number *BNM-DR-25-04-RP-17: Clongawney Bog Current Habitat Map*, included in the accompanying Mapbook, which illustrates the habitats at Clongawney Bog.

*Table 3-1: Photos of Habitats at Clongawney*

| Photos of Habitats at Clongawney (2024) | |
|---|---|
|  |  |
| *Plate 3-1 Bare peat dominated habitat within former production area in the southern part of Clongawney. Residual areas of deep peat are present within this area.* | *Plate 3-2 Area of Poor Fen habitat within the central part of Clongawney.* |
|  |  |
| *Plate 3-3 Existing wetland area within the central part of Clongawney.* | *Plate 3-4 Remnant dry heath habitat within the central are of Clongawney.* |
|  |  |
| *Plate 3-5 Bare peat habitat with establishing Molina and pioneer Juncus effusus (pJeff) in the western area of Clongawney. Two areas of Coillte managed forestry are visible in the background.* | *Plate 3-6 Clongawney Lake within the south-eastern area of Clongawney. This feature was created in 2000 by blocking an outfall and allowing a basin that had formed through peat extraction to fill with water.* |

### *3.3.2 Species of Conservation Interest*

A number of species of conservation concern have been recorded at Clongawney Bog. The following is a summary of the records of these species available within both BnM records and those of the National Biodiversity Data Centre. Evidence of multiple mammal species has been recorded on or in close proximity to the bog including Pine Marten (*Martes martes*), Badger (*Meles meles*), Red Fox (*Vulpes vulpes*), Rabbit (*Oryctolagus cuniculus*) and Irish Hare (*Lepus timidus subsp. hibernicus*), Eurasian red squirrel (*Sciurus vulgaris*) and Fallow Deer (*Dama dama*).

Marsh Fritillary was recorded in the potential rich fen area in June 2010 and adjacent to a number of tracks and boundary habitats in 2018, when 24 larval webs were located. A follow-up survey in 2019 recorded 80 larval webs in total, within a number of locations within Clongawney Bog. It is listed on Annex II of the EU Habitats Directive and is a species of significant conservation importance. Areas of habitat identified as being important for this species were identified within the EIAR for the Derringlough Wind Farm project and have been specified as biodiversity areas/ ecological restriction zones, to be retained and protected during the construction phase of the project.

Dingy Skipper butterfly is widely distributed through Clongawney on gravelly mounds. This butterfly species has a restricted distribution in Ireland.

Clongawney Lake in the south-east has been used since it flooded in c.2000 by a breeding colony (of varying size) of Black-headed Gulls (red-listed species). The colony size peaked at c.30 pairs of Black-headed Gulls during 2017, although it is not considered likely that these birds bred successfully (refer to Chapter 7: Ornithology of the EIAR for Derrinlough Wind Farm). Three pairs were present at the lake in 2018 and two pairs were present in 2019.

Clongawney Bog was being used by an estimated six pairs of breeding Lapwing (Red-listed species) during surveys carried out in summer 2018. These breeding waders were mainly found within the central part of Clongawney associated with wetlands. One Woodcock territory was also identified within Clongawney Bog in 2018, towards the western side of the site.

Clongawney Bog is also known to be used occasionally by Whooper Swan, Hen Harrier, Merlin and Peregrine in the winter (refer to Chapter 7: Ornithology of the EIAR for Derrinlough Wind Farm).

In addition, numerous bird species are known to use the cutover bogs in Ireland's midlands as breeding grounds, wintering grounds or both. Heron (*Ardea cinerea*), Mallard (*Anas plathrhynchos*), Kestrel (*Falco tinnunculus*), Skylark (*Alauda arvensis*), Wood Pigeon (*Columba palumbus*), Meadow Pipit (*Anthus pratensis*), Pheasant (*Phasianus colchicus*), Hooded Crow (*Corvus cornix*), Blue Tit (*Cyanistes caeruleus*), Wren (*Troglodytes troglodytes*), Pied Wagtail (*Motacilla alba yarrellii*) and Swallow (*Hirundo rustica*) have all been recorded during BNM ecology surveys.

NBDC records for red-listed[4] bird species of conservation concern recorded within a custom polygon overlapping the Clongawney Bog boundary include; Common Kestrel (*Falco tinnunculus*) and Eurasian Woodcock (*Scolopax rusticola*). Amber listed species Black-headed Gull (*Larus ridibundus*) and Mallard (*Anas platyrhynchos*) have also been recorded. The Annex I listed species of the EU habitats directive Peregrine Falcon (*Falco peregrinus*) has also been recorded within this custom polygon.

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

Peatland rehabilitation may result in positive quality effects on the relative abundance or proportion of species of conservation concern utilising bogs post rehabilitation. This may include Red or Amber listed species of breeding wader along with wintering species including Swans and other wildfowl.[5]

### *3.3.3 Invasive species*

A population of Fallow Deer are present within Clongawney Bog. No records of high impact invasive species have been recorded at Clongawney Bog. A broad range of common garden escapes are also occasionally present around the margins of Bord na Móna bogs. Although spatial overlap with the proposed rehabilitation work is expected to be limited, these are, where necessary, to be treated in line with best practice during rehabilitation.

## 3.4 Statutory Nature Conservation Designations

There are no European Sites i.e. Special Areas of Conservation (SAC) or Special Protection Areas (SPA), located within or adjacent to Clongawney Bog. The nearest EU Designated sites to Clongawney Bog are as follows:

- River Shannon Callows SAC (site code: 000216) – approx. 2.4km to the north-west
- Middle Shannon Callows SAC (site code: 004096) – approx. 2.4km to the north-west
- All Saints Bog and Esker SAC (site code 000566) – approx. 3.2km to the south-west
- All Saints Bog SPA (site code 004103) – approx. 3.2km to the south-west
- Ridge Road, SW of Rapemills SAC (site code: 000919) - approx. 4km to the south-west
- Dovegrove Callows SPA (site code: 004137) - approx. 4.7km to the south
- River Little Brosna Callows SPA (site code: 004086) - approx. 5km to the south-west

A number of NHAs (Natural Heritage Areas) and pNHA's (Proposed Natural Heritage Areas) also occur within 5km of Clongawney Bog including:

- Lough Coura pNHA (Site code: 000909) - lies directly adjacent to the south-eastern boundary of Clongawney Bog;
- Banagher (Domestic Dwelling, Occupied) pNHA (Site code: 000567) – approx. 675m north;
- River Shannon Callows pNHA (Site code 000216) – approx. 2.3km to the north-west; also designated as an SAC and SPA, see above ;
- All Saints Bog And Esker pNHA (Site code: 000566) - approx. 3.1km to the south-west;
- Ross And Glenns Eskers pNHA (Site code: 000920) – approx. 3.2km south-west;
- Woodville Woods pNHA (Site code: 000927) – approx. 3.2km south-west;
- Ridge Road, SW Of Rapemills pNHA (Site code: 000919) lies approximately 4km to the south-west
- Dovegrove Callows pNHA (Site code: 000010) lies approximately 4.8km to the south-west

### *3.4.1 Other Nature Conservation Designations*

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

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

There are no Ramsar sites within close proximity (the nearest, Mongan Bog, is over 13km away) to Clongawney Bog.

See drawing *BNM-DR-25-04-RP-23: Clongawney Bog Proximity to Designated Sites* in the accompanying map book.

## 3.5 Hydrology and Hydrogeology

Clongawney forms part of the Lower Shannon Catchment (Catchment ID: 25B) and Lower Shannon Catchment (Catchment ID: 25A) as defined by the EPA under the Water Framework Directive (WFD) and is primarily situated within the Shannon [Lower]_SC_040 and BROSNA_SC_080 sub-catchment, with a small pocket of the bog falling within the Shannon [Lower]_SC_030 sub-catchment.

There are six mapped EPA watercourses within the boundary of Clongawney bog. The Madden's Derry (EPA Code: 25M76) stream flows in a northernly direction inside the northern bog boundary. This watercourse flows into the Little (Cloghan) (EPA Code: 25L01) and then Brosna Flow Network downstream, which flows in a north-westerly direction outside the western site boundary, eventually discharging to the River Shannon (Lower). The Industrial Railway Derrinlough (EPA Code: 25I29) stream flows in a south-easterly direction inside the north easterly bog boundary. This watercourse flows into the Little (Cloghan) and then river Brosna downstream, which flows in a north-westerly direction outside the northern bog boundary, eventually discharging to the River Shannon (Lower).

The Derrymullin and LoughDerry (EPA Code: 25D98) stream flows in a south-easterly direction inside the eastern site boundary. This watercourse flows into the Little (Cloghan) and then Brosna Flow network downstream, which flows in a north-westerly direction outside the eastern bog boundary, eventually discharging to the River Shannon (Lower). The Mullaghakaraun_Bog (EPA Code: 25M48) stream flows inside and along the boundary of the bog, before flowing in a south-westerly direction into the Rapemills River (EPA code: 25R01), which flows in a north-westerly direction, eventually discharging to the River Shannon (Lower).

The Feeghroe or Mountcarteret (EPA Code: 25F41) stream flows in a south westerly direction inside the site boundary. This watercourse eventually flows into the Rapemills River (EPA code: 25R01). The Grants Island (EPA Code: 25Y47) stream flows in a north-westerly direction inside the Northern bog boundary. This watercourse then discharges to the River Shannon (Lower).

Clongawney Bog is now entirely gravity-drained, with no active pumps present within bog boundary. Previously a single pump was in operation in the north-east corner of the bog, during the period of industrial peat production at the bog, however this has since been removed.

Hydrological modelling (*BNM-DR-25-04-RP-09: Depression analysis*) indicates that parts of the bog are in natural basins with significant potential for re-wetting, with the assumption that all drains would be blocked. It is likely that a portion of the basins in target areas will re-wet with deeper water, creating a mosaic of wetland habitats, when drains are blocked.

GSI data indicates that Clongawney Bog is underlain entirely by Waulsortian Limestones (massive unbedded lime-mudstone), which is classified as a locally important aquifer – bedrock which is moderately productive only in local zones. Geological Survey of Ireland (GSI) mapping identifies several karst features (spring, swallow hole and superficial solution feature) within 1km of the bog (north and east) including a spring (Kilcannin Holy Wells) approximately 0.7km to the north of Clongawney Bog. A number of mapped Mushroom Rock features also occur in proximity to the bog to the north and east. No data exists concerning depth to bedrock.

No data exists concerning depth to bedrock, however, there are some small pockets of bedrock outcrop identified within 1km of the bog (to the west and north-west).

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

Clongawney bog is located in an area mapped by GSI as of Moderate groundwater vulnerability (GSI Map viewer). Groundwater vulnerability for the area surrounding Clongawney Bog is variable between areas of 'Extreme', 'High' and 'Moderate' vulnerability, with some areas of 'Rock near surface or karst (X)' also noted. Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability maps are based on the type and thicknesses of subsoils (sands, gravels, glacial tills (or boulder clays), peat, lake and alluvial silts and clays), and the presence of karst features. Groundwater is most at risk where the subsoils are absent or thin and, in areas of karstic limestone, where surface streams sink underground at swallow holes. These data indicate there is generally low risk of any groundwater contamination occurring at this site. Groundwater Vulnerability is typically used to indicate the susceptibility to groundwater pollution.

## 3.6 Emissions to surface-water and watercourses

Clongawney Bog has 4 treated surface water outlets from a previously active peat extraction catchments, all which discharge to either the Rapemills River (EPA code: 25R01) or the Little (Cloghan) River (EPA code: 25L01).

The Little (Cloghan) river is classed as at Moderate water quality status with the downstream River Brosna (IE_SH_25B091200 BROSNA_140) at Moderate Status also. The Rapemills river is classed as at Moderate Status (Ecological Status or Potential SW 2016-2021) – Water Framework Directive, (*BNM-DR-25-04-RP-WQ01: Water Quality Map*).

The locations of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the attached water quality map (*BNM-DR-25-04-RP-13: General Drainage Map*).

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.

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

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

From an analysis of any results over number of years of the IPC licence environmental monitoring of some of the discharges from this bog, these indicate that results were under the Emission Limit Value for Suspended Solids 100% of the period, 90% compliance for COD and under the trigger level for Ammonia.

Ammonia averaged 0.652mg/l and ranged from 0.06 to 1.5mg/l with Suspended Solids ranging from 5 to 15 mg/l and averaging 5.6mg/l.

*Table 3-2 Decommissioning and Rehabilitation Programme Water Quality Monitoring.*

| Bog | SW | Monitoring | pH | SS | TS | Ammonia | TP | COD | Colour |
|---|---|---|---|---|---|---|---|---|---|
| Clongawney | SW-1 | Q3 16 | 7.5 | 5 | 256 | 0.79 | 0.05 | 79 | 124 |
| Clongawney | SW-3 | Q3 16 | 7.9 | 5 | 298 | 1.4 | 0.05 | 52 | 116 |
| Clongawney | SW-4 | Q3 16 | 7.2 | 5 | 274 | 0.12 | 0.07 | 67 | 243 |
| Clongawney | SW-5 | Q3 16 | 7.7 | 6 | 244 | 0.73 | 0.05 | 47 | 132 |
| Clongawney | SW-1 | Q3 17 | 7.6 | 5 | 266 | 0.93 | 0.05 | 63 | 166 |
| Clongawney | SW-3 | Q3 17 | 7.8 | 9 | 282 | 1.5 | 0.05 | 44 | 119 |
| Clongawney | SW-4 | Q3 17 | 7.4 | 5 | 246 | 0.06 | 0.05 | 116 | 319 |
| Clongawney | SW-5 | Q3 17 | 7.6 | 5 | 234 | 0.7 | 0.05 | 55 | 111 |
| Clongawney | SW-1 | Q2 19 | 7.3 | <5 | 250 | 0.2 | <0.05 | 130 | 330 |
| Clongawney | SW-3 | Q2 19 | 7.6 | <5 | 336 | 1.6 | 0.06 | 40 | 75 |
| Clongawney | SW-4 | Q2 19 | 7.8 | 8 | 256 | 0.3 | <0.05 | 89 | 113 |
| Clongawney | SW-5 | Q2 19 | 7.8 | <5 | 276 | 0.33 | <0.05 | 78 | 115 |
| Clongawney | SW-1 | Q4 20 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 |
| Clongawney | SW-3 | Q4 20 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 | Note 1 |
| Clongawney | SW-4 | Q4 20 | 7.4 | 4 | 180 | 0.082 | 0.05 | 65 | 399 |
| Clongawney | SW-5 | Q4 20 | 7 | 6 | 332 | 1.33 | <0.05 | 93 | 470 |
| Clongawney | SW-1 | Q4 23 | 8 | 2 | 195 | 0.321 | <0.05 | 36 | 207 |
| Clongawney | SW-3 | Q4 23 | 7.7 | 15 | 290 | 0.776 | <0.05 | 50 | 367 |
| Clongawney | SW-4 | Q4 23 | 7.5 | 2 | 295 | 0.392 | <0.05 | 69 | 305 |
| Clongawney | SW-5 | Q4 23 | 7.1 | 3 | 283 | 0.181 | <0.05 | 83 | 488 |
| | | | | | | | | | |
| Note 1. No sample due to flooded access | | | | | | | | | |

Rehabilitation of cutaway peatland is closely linked with control of emissions. One of the criteria for successful rehabilitation is stabilisation through re-vegetation, which will stabilise all substrates and in turn remove the need for further silt control measures. This site is already vegetated in some areas. 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 draft National River Basin Management Plan (NRBMP) 2022-2027 (DHPCLG, 2022) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). The NRBMP outlines how key actions such as the Bord na Móna peatland rehabilitation is expected to have a positive impact on water quality and help the NRBMP deliver its objectives in relation to the WFD.

Water will still discharge from designated emission points when rehabilitation at Clongawney 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 downstream water bodies. While water quality improvements assist in meeting water frameworks directive ambitions and targets, they can also improve drinking water sources in applicable catchments with drained peatlands and the potential for associated reduction in treatment requirements at drinking water treatment facilities.

**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 monthly.

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

This new sampling programme 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 Clongawney bog. These results cover the period from November 2020 to December 2023 and are from some of the surface water outlets from the sections of bog to be rehabilitated in 2024. Peat extraction ceased in this bog in 2019 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 level trend from all three outlets during the period, all well below any limits of concern. During this same period there was also no discernible trend in Ammonia for all three emission points, with all other parameters fluctuated slightly, most likely influenced by normal weather patterns, including rainfall.

Monthly ammonia concentrations from both emission points for November 2020 to December 2023 had a range of 0.027 to 1.54 mg/l with an average of 0.511 mg/l. Results for suspended solids for the same period indicated a range of 2 to 15mg/l with an average of 3.09 mg/l.

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

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

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

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

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

**Success criteria:**

The key water quality success criteria associated with this enhanced rehabilitation are as follow:

- 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.
- 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 any 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.

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

## 3.7 Fugitive Emissions to air

None - the bog is no longer in industrial peat production.

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

## 3.8 Carbon emissions

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

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

It is expected that Clongawney 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. Some parts of this bog are expected to develop as regenerating wet *Sphagnum*-rich vegetation on deep peat areas. The majority of Clongawney comprises shallower residual peat, which it is expected will develop wetland habitats on shallow peat with open water, reed swamp and fen habitats with alkaline peatland emission factors. Birch woodland and Heather is expected to further develop on the drier areas and along peripheral headlands.

## 3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

The majority of Clongawney Bog can be rated as **Local Importance (lower value) to Local Importance (higher value).** Bare peat in the former production area of Clongawney Bog is assessed as **local importance (lower value)**. Clongawney Lake, developing wetlands and the pockets of Oak-Ash-Hazel Woodland (WN2) as well as marginal habitats including, woodland, scrub, pioneer cutaway habitats and raised bog remnants may act as a refuge and as ecological corridors for wildlife and are therefore deemed to be **locally important (higher value)**.

# 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.

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

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

There has been ongoing consultation with respect to the planning and construction of Derrinlough Wind Farm as part of the planning for that particular proposed development. This website describes the project and has up to date project newsletters: www.derrinloughwindfarm.ie.

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

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

## 4.2 Issues raised by Consultees

N/A - consultation has not yet commenced.

## 4.3 Bord na Móna response to issues raised during consultation

N/A - consultation has not yet 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.
- Environmental stabilisation of the former peat production areas and mitigation of potential silt run-off.
- Stabilisation or reduction in water quality parameters of water discharging from Clongawney (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**.
- Carrying out an intensive rehabilitation measures in including drain-blocking to encourage ***Sphagnum*-rich regenerating wet deep peat vegetation** on areas of deep peat.
- Optimising hydrological conditions for the development of reed swamp and fen on shallow, more alkaline peat and other subsoils, in hydrological depressions.
- Optimising conditions for the development of woodland, scrub and heath vegetation on more elevated, shallow peat.
- Integrating rehabilitation measures with current land-use.
- Optimising hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future.
- 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:

- It will take some time for stable naturally functioning habitats to fully develop at Clongawney Bog. This will happen over a longer timeframe than the implementation of this rehabilitation plan.
- Re-wetting residual peat will initially maintain and enhance the carbon storage capacity of the bog. There is scientific consensus that restoration of hydrology in damaged bog can improve carbon storage, water storage and attenuation and help support biodiversity both within Clongawney Bog and in the catchment (See Section 3.8). This will reduce carbon emissions from a larger carbon source to a smaller carbon source. In time, Clongawney 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 Clongawney Bog 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 Clongawney Bog 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 Móna).
- Bord na Móna are also planning rehabilitation measures in the adjacent western area of Drinagh Bog in 2024, with some rehabilitation works having been previously carried out in other parts of Drinagh in 2023. 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.

# 6 SCOPE OF REHABILITATION

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

- The area of Clongawney Bog.
- EPA IPC Licence - Ref. P0500-01. As part of Condition 10.2 of this licence, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Clongawney bog is part of the Boora bog group.
- The Scheme is designed to exceed the stabilisation requirements as defined by the IPC Licence. This scheme is designed to enhance the ecosystem services of Clongawney Bog, 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 Clongawney Bog mean that dry cutaway measures, wetland creation along with some deep peat measures are the most suitable rehabilitation approach for this site. Clongawney Bog has relatively shallow peat remaining, with a number of small pockets of residual deep peat.
- Bord na Móna have defined the key goal and outcome of rehabilitation at Clongawney Bog as **environmental stabilisation** of the site via **optimising climate action benefits, where possible,** and integrating rehabilitation with the existing land-uses.
- Rehabilitation of Clongawney Bog 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.
- It is not proposed to carry out rehabilitation on all marginal or peripheral cutover bog zones. Generally, these bog remnants are narrow, or are subject to turbary, and do not have positive bog restoration prospects. However some marginal bog remnants will have rehabilitation measures applied.

## 6.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland).
- Drain blocking can be widespread in scale with each field drain being blocked (e.g. Kellysgrove) or more localised with targeted drain-blocking (e.g. Mountlucas Wind Farm) and both can be very effective. This can be used in conjunction with local topographical features like natural hollows to manage water levels or with other typical features of cutaway peatlands like high peat fields, which act as berms to hold water to some extent. Active management to create low berms to manage water-levels and create shallow wetland habitats dominated by emergent vegetation has also been successfully developed (e.g. Mountlucas Wind Farm, Bruckana Wind Farm, Oweninny, Lough Boora Discovery Park, Ballycon). In conjunction with the wind farm development and associated roads and embankments there will be

further opportunities to manage water-levels using the new construction as a partial embankment, where possible. Material (peat and sub-soil) side-casted from the road construction can be used to develop low berms that would then prevent the adjacent cutaway from draining directly into the drains along the roads. This technique has been used at Mountlucas and Bruckana Wind Farm. Overflow pipes will be used to maintain maximum water levels across the cutaway and allow excess surface water to flow into the drainage channels beside the roads and other infrastructure. Managing the cutaway in this way means that the cutaway can stay wet, while excess surface water can drain away through the drainage infrastructure.

- **Coillte woodland.** Some areas within Clongawney are leased to Coillte for the purposes of managed conifer forestry (see Section 3.1.1); these areas have been constrained out from the proposed rehabilitation measures.
- **Native woodland.** Areas of native woodland planting around the margins of the bog have also been mapped as constrained areas. A native woodland comprised of oak (1.2ha) was planted in the southwest area of in Clongawney bog, just north of the Madden Derries mineral island, in 2007 as part of a Bord na Móna Native Woodland Scheme. These areas are considered rehabbed and have been excluded from the rehab plan. The detailed Drainage Management Plan details the specific measures to be implemented to avoid rewetting of these areas.
- **Future land-use.** An area within Clongawney Bog will be part of the Derrinlough Wind Farm, which is currently under construction at the site. Any proposed rehabilitation measures will be integrated to enable this and any future renewable energy development. It is expected that the proposed development footprint associated with the renewable energy will be < 9% of the overall site. The potential impact of this infrastructure on the rehabilitated area is expected to be relatively minor and it does not change the overall goals and outcomes of the proposed rehabilitation (re-wetting residual peat) for the overall site. The key objective will be environmental stabilisation and re-wetting of the cutaway areas between the proposed windfarm infrastructure and/or any associated land use such as management areas etc.
- The EIAR for the proposed Derrinlough Wind Farm development details issues related to peat management during construction. In summary, during construction of access tracks, hardstands and other areas, peat is excavated from the cutaway, moved to the side, graded into berms not more than 1m and allowed to naturally re-vegetate. This has proven successful during construction of Mountlucas Wind Farm. In the event that natural re-vegetation was unsuccessful, then other measures such as re-seeding would be considered. Natural re-vegetation is likely to occur within the area constrained out of this rehabilitation plan as part of the wind farm infrastructure.
- **Features of Biodiversity Value**. A number of areas within Clongawney are known to be of value to Marsh Fritillary and have been specified as ecological restriction zones as part of the wind farm construction. Some sensitive ecological receptors if present may require protection through the provision of Environmental Restriction Zones (or ERZ's). At Clongawney Bog, ERZs have been established for Marsh Fritillary as part of the construction phase mitigation measures for Derrinlough Wind Farm; rehabilitation of the site under PCAS will avoid compromising the extent of suitable habitat for Marsh Fritillary.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care must 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.

Several marginal areas have been identified as required hydraulic breaks and have been constrained out of the rehab plan.

- **Archaeology**. There are two known archaeological features present in the western part of Clongawney Bog – a togher and a single roundwood. 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 Clongawney Bog. 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 known rights of way around the margins of Clongawney bog, with amenity trails also proposed as part of the Derrinlough Wind Farm. Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remains intact where possible. In some instances, depending upon previous land uses and management, alternative solutions may be required. These will be explored in consultation with local communities and statutory bodies during the consultation work associated with the decommissioning and rehabilitation work described here.
- **Turf-cutting.** There are pockets of domestic turf cutting along the northern and western perimeters of Clongawney. These areas will not be subject to rehabilitation measures.

## 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:

- Areas subject to turf cutting are excluded.
- The longer-term development of stable naturally functioning habitats to fully develop at Clongawney 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.
- The proposed Derrinlough Wind Farm footprint.
- Land leased to Coillte. This rehabilitation plan does not cover conifer forestry management on lands leased by Coillte. As described above, measures are detailed within the Drainage Management Plan to avoid indirect rewetting of these areas occurring.
- This plan is not intended to be an after-use or future land-use plan for Clongawney Bog.

- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.
- Previously planted native woodland areas.

# 7 CRITERIA FOR SUCCESSFUL REHABILITATION

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

The key objective of this rehabilitation plan is **environmental stabilisation** and the stabilisation of any emissions from Clongawney Bog 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 bog and encouraging a naturally functioning raised bog ecosystem; and mitigation of key emissions (e.g. potential suspended solids run-off).

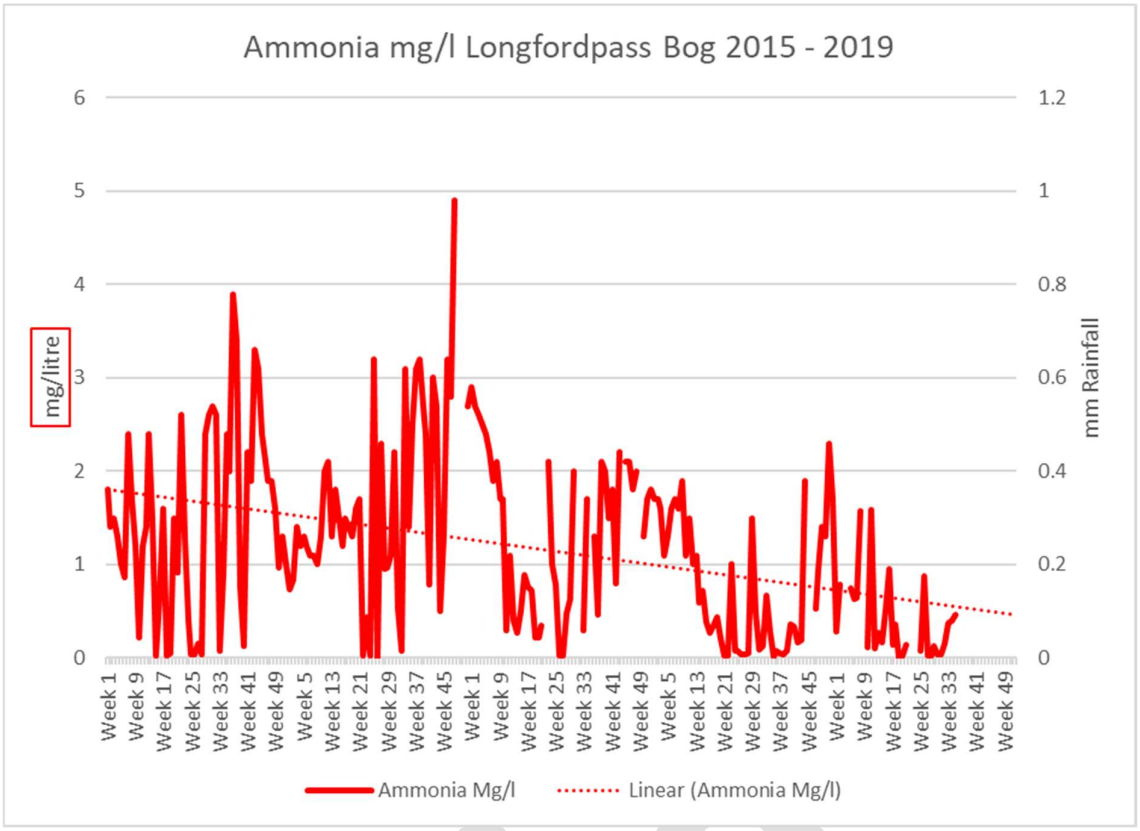
## 7.1 Criteria for successful rehabilitation to meet EPA IPC licence conditions:

- Rewetting of residual peat in the former area of industrial peat production to offset potential run off of suspended solids and to encourage and accelerate development of vegetation cover via natural colonisation, and increase in the area of potentially peat-forming habitats. See Table 7.1 for a summary of the criteria for successful rehabilitation and associated monitoring. The target will be the delivery of measures and this will be measured by an aerial survey after rehabilitation is completed.
- That there is a 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 years, 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 3 years post cessation of peat extraction with ongoing rehabilitation, indicate downward trends.

As the monthly monitoring program at Clongawney Bog continues in 2023 and during the rehabilitation works planned for 2024 further trending will be produced to verify any ongoing trends.



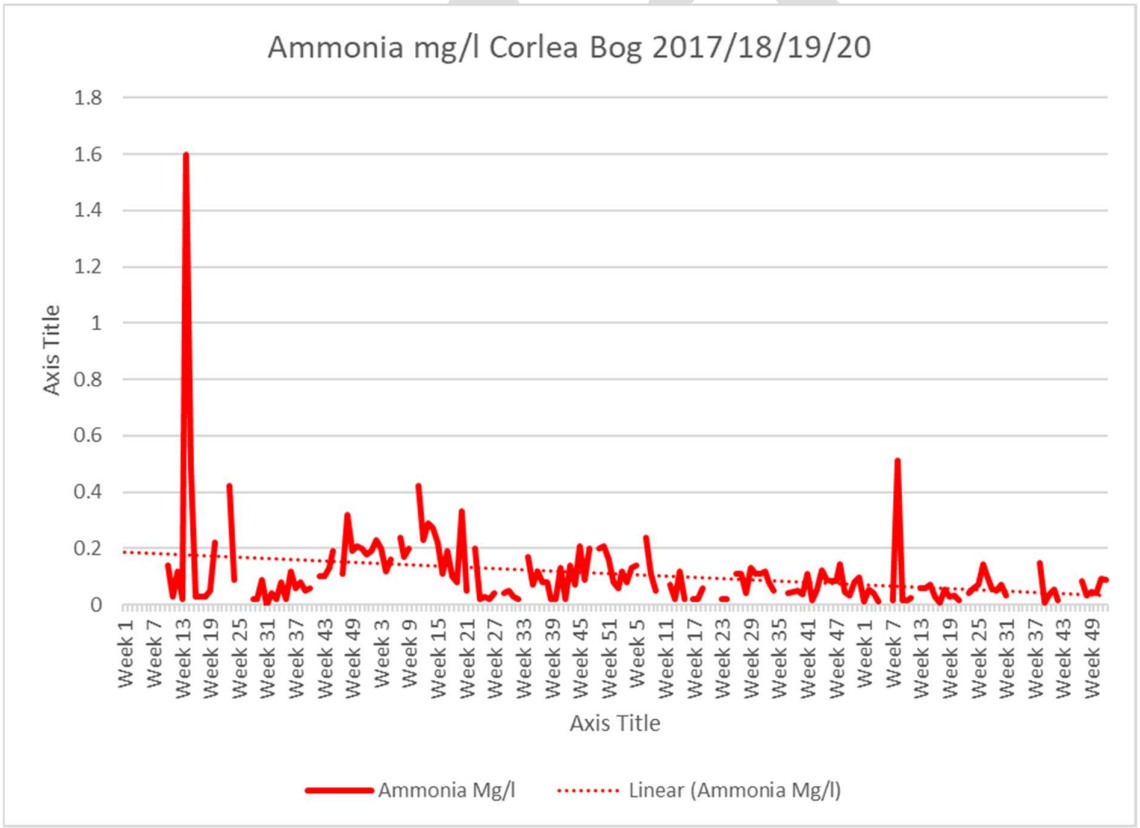




*Figure 7-1: Ammonia levels over the period 2015-2019/2020 at Longfordpass and Corlea.*

*Table 7-1: Summary of Success criteria, targets, how various success criteria will be measured and expected time-frames.*

| Criteria type | Criteria | Target | Measured by | Expected Timeframe |
|---|---|---|---|---|
| IPC validation | Rewetting in the former area of industrial drainage. | Delivery of rehabilitation measures<br>Restoration of hydrological regime. | Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking)<br>Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition. | 2024-2026 |
| IPC validation | Key water quality parameters<br>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 | 2024-2026 |
| IPC validation | Reducing pressure from drainage on the local water body catchment (WFD) | No decline in the WFD status of the local river catchment related to this bog | EPA WFD monitoring programme | WFD schedule |
| Climate action verification | Reduction in carbon emissions. | Reduction in carbon emissions | Carbon emissions – estimated using a bog condition assessment and appropriate carbon emission factors. | 2024-2026 |
| Climate action verification | Setting Clongawney Bog on a trajectory towards establishment of a mosaic of compatible habitats | Establishment of compatible cutaway habitats | Habitat map, Cutaway bog condition map<br>Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and | 2024-2026 |

| Criteria type | Criteria | Target | Measured by | Expected Timeframe |
|---|---|---|---|---|
| | | | 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).** Bord na Móna maintains a provision on its balance sheet to pay for these future costs. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.
- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.
- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practice applied internationally in peatland management. Measures proposed in this plan have already been shown to be 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 cutaway peatland takes time. Pioneer vegetation can develop relatively quickly (3-10 years) and wetland habitats can develop relatively quickly. Birch woodland make take 20-30 years to develop. However, it may take 50 years for active raised bog vegetation to re-develop on ground that was previously cutaway. Different environmental conditions will have a significant impact on the rate of natural colonisation, and as a result of the combination of different environmental conditions and the application of different rehabilitation measures, there will be a variety of habitat outcomes.
- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation and restoration has shown that re-wetting improves conditions for natural colonisation and that natural colonisation is accelerated where the environmental conditions are most suitable. Rehabilitation measures have been designed to modify the conditions of areas within sites where conditions are less suitable for natural colonisation (modifying hydrology, topography, nutrient status or availability of potential seed sources).
- **Monitoring to be robust and effective.** Rehabilitation Monitoring will be established to validate the success of rehabilitation as required by Condition 10 of the IPC Licence 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 restoration and 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 based on environmental characteristic. Hydrological modelling indicates those areas that are likely to re-wet when drains are blocked, based on the current topography. This planning is 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 rehabilitation planning and design, including aerial photography, peat depths and LiDAR surface maps, these are included in the accompanying Mapbook as the drawings referenced below:

*BNM-DR-25-04-RP-22: Clongawney Bog Aerial Imagery 2020*

*BNM-DR-25-04-RP-04: Clongawney Bog Peat Depths*

*BNM-DR-25-04-RP-03: Clongawney Bog LiDAR Map*

*BNM-DR-25-04-RP-09: Clongawney Bog Depression Analysis*

The restoration and rehabilitation measures are provisionally outlined in the drawings titled *BNM-DR-25-04-RP-05: Clongawney Bog Enhanced Rehabilitation Measures* and *BNM-DR-25-04-RP-20: Clongawney Bog Standard Rehabilitation Measures* and in the accompanying Mapbook.

These rehabilitation measures for Clongawney Bog will include the following (see Table 8.1):

- A widespread drain-blocking programme will be implemented across the cutaway, where possible. This will have to be planned in association with the wind farm infrastructure. In general, field drains will be blocked where possible to re-wet cutaway and re-wet to the optimum water-level. More intensive measures will be targeted towards the bare peat.
- There are areas of deeper peat within the southern area of Clongawney, and at the bog margins. These will be targeted for more intensive drain-blocking (max 7/100 m), with field reprofiling also where suitable. Berms are also additionally proposed within a small (0.9 ha) area at the north-eastern margins of Clongawney. Deep Peat measures will also include modifying outfalls, and management of water levels with overflow pipes and blocking of internal outfalls.
- Initial hydrological modelling indicates low lying parts 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 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, where possible.
- The water levels at the previously rehabilitated Clongawney Lake will be adjusted by means of outfall management.
- Less intensive measures (targeted drain-blocking) will be used in areas where habitats have already established.
- Regular drain blocking (3/100) will be implemented on dry cutaway along with the blocking of outfalls and management of water levels, along with organic fertiliser application (if required).

- 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.
- Targeted drain blocking will be implemented to optimise hydrological conditions/rewet the residual peat in some marginal (degraded) raised bog remnants. Additional targeted drain blocking is proposed within the previously rehabilitated areas to the south of Clongawney Lake.
- The existing silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase the silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that the silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. The silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).

*Table 8-1: Types of and areas for rehabilitation measures at Clongawney Bog. Note that the types of rehab and areas of rehab may change in response to stakeholder consultation and refinement of the rehabilitation measures.*

| Type | Code | Description | Area (Ha) |
|---|---|---|---|
| Deep peat cutover bog | DPT2 | More intensive drain blocking (max 7/100 m) + blocking outfalls and managing overflows | 75.2 |
| | DPT3 | More intensive drain blocking (max 7/100 m), + field reprofiling + modifying outfalls and managing overflows | 49.4 |
| | DPT4 | Berms and field re-profiling (45m x 60m cell) + modifying outfalls and managing overflows + drainage channels for excess water + Sphagnum inoculation | 0.9 |
| Dry cutaway | DCT2 | Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes + targeted fertiliser treatment OR DCT2 Fertiliser only | 342.5 |
| Wetland cutaway | WLT2 | Modifying outfalls and managing water levels with overflow pipes + Targeted blocking of outfalls within a site + fertiliser application | 50.9 |
| | WLT4 | More intensive drain blocking (max 7/100 m), + blocking outfalls and managing overflows + transplanting Reeds and other rhizomes | 137.2 |
| Marginal land | MLT1 | No work required | 55.8 |
| | MLT2 | More intensive drain blocking (max 7/100 m) | 9.5 |
| Additional Works | AW2 | Targeted drain blocking with excavator (1 per 100m) | 21.3 |
| Silt Pond | Silt Pond | Silt Pond | 1.5 |
| Constraint | Constraint | Constrained areas (e.g. wind farm footprint) | 246.4 |
| Archaeology | Archaeology | Know archaeological interest (National Monument Service open data) | 0.3 |
| **Total Area (Ha)** | | | **990.8** |

## 8.1 Completed and ongoing

- Several areas of the site have been rehabilitated in the past. Notably, Clongawney Lake was created along the eastern boundary of the site in 2000, by blocking an outfall and allowing a basin that had formed through peat extraction to fill with water. The water levels at this Lake will be adjusted by means of outfall management. 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.

- In 2017 a small area of residual deep heath within the south-eastern part of the site was re-wetted in 2017 using an intensive drain blocking programme. This area will have additional targeted drain blocking implemented, as some sections do not have existing drain blocks.
- A native woodland comprised of oak (1.2ha) was planted in the southwest area of in Clongawney bog, just north of the Madden Derries mineral island in 2007 as part of a Bord na Móna Native Woodland Scheme. These areas are considered rehabbed and have been excluded from the rehab plan.
- A significant proportion of Clongawney Bog has already re-vegetated, with pioneer vegetation maturing and developing a mosaic of typical cutaway peatland habitats with Birch woodland predominating. Bare peat areas within the older cutaway areas are reducing. Natural re-colonisation of the cutaway so far has been quite effective. Other parts of the bog (younger cutaway) are beginning to revegetate and develop pioneering cutaway habitats.

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

- Seek formal approval of the rehabilitation plan from the EPA.
- Develop a detailed site plan outlining how the various rehabilitation methods will be applied to Clongawney Bog. This will take account of peat depths, topography, drainage and hydrological modelling (see rehabilitation map for an indicative view of the application of different rehabilitation methodologies).
- A drainage management assessment of the proposed rehabilitation measures will be carried out and any issues identified resolved and the rehabilitation plan adapted.
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible.
- A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out.
- A review of remaining milled peat stocks is to be carried out.
- An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) will 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.
- Appropriate Assessment (AA) of the Rehabilitation Plan will be carried out. Any required mitigation measures from the AA (if needed) will be incorporated into the plan for the delivery of rehabilitation and decommissioning across Clongawney.
- Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures (AA) and other environmental control measures during the implementation of the rehabilitation plan.

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

- There will be ongoing monitoring at Clongawney and appropriate rehabilitation planning during the proposed wind farm construction phase.
- Side-casted material from the wind farm road and drainage construction will be used to create low berms to help manage water levels and prevent surface water draining directly into the new drains. Pipes will

be inserted, where required, to manage water-levels flowing off the cutaway and into the wind farm drainage.

- Carry out proposed measures as per the detailed site plan. This will include intensive drain blocking and targeted hydrological management prescriptions in the cutaway. 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 in Section 9.
- Silt ponds will be monitored during this period and there will be continued maintenance and cleaning to prevent potential suspended solids run-off during the rehabilitation phase.
- Submit an ex-post report to the Scheme regulator to verify the eligible measures to be carried out in year 1 of the Scheme, and an ex ante estimate for year 2 of the Scheme; and so on for each year of the Scheme.

## 8.4 Long-term (>3 years)

- Site conditions and drainage are likely to change somewhat after the construction of the Derrinlough Wind Farm, so continued assessment could be made of further rehabilitation and maintenance works such as localised drain blocking and berm creation in association with the wind farm infrastructure. Similar rehabilitation works have already been carried out successfully at Mountlucas Wind Farm in County Offaly.
- Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- Delivery of a monitoring, aftercare and maintenance programme (See section 9 below).
- Decommissioning of silt-ponds will be assessed and carried out, where required.
- Reporting to the EPA will continue until the IPC Licence is surrendered.

## 8.5 Long-term (Post Wind Farm decommissioning)

- At this stage it is expected that Clongawney would have no bare peat cover and that the entire site will be developing a suite of maturing cutaway habitats that reflect the mosaic of environmental conditions. The wind farm infrastructure will have been integrated into the landscape and there are likely to be other land-uses across the site, including amenity.

## 8.6 Timeframe (to be adjusted when finalised)

- **Year 1**: Short-term planning actions
- **Year 1-3:** Short-term practical actions
- **Year 1-3:** Long term practical actions. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- **>Year 3**: Decommission silt-ponds, if necessary

## 8.7 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. This is updated every year - for more information see the Bord na Móna Annual Report (Bord na Móna, 2023). Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence.

Clongawney Bog is proposed to undergo enhanced rehabilitation measures as part of the Scheme (PCAS), as outlined in Section 1. 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.

# 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** undertaken for Clongawney Bog to determine the general status of the site, the condition of the silt ponds (if added), 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 Clongawney will be established** post-rehabilitation, 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 (if added) 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 Clongawney 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 Clongawney 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* and Ireland's National Recovery and Resilience Plan 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. 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 Clongawney Bog, as the site continues along its trajectory towards a naturally functioning peatland ecosystem.

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

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

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

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

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

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

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

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

**Scope of rehabilitation**

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

- The area of Clongawney Bog.
- EPA IPC Licence - Ref. P0500-01. As part of Condition 10.2 of this licence, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Clongawney Bog is part of the Boora Bog Group.
- The current condition of Clongawney Bog.
- 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 Clongawney 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 Clongawney 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 deep 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:**

- 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 | Blocking outfalls and managing water levels with overflow pipes | 343 |
| Deep peat | DPT1 | Regular drain blocking (3/100 m) + blocking outfalls and managing water levels with overflow pipes | 126 |
| Wetland | WLT1 | Blocking outfalls and managing water levels with overflow pipes | 188 |
| Marginal Land | MLT1 | No work required | 64 |
| Additional Works | AW1 | Targeted drain blocking | 42 |
| Other | Silt Pond | Silt ponds | 2 |
| Other | Constraint | Derrinlough Wind Farm Development Footprint, Rights of Ways, Turf Cutting, Coillte, Forestry, Archaeology | 226 |
| **Total** | | | 991 |

See Drawing number *BNM-DR-25-04-RP-20: Clongawney 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 Licence is surrendered. The bog will be included in the full licence surrender process as per the Guidance to Licensees on Surrender, Cessation and Closure of Licensed Sites (EPA, 2012) when:

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

## APPENDIX II. 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 Bogs for the supply of fuel peat to the power station in Ferbane which commenced power generation in 1957 and closed in 2001. The Boora bogs were also developed for the supply of milled peat to the Derrinlough Briquette factory, which commenced production in 1957.

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

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

A breakdown of the component bog areas for the Boora Bog Group IPC Licence Ref. P0500-01, and current, indicative Peat Production Status, is outlined in Table Ap-2. See Drawing number *BNM-DR-25-04-RP-24: Bog Group Map*, included in the accompanying Mapbook which illustrates the location of Lemanaghan Bog and the Boora Bog Group in context to the surrounding area.

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

| Bog | Area (Ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| Killaun | 359.5 | Cutover Bog<br>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.<br>Most of the former production area is bare peat. | 2020 | Draft<br>2017 |
| Boora | 1,842.4 | Cutaway<br>Harvested since the 1950's resulting in the exhaustion of the commercially viable peat resource | The majority of Boora bog has already been rehabilitated. A significant area of cutaway bog has | 2020 | Finalised 2021. Rehab |

| Bog | Area (Ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| | | at the bog. The majority of Boora Bog is considered a shallow peat cutaway bog. Some areas of deep peat persist at this site. | been re-wetted, developed as conifer forestry (Coillte) and developed as farmland (1980s).<br>This site now forms the core of Lough Boora Discovery Park. | | completed 2022. |
| Pollagh/ Cornalaur | 280.8 | Cutaway<br>At Pollagh Bog, industrial peat production began in 2004 and ceased in 2020.<br>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.<br>The adjacent Cornalaur Bog was never developed for peat production. | 2020 | Finalised 2021<br>Rehab complete 2021. |
| Noggusboy | 917.4 | Cutaway Bog<br>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.<br>Part of the site was developed as Cloghan Lake, as part of Lough Boora Discovery Park, in 1999.<br>There is some emerging naturally colonising cutaway. | 2020 | Finalised in 2022<br>Rehab complete 2023. |
| Drinagh | 1,339.1 | Cutaway Bog<br>Industrial peat production commenced at Drinagh during the 1950's and ceased in 2020. Some small pockets of deep peat reserves remain in parts of Drinagh Bog but most of the commercially viable peat reserves have been exhausted. Drinagh is considered a shallow peat, cutaway bog. | Drinagh East is cutaway and has been extensively rehabilitated as wetland. This part of the site has extensive development of naturally functioning peatland habitats.<br>Some Coillte conifer forestry is also present.<br>There is some emerging naturally colonising cutaway in Drinagh West. | 2020 | Rehab plan draft 2024. |
| Killaranny | 242.8 | Cutover Bog<br>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.<br>A portion of the site is leased by NPWS since 2011 as a re-location area for turf cutters from nearby Clara Bog SAC. | 2020 | Finalised 2022<br>Rehab complete 2023 |

| Bog | Area (Ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| Oughter | 352.9 | Cutaway<br>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.<br>Part of the site has been developed as the Midlands National Shooting Centre of Ireland. | 2012 | Finalised 2021<br>Rehab complete 2022 |
| Galros | 191.5 | Cutover Bog<br>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.<br>Some naturally emerging cutaway habitats are developing in part of the site. | 2020 | Draft 2017 |
| Clongawney More | 987.2 | Industrial peat production commenced at Clongawney More during the 1950s and ceased in 2019. Some pockets of deep peat persist, particularly in the south-western portion of the former production area. Clongawney 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.<br>Some Coillte conifer forestry is also present.<br>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. | 2019 | Draft 2024 |
| Derrinboy | 305.7 | Cutover Bog<br>Derrinboy was first developed by BnM in the 1980's. Peat production ceased at Derrinboy in 2020. This bog was used to supply horticultural peat. Only the upper layers of peat have been harvested. Derrinboy is considered a deep peat cutover bog. | Derrinboy Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat. | 2020 | Finalised in 2022<br>Rehab complete 2023 |
| Moneitta | 707.5 | Cutover Bog<br>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 Bog formerly supplied a range of commercial customers including; horticultural peat and fuel peat. | 2020 | Draft 2017 |

| Bog | Area (Ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| | | Moneitta is considered a deep peat cutover bog. | | | |
| Boora Lemanaghan Rail Link | 6.9 | N/A | Not applicable | N/A | N/A |
| Derries | 368.2 | Cutaway Bog<br>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.<br>The Derries Bog is considered a shallow peat cutaway bog. | Wetland rehabilitation carried out over part of site in 1999.<br>Amenity trackway development in 2015. Part of the Lough Boora Discovery Park.<br>The site has now been extensively naturally colonised and is a mosaic of wetland and Birch woodland habitats. | 2005 | Finalised 2021<br>Rehab complete 2022 |
| Turraun | 534.5 | Cutaway Bog<br>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<br>Rehab complete 2022 |
| Derryclure | 327.6 | Cutover Bog<br>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<br>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.<br>There are some naturally emerging cutaway habitats. | 2019 | Draft rehab plan 2024.<br>Rehab to commence 2024. |
| Belair North | 565.7 | Cutover Bog | Belair North Bog formerly supplied a range of commercial functions | 2020 | Draft 2017 |

| Bog | Area (Ha) | Stage of development | Land-Use and History | Peat Production Cessation | Rehab Plan Status |
|---|---|---|---|---|---|
| | | Belair North was first developed by BnM in the 1960's. Peat 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 considered a deep peat cutover bog. | including horticultural peat and fuel peat. | | |
| Derrybrat | 171.6 | Cutaway Bog<br>Industrial peat production commenced at Derrybrat during the 1950's and ceased in 2016. Derrybrat has shallow peat depths across the site. It is considered a shallow peat cutaway bog. | The site has been partially rehabilitated and there is already significant natural colonisation. Some conifer forestry has been developed by Coillte on the site. | 2016 | Finalised 2022<br>Rehab complete 2023 |
| Belair South | 228.8 | Cutover Bog<br>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<br>2017 |
| **Boora Bog Group Total** | **10,983.7** | | | | |

See Drawing number *BNM-DR-25-04-RP-24: Bog Group Map*, included in the accompanying Mapbook which illustrates the location of Clongawney Bog and the Boora Bog Group in context to the surrounding area.

## APPENDIX III. ECOLOGICAL SURVEY REPORT

*Note: this survey report from 2014 refers to the entirety of the bog, including areas within the footprint of Derrinlough Wind Farm that are constrained from PCAS rehabilitation footprint.*

**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.*

| | | | |
|---|---|---|---|
| **Bog Name:** | ***Clongawny More*** | **Area (ha):** | 1,028ha |
| **Works Name:** | Boora | **County:** | Offaly |
| **Recorder(s):** | MMC & DF | **Survey Date(s):** | 29/30 September & 1 September 2009<br>4/06/2010, May 2014 |

**Habitats present (in order of dominance)**

- Habitats present on the industrial cutaway include: (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II).
- Bare peat (BP), pioneer Poor Fen communities (pJeff, pEang, pTrig, pJbulb) and *Betula pubescens*-dominated scrub (eBir, cBir). There is one large lake along with other fragmented and minor patches of Open water (OW), Reedbeds (pTyp, pPhrag), Dry Heath (dHeath) and dry disturbed/pioneer communities (DisCF, DisWill) around the site. A small wetland area in the centre of the site has developed some Rich fen indicators. (Codes refer to BnM classification of pioneer vegetation of industrial cutaway areas, see appendix II.).
- There is some built land (BL3) with paths accessing works areas and a mobile phone in the SE section. Rail-lines crossing the site can also be classified as BL3. Silt Ponds are located to the NE and SW of the bog. Alongside the silt ponds are linear mounds of excavated material that run parallel to the ponds. This spoil is a mixture of glacial material, limestone and marl.
- Several large areas of conifer forestry (WD4) (approximately 92ha in total) have been planted at various locations around the site, on peat and on some of the mineral mounds.
- Oak-Ash-Hazel Woodland (WN2) is present on several small mineral mounds and another mound contains some mature dense Hazel and Blackthorn scrub (WS1). There are small areas of grassland (gCal) associated with this mound, and also with the access routes such as the railways and around the mobile phone mast area.
- Other fringe habitats around the margins of the bog include Scrub (Birch-dominated with some Scots Pine), Birch woodland (WN7) and Cutover Bog (active and abandoned). There are also several drainage ditches around the margins of the site (FW4).

**Description of site**

Clongawny Bog is located adjacent to the Cloghan to Birr Road. The majority of the site was in industrial peat extraction in 2019 but this has now ceased. The bog is primarily divided into several sections by the blocks of forestry located towards to centre of the site and by a railway that crosses the site in a NW-SE orientation. The forestry on the site is managed by Coillte with both commercial production of timber and biodiversity as the main management objectives. The site has a varied topography with some higher areas, mineral mounds of glacial material and deeper basins.

**Northern Section**

This is the largest section and takes in all of the site north of the railway from the eastern to the western side, including a small area of recently active production on the east side (east of the railway, Derrinlough). The majority of this area (north-

west of the lake and north of the railway) has been classified as production related cutaway. The largest habitat in the N section is bare peat (BP).

A large block of forestry is situated to the south of this section and is composed primarily of Sitka Spruce and some Lodgepole Pine. This section of forestry is of moderate quality and appears to grade from moderate quality on its eastern side to poorer quality on the western side. Some of this forestry has failed and is naturally re-generating scrub. One native woodland (dominated by Ash) on a mineral mound is also located in this section (west side), while another mineral island on the east side contains some maturing scrub with dense Hazel and Blackthorn.

The central section is an area of production-related cutaway that is re-vegetating and contains Poor fen pioneer communities (pJeff, pEang), emergent Birch scrub (eBir), and a minor amount of dry heath (dHeath). A small patch of raised bog (high bog) (PB1) is located on the northern boundary, while some other boundary habitats include scrub (WS1), conifer plantation (WD4), and dry grassland (GS1, GS2) along with a works area near Derrinlough that is used for storage and refuelling to the east of the site.

**South-west section**

This section is found in the SW part of the site and is found south of the railway. It contains a small native woodland on a mineral island named Maddens Derries. A small area of newly planted Oak woodland (a Bord na Móna Native Woodland Scheme) is located to the north side of this area. This section of new woodland is clearly visible by the high fence around its perimeter. Maddens Derries is the central part of a long ridge on which is developing open birch scrub (oBir) and dry heath (dHeath). The area to the south of this ridge is primarily recently active peat production with very little vegetation cover and minor amounts of Poor fen communities (pJeff, pEang). A silt pond is located to the west side. There are some remnants of uncut high bog along the eastern and western boundary of this section that can be classified as raised bog (PB1) and are being cut for peat by private individuals along the outer boundary. The eastern boundary also has several plots of land that extend into the mineral ridge of Clongawwny More. Some of these plots contain Birch woodland (WN7), scrub (WS1) and cutover bog (PB4).

**South-eastern section**

This large area (south of the railway and east of the mineral ridge that extends into the site from the southern side) contains a large area of recently active peat production with bare peat with very little vegetation cover (west side). There is a group of silt ponds (Rip) and some associated Birch scrub (eBir) located at the western side of this section. This area also contains some young pioneer Poor Fen vegetation (mainly pEang and pJeff) spreading from the drains.

The eastern side contains a relatively large lake (classified as an Acid (Oligotrophic) lake) that has developed on a natural basin between forestry planted on higher ground and the main road. This area is classified as a Biodiversity Area (on the land-use map) and is surrounded by dry heath and some emergent Birch scrub, which are colonising the bare peat. This section is notable for the presence of naturally colonising Oak in some of the scrub and also *Sphagnum* moss appearing in some of the drains connected to the lake. The western boundary is defined by several large blocks of conifer forestry. A phone mast is located in one section of plantation, which has been planted on a relatively large mineral island and surrounding shallow peat. This forestry is dominated by Sitka Spruce but it also contains two distinct patches of native old woodland that have developed on mineral mounds and have been left intact. To the south east (south of the railway) an area of dry heath (dHeath) was developing on an old section of cutaway.

This section also contains a small area of diverse wetland located to the north-west (between the mineral ridge of Clongawny More Townland and the conifer plantation). This area is classified as production-related cutover and is used for access between the various sections of the site, although most of the area has been re-vegetated for some time with communities well-established. The railway also runs through this section. The wetland area is mainly at the western side and there are several small areas of open water around which there have developed diverse poor fen communities (pEang, pJeff, pBulb), minor amounts of Reedbeds (pTyph, pPhrag) and emergent Birch scrub (eBir). This area also contains several indicators of Rich fen development including *Cladium mariscus* in the open water, a small area being vegetated by *Schoenus nigricans*, the presence of Brown Mosses and the presence of an iron flush.

**South-west 'Island'**

This small isolated area to the south-west of the main site is located adjacent to the Cloghan to Five Roads Corss road (R438). It contains a mosaic of cutover bog (PB4), scrub (WS1) and a minor amount of raised bog (PB1). It has never been in industrial peat production and has been leased to Coillte (although no forestry has been planted on it).

**Forestry and potential forestry on site**

Three main commercial forestry blocks are located on the site. These areas are managed by Coillte and are dominated by *Picea sitchensis.* These plantations have dual purposes with some sections intended for timber production and some sections intended for biodiversity. Some sections have achieved a yield class of 22 which is considered to be of medium quality (depending on planting year) from a timber production point of view but many other sections are of much poorer quality and some sections are failing completely. Low nutrient levels, high water table, competition from other plants, namely *Calluna vulgaris* and exposure, appear to be taking their toll on these plantations.

A small flush with extensive *Sphagnum* sp. cover was noted close to the edge of the large conifer plantation in the south-east section (northern side, see map). This flush contained extensive cover of *S. capillifolium*, *S. magellanicum*, S. *papillosum* and *Aulacomnium palustre*. Forestry planted in this area had failed. Other species such as *Eriophorum vaginatum*, *Narthecium ossifragum* and *Rhynchospora alba* were present.

An area to the north of the most westerly woodland (Madden's Derries) has been planted with Oak as part of the Native Woodland Scheme. This area was planted in 2008 and is clearly visible with the high deer fencing bounding it. This area consists of *Quercus robur*, *Betula pubescens, Calluna vulgaris, Eriophorum sp.* and *Juncus effusus.* The fungus *Armillaria tabescens* was also noted within this area.

This habitat is found in four separate locations on the site and a boundary wall is still visible in some of the woodlands, indicating they were managed in the past, possibly grazed. These woodlands are dominated by Oak trees that are estimated to be 180+ years old and are quite large (dbh 1.5 m). Many of the trees appear to have been coppiced in the past and as a result are multi-stemmed. Some of these woodlands are bordered with or contained within conifer plantations.

Over-grazing (presumably by deer) is a problem with the result that there is poor diversity in the woods with a poor shrub layer and the woodland is quite open. However, some sections did have numerous *Fraxinus excelsior* (Ash seedlings) so grazing intensity may vary across the site and the poor woodland development may in part be due to the heavy canopy. Species found within the canopy and understorey included *Quercus robur*, *Corylus avellana*, *Sorbus aucuparia*, *Ilex aquifolium*, *Betula pubescens*, *Prunus spinosa*, *Euonymus europaea*, *Hedera helix*, *Sambucus nigra*, *Alnus glutinosa*, *Malus sylvestris*, *Crataegus monogyna* and *Fagus sylvatica*. Several mature *Taxus baccata* were noted in one of the woodlands. Some sections of the canopy were much younger and dominated by *Betula pubescens, Salix cinerea* and/or *Corylus avellana*. The ground cover was generally dominated by *Hedera helix* in the heavily shaded areas, with *Rubus fruticosus* appearing in the more lightly shaded sections. Other species present included *Dryopteris dilatata*, *Dryopteris felix-mas, Arum maculatum, Rubus fruticosus*, *Urtica dioica, Pteridium aquilinum, Lonicera periclymenum, Viola* sp. *Oxalis acetosella* and *Sanicula europaea*. The ground cover of these woodlands was low in diversity but survey during early summer would probably increase the number of species recorded. The ground cover also had extensive moss cover in places as well as one exposed limestone rocks. This was dominated by *Thamnobryum alopecurum*, with *Mnium hornum*, *Hypnum sp.*, *Eurhynchium striatum* and *Thuidium tamariscinum* all present.

One of the woodlands has a canopy dominated by *Fraxinus excelsior* and contained *Sambucus nigra* and *Corylus avellana* with a dense *Rubus fruticosus* and *Pteridium aquilinum* understorey.

The woodland at Maddens Derries is poor in structure, with large gaps in the canopy and dense scrub and thickets of *Rubus fruticosus* and *Pteridium aquilinum* surrounding the mature trees.

One of the small mineral mounds has developed a small area of *Corylus avellana*-dominated scrub. This scrub is quite dense and impenetrable. It is surrounded by a band of dense *Prunus spinosa* and then by a zone of dense *Pteridium aquilinum* and *Rubus fruticosus*. This is a typical example of a succession habitat that will eventually develop Ash woodland (WN2). Several *Fraxinus excelsior* and *Betula pubescens* trees are emerging from the *Corylus avellana* canopy.

There is a minor amount of this habitat on the site and it can be found around the edges of the wooded mineral islands. The canopy is generally dominated by *Betula pubescens*. Other species present include *Sorbus aucuparia*. The ground cover and shrub layers are poorly developed and are dominated by *Rubus fruticosus* thickets. Other species present include *Molinia caerulea*, *Juncus effusus*, *Carex* sp., *Dryopteris dilatata*, *Hedera helix* and *Sambucus nigra*.

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

None

**Adjacent habitats and land-use**

Habitats and land-use around the site include cutover bog with active peat-cutting (PB4), the use of improved grassland (GA1) for grazing livestock and growing fodder, some minor semi-natural habitats such as scrub and remnant patches of raised bog (PB1), some Birch woodland (WN7), commercial forestry (WD4) and the Derrinlough briquette factory to the east of the site.

**Watercourses (major water features on/off site)**

Several Silt pond areas are present on the site along with some drains along the site boundaries. A deep drain is present in the mid-section of the site while a mostly dry drain was noted to the north of the site.

The eastern side of the site is within the Little River catchment. This river flows north along the eastern side of the site and links to the River Shannon. The western side of the site is drained by several small streams that are linked to the Rapemills River, which also flows to the River Shannon, to the west of the site, and by another small stream to the north of the site that flows directly into the River Shannon.

**Fauna biodiversity**

**Birds**

- Several bird species were noted around the site. Wren, Robin and Blackbird use the scrub areas around site, Meadow Pipit (10 - 15) using a variety of habitats on site, Blue Tit was recorded in some of the woodlands, and Snipe (>15) in some of the wetter pioneer Poor fen and wetland areas and in the drains around the site. Wood Pigeon, Magpie, Raven and House Martin occasionally observed over the site. A flock of 22 Curlew were observed on bare peat in the N section while a flock of 40 Lapwing were observed over the S section of the site. A Peregrine Falcon was hunting close to the road on the on the E edge of the bog. Jays were also heard in at least two of the woodlands.
- A group of Mallard (9) were noted in the lake as were one Grey Heron, a single Snipe and two flocks of Lapwing (seven and twelve).

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- 16 Black-headed Gulls using lake (breeding colony)
- 2 Great-crested Grebe
- 1 Ringed Plover (near lake)
- Blackcap (in adjacent Birch woodland)

**Mammals**

- Signs of Rabbits are widespread and common around the site.
- Signs of Hares also noted.
- Deer tracks were observed throughout the site while evidence of Deer rutting was also observed in some of the woodlands in the form of damaged trees and ground disturbance.
- Pine Marten tracks were observed in numerous locations around the bog.
- Signs of Badger activity in the bog included tracks, scrapes and droppings. Badger activity appeared to be focused on some sections of the woodlands.
- Fox droppings recorded at several locations.
- Evidence of Squirrels (red or grey) was noted in two of the native woodlands.

**Other species**

- Frogs recorded at several locations on the site.
- Sticklebacks were observed in the lake.
- Painted Lady Butterfly and Tortoiseshell Butterfly were noted in the north of the site while other invertebrate species observed included Grasshopper, Two-spotted Ladybird and numerous Dragonflies.
- Dingy Skipper butterfly was recorded using the site in 2014

**4/06/2010**

- 4-spotted chaser Dragonfly
- Green-veined White
- Marsh Fritillary Butterfly (8) using dry grassland around the potential rich fen area.

**Fungal biodiversity**

*Leccinum scabrum* (Brown Birch Bolete), *Hygrocybe cantharellus* (Goblet Waxcap), *Lactarius vietus* (Grey Milkcap), *Lactarius uvidus*, *Lycoperdon lividum* (Common Puffball), *Armillaria tabescens* (Ringless Honey Fungus) and *Agaricus silvicola* (Wood Mushroom).

**HABITAT DESCRIPTIONS**

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

**Pioneer Poor Fen communities (pPhrag)**

There is a small amount of this habitat present on the site and it is found associated with the developing wetland in the south-west section (south-west of Madden's Derries). Dense stands of *Phragmites australis* are developing in association with *Eriophorum angustifolium*-dominated vegetation (pEang) and a minor amount of *Typha latifolia* in drains with some *Carex rostrata*-dominated vegetation (pRos).

**Open Water (OW)**

A large area of open water is found within the Biodiversity Area in the east section of the site. This open water area is an acid oligotrophic lake and it is noticeable that there are no emergent Reedbed communities (pTyph and pPhrag) in this lake compared to other recently created lakes. Algae were noted in the lake itself with very little emergent plant species.

The marginal vegetation around the lake is a pioneer community developing on bare peat that included *Campylopus introflexus, Juncus bulbosus, Drosera rotundifolia, Molinia caerulea, Quercus robur, Eriophorum vaginatum, Polytrichum sp., Sorbus aucuparia, Utricularia sp., Alnus glutinosa, Carex echinata, Carex echinata, Betula pubescens, Succisa pratensis, Salix cinerea, Juncus effusus, Carex rostrata* and *Eriophorum angustifolium.* This community was a mosaic of *Campylopus*-dominated vegetation (pCamp) and *Eriophorum angustifolium*-dominated vegetation (pEang). There were some stands of *Eriophorum angustifolium* (pEang) within the water as well as a minor amount of *Carex rostrata* (pRos). Drains connected to the lake contained some *S. cuspidatum* and this species also appeared around the edge of the lake but was poorly developed.

The vegetation of the drier sections around the southern end of the lake was composed of emergent Birch (eBir) and areas of *Calluna vulgaris* dHeath). Birch was more prominent to the west of the lake, while the northern end comprised Sitka Spruce, Heather and bare peat.

The OW habitat immediately to the north of the Native Woodland scheme appears to be subject to seasonal wetting and appeared shallow and mainly consisted of *Juncus bulbosus*-dominated vegetation (pJbulb).

**Potential Rich Fen Wetland complex (OW, pClad, pEang, pJeff, eBir, oBir)**

This relatively small area is located in the central part of the site adjacent to the south-side of a conifer plantation and the end of the Clongawny More mineral ridge. This area is classified as production-related cutaway but has been out of production for some time and the vegetation communities are well-established. Two access routes cross through the area. This area contains several wetland areas where there is open water and/or a quaking vegetation mat. There is a subtle transition westwards related to the underlying topography from drier communities (eBir and pJeff) to the wetter communities.

The main communities were an *Eriophorum angustifolium*-dominated community and a *C. rostrata*-dominated community with a small amount of emergent *Betula*-dominated scrub. Other species present include *Carex echinata*, *Carex demissa*, *Triglochin palustris*, *Mentha aquatica*, *Molinia caerulea*, *Juncus articulatus*, *Juncus effusus*, *Ranunculus flammula*, *Juncus bulbosus*, *Hydrocotyle vulgaris*, *Salix aurita*, *Osmunda regalis*, *Narthecium ossifragum* and *Myrica gale* (west side). The quaking areas contain *Potamogeton sp., Menyanthes trifoliata* and *Carex rostrata*. Mosses include extensive cover of *Calliergonella cuspidata* and *Fissidens* sp.. *Drepanocladus* sp. was also present. The moss layer was extremely well developed on some sections and some hummocks of *Sphagnum* sp. moss were also associated with these wetlands.

The open water contains some stands of *Typha latifolia* (pTyph) as well as several small clumps of *Schoenoplectus lacustris*. *Chara* is prominent in shallow water. One clump of *Cladium mariscus* (a rich fen indicator) was noted in one of the open water areas.

Drier grassland around the fringes of these wetland areas is dominated by *Molinia caerulea* (gMol). An iron flush was noted adjacent to one of the wetland areas and *Schoenus nigricans* appeared in a small drier area adjacent to the open water at the west side of this section (adjacent to the Ash woodland).

04/06/2010

This site was also visited during June 2010 and a detailed species list was made. The water level was somewhat lower but there still was extensive standing water (20 cm high) over most of the wetland. Several areas were quaking and there was still some small pools. The vegetation was dominated by *Carex rostrata* with a ground layer of dense *Chara* sp. There were patches dominated by *C. nigra* through the wet area. Loose tussocks of *Carex diandra* were scattered through the wetland, becoming locally frequent. Some of the ground layer was dominated by a dense mat of *Calliergonella cuspidata*. *Betula pubescens*, *Salix cinerea* and *Salix aurita* appeared along the old drains and in drier areas towards the margins, although the majority of the wetland was quite open. The wetland area was surrounded by mainly open scrub.

There were some large hummocks of Bryophytes including *Hylocomium splendens* associated with the scrub. Species more typical of dry communities were found on these hummocks, such as *Molinia caerulea*. Other species recorded in this area included, *Hydrocotyle vulgaris*, *Eriophorum angustifolium*, *Ranunculus flammula*, *Osmunda regalis*, *Mentha aquatica*, *Equisetum fluviatile*, *Cardamine pratensis*, *Juncus articulatus, J. effusus*, *Typha latifolia*, *Menyanthes trifoliata* , *Cladium mariscus* , *Potamogeton* sp., *Hippuris vulgaris*, *C. diandra, C. panicea, C. dioica, C. elata, C. demissa, Pinus contorta*, *Salix repens*, *Potentilla erecta*, *Listera cordata*, *Calluna vulgaris*, *Drosera rotundifolia*, *Kindbergia praelonga*, *Dryopteris carthusiana*, *Succisa pratensis*, *Centaurea nigra Pedicularis sylvatica*, and *Dactylorhiza maculata*. In addition to the one large clump of *Cladium mariscus*, an additional small clump was noted at another location.

The above description indicates that this is a relatively species-rich area and is likely to develop into rich fen in the future (PF1). At present the bryophyte flora may be somewhat less diverse but the site is quite stable at present with 100% vegetation cover in the wetland areas. This area could also be classified as transition mire as it also contains several indicators of this habitat including the quaking sections and the wetland vegetation with frequent *C. diandra. The* domination by *Carex rostrata* probably indicates that the rich fen influence is not extensive at present and that the site is still in a pioneer phase. This is also confirmed by the sparse presence of brown mosses, which were only found in one location.

Marsh Fritillary was recorded within and around the margins of this area, mainly using drier open pioneer grassland dominated by *Molinia caerulea* and *Carex flacca* that was developing on a mound of glacial till along the northern boundary.

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

This habitat is a common one, particularly in the north west of the 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, the Birch scrub appears to readily emerge from the drains. An area to the east of Madden's Derry is dominated by Open Birch as it runs along a ridge in an east west direction. The majority of eBir and oBir habitats on this site were dry and contained *Salix aurita*, *Tussilago farfara, Agrostis stolonifera, Gallium saxatile, Hieracium pilosella, Chamaerion angustifolium, Calluna vulgaris, Salix cinerea, Viola sp., Campylopus introflexus, Juncus effusus, Rubus fruticosus, Carex flacca, Eriophorum angustifolium, Osmunda regalis, Blechnum spicant* and *Polytrichum formosum.*

This habitat is also prominent along a ridge that is connected to Madden's Derries. This area contains a mosaic of open and emergent *Betula pubescens* scrub that is developing from dry heath dominated by *Calluna vulgaris*. Other species present include *Salix cinerea* and occasional *Sorbus aucuparia* and *Ulex europaeus*. The ground cover contains frequent *Juncus effusus*, *Pteridium aquilinum*, *Chamaerion angustifolium* and *Rubus fruticosus*. Other species present include *Galium saxifrage*, *Molinia caerulea*, *Cirsium* sp., *Hypericum pulchrum*, *Polytrichum* sp. moss, *Polytrichum formosum*, *Eriophorum angustifolium*, *Dryopteris affinis, D. dilatata, D. felix-mas*, *Salix repens*, *Anthoxanthum odoratum*, *Carex binervis*, *Potentilla erecta*, *Leontodon autumnalis* and *Daucus carota*

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

Areas of dHeath can be found dotted throughout the site mainly on higher areas of cutover bog (former high fields. *Calluna vulgaris* is the dominant species in this habitat with other minor components comprising of *Juncus effusus*, *Cirsium palustre, C. arvense*, *Agrostis stolonifera*, *Succisa pratensis, Phragmites australis, Chamaerion angustifolium, Polytrichum sp., Betula pubescens, Salix aurita, Ulex europaeus, Rubus fruticosus, Potentilla anglica, Salix repens, Hypochaeris sp.* and *Hypericum sp.*

This habitat is also found in the south-east section of the bog. It is primarily dominated by *Calluna vulgaris* and also contains substantial bare peat and *Campylopus introflexus* cover. Scrub with *Betula pubescens*, *Salix* sp. and *Pinus* sp. is colonising this habitat. Some acidic indicators were noted along the drains through this section such as *Narthecium ossifragum* and *Rhynchospora alba*. *Sphagnum* spp. mosses are appearing in the drains and some sections of drains are infilling where there

is water retention (at the bottom of a small basin) with *S. cuspidatum* and *S. magellanicum* prominent. Some *S. capillifolium*. and S. *papillosum* is also appearing along the edges of the drains.

**Dry grassland communities (gCal)**

A small area of dry grassland habitat is found on the site but is widely distributed. This grassland is found a few locations such as close to the silt ponds, on the verges of some areas of conifer plantation and along the railway. Species composition of this habitat included *Centaurea nigra, Tussilago farfara, Equisetum sp., Agrostis stolonifera, Daucus carota, Centaurium sp, Rubus fruticosus, Hypochaeris radicata, Hydrocotyle vulgaris, Betula pubescens, Anthoxanthum odoratum, Potentilla anglica, Lotus corniculatus, Carex flacca, Dactylorhiza sp., Hypericum pulchrum, Plantago lanceolata, Cirsium arvense, Carex demissa, Mentha sp., Trifolium repens, Molinia caerulea* and *Rumex obtusifolius.*

This type of grassland was also found around one of the mineral islands that contained dense *Corylus avellana* scrub. Additional species present at this location included *Galium verum* and *Arrhenatherum elatius*.

**Wet grassland communities (gMol)**

A minor amount of wet grassland habitat is found on the site but is widely distributed. This community was also found around the small mineral mound in the centre of the site containing *Corylus avellana*-scrub and is association with railways and the drier sections of the wetland complexes. The vegetation was dominated by *Molinia caerulea* and also contained *Succisa pratensis*, *Carex demissa*, *Rubus fruticosus*, *Potentilla anglica*, *Agrostis stolonifera*, *Hypochaeris radicata*, *Cirsium* spp., *Poa* sp., *Anthoxanthum odoratum*, *Linum catharticum*, *Potentilla erecta*, *Plantago lanceolata*, *Calluna vulgaris* and *Viola* sp.

**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*, *Briza media*, *Equisetum* sp., *Dactylorhiza* sp., *Cirsium arvense*, *Cirsium palustre*, *Salix aurita*, *Leucanthemum vulgare*, *Hypochoeris radicata* and *Centaurium erythraea.*

**Production areas (BP)**

The majority of this bog was in active production at the time of the survey. There are extensive fields of bare peat around the site that have been recently milled and are divided by drains devoid of vegetation.

Some vegetation is spreading into other fields where there has been less recent activity although vegetation re-colonisation is at various stages. The vegetation is most typically pJeff and it is spreading from the drains into the fields. The drains in these sections are generally completely vegetated and also contain some emergent *Betula pubescens*-dominated scrub (eBir).

There is some encroachment of vegetation from the sides of the drains including pJeff pEang, pTrig, and eBir.

**Conifer Plantation (WD4)**

Three main commercial forestry blocks are located on the site. These areas are managed by Coillte and are dominated by *Picea sitchensis.* These plantations have dual purposes with some sections intended for timber production and some sections intended for biodiversity. Some sections have achieved a yield class of 22 which is considered to be of medium quality (depending on planting year) from a timber production point of view but many other sections are of much poorer quality

and some sections are failing completely. Low nutrient levels, high water levels, competition from other plants, namely *Calluna vulgaris* and exposure, appear to be taking their toll on these plantations.

A small flush with extensive *Sphagnum* sp. cover was noted close to the edge of the large conifer plantation in the south-east section (northern side, see map). This flush contained extensive cover of *S. capillifolium*, *S. magellanicum*, S. *papillosum* and *Aulacomnium palustre*. Forestry planted in this area had failed. Other species such as *Eriophorum vaginatum*, *Narthecium ossifragum* and *Rhynchospora alba* were present.

**Riparian zone (Rip)**

Two silt ponds are located on the site along with some drains along the boundary. Plant species in these areas includes *Agrostis stolonifera*, *Potamogeton sp*. and *Glyceria fluitians.* The silt ponds appeared to have been recently cleaned out and a drain to the north of the site was in the process of being cleaned during the site visit.

**Recently-planted woodland (WS2)**

An area to the north of the most westerly woodland (Madden's Derries) has been planted with Oak as part of the Native Woodland Scheme. This area was planted in 2008 and is clearly visible with the high deer fencing bounding it. This area consists of *Quercus robur*, *Betula pubescens, Calluna vulgaris, Eriophorum sp.* and *Juncus effusus.* The fungus *Armillaria tabescens* was also noted within this area.

**Oak-Ash-Hazel Woodland (WN2)**

This habitat is found in four separate locations on the site and a boundary wall is still visible in some of the woodlands, indicating they were managed in the past, possibly grazed. These woodlands are dominated by Oak trees that are estimated to be 180+ years old and are quite large (dbh 1.5 m). Many of the trees appear to have been coppiced in the past and as a result are multi-stemmed. Some of these woodlands are bordered with or contained within conifer plantations.

Over-grazing (presumably by deer) is a problem with the result that there is poor diversity in the woods with a poor shrub layer and the woodland is quite open. However, some sections did have numerous *Fraxinus excelsior* (Ash seedlings) so grazing intensity may vary across the site and the poor woodland development may in part be due to the heavy canopy. Species found within the canopy and understorey included *Quercus robur*, *Corylus avellana*, *Sorbus aucuparia*, *Ilex aquifolium*, *Betula pubescens*, *Prunus spinosa*, *Euonymus europaea*, *Hedera helix*, *Sambucus nigra*, *Alnus glutinosa*, *Malus sylvestris*, *Crataegus monogyna* and *Fagus sylvatica*. Several mature *Taxus baccata* were noted in one of the woodlands. Some sections of the canopy were much younger and dominated by *Betula pubescens, Salix cinerea* and/or *Corylus avellana*. The ground cover was generally dominated by *Hedera helix* in the heavily shaded areas, with *Rubus fruticosus* appearing in the more lightly shaded sections. Other species present included *Dryopteris dilatata*, *Dryopteris felix-mas, Arum maculatum, Rubus fruticosus*, *Urtica dioica, Pteridium aquilinum, Lonicera periclymenum, Viola* sp. *Oxalis acetosella* and *Sanicula europaea*. The ground cover of these woodlands was low in diversity but survey during early summer would probably increase the number of species recorded. The ground cover also had extensive moss cover in places as well as one exposed limestone rocks. This was dominated by *Thamnobryum alopecurum*, with *Mnium hornum*, *Hypnum sp.*, *Eurhynchium striatum* and *Thuidium tamariscinum* all present.

One of the woodlands has a canopy dominated by *Fraxinus excelsior* and contained *Sambucus nigra* and *Corylus avellana* with a dense *Rubus fruticosus* and *Pteridium aquilinum* understorey.

The woodland at Maddens Derries is poor in structure, with large gaps in the canopy and dense scrub and thickets of *Rubus fruticosus* and *Pteridium aquilinum* surrounding the mature trees.

**Hazel scrub (WS1)**

One of the small mineral mounds has developed a small area of *Corylus avellana*-dominated scrub. This scrub is quite dense and impenetrable. It is surrounded by a band of dense *Prunus spinosa* and then by a zone of dense *Pteridium aquilinum* and *Rubus fruticosus*. This is a typical example of a succession habitat that will eventually develop Ash woodland (WN2). Several *Fraxinus excelsior* and *Betula pubescens* trees are emerging from the *Corylus avellana* canopy.

**Birch woodland (WN7)**

There is a minor amount of this habitat one the site and it can be found around the edges of the wooded mineral islands. The canopy is generally dominated by *Betula pubescens*. Other species present include *Sorbus aucuparia*. The ground cover and shrub layers are poorly developed and are dominated by *Rubus fruticosus* thickets. Other species present include *Molinia caerulea*, *Juncus effusus*, *Carex* sp., *Dryopteris dilatata*, *Hedera helix* and *Sambucus nigra*.

**Other Habitats (around the fringe of the bog)**

**Raised Bog (PB1)**

Several small remnant patches of this habitat are found around the fringes of the site. The majority of this remnant high bog was drained in the past for industrial peat production, but peat was never harvested. These drains are now filling in. Steep face-banks separate this habitat from the industrial harvested areas of the BnM areas while domestic turf cutting has been taking place on the outer boundaries, some of which would appear to have encroached onto the BnM property. Species present include *Calluna vulgaris*, *Erica tetralix, Eriophorum vaginatum*, *E. angustifolium*, *Trichophorum cespitosum*, *Narthecium ossifragum*, *Rhynchospora alba*, *Cladonia portentosa*, *Carex panicea*, *Molinia caerulea*, *Andromeda polifolia*, *Sphagnum capillifolium, S. papillosum* and *S. magellanicum. Sphagnum cuspidatum* was noted in the drains. *Myrica gale* was noted on the high bog at several locations.

*Betula pubescens* and *Ulex europaeus* are spreading onto these fragments in places and there are patches of scrub (WS1) and Birch woodland (WN7) that have developed on the high bog in places.

The majority of the raised bog would be classified as marginal or face-bank ecotopes and is dominated by *Calluna vulgaris*. A small amount being in better condition could be considered to be sub-marginal with greater *Eriophorum vaginatum* and *Narthecium ossifragum* cover. This habitat as a whole was dry and degraded with evidence that it may once have been burned. No intact pools were present and there were only a few small wet hollows containing *S. cuspidatum*. There are poor restoration prospects for any of these fragments of raised bog but they are good for biodiversity on a local level.

**Scrub (WS1)**

This habitat appears along the fringes of the production area, mainly along the boundaries. Several different communities are present.

Species present include *Salix cinerea*, *Salix aurita*, *Alnus glutinosa*, *Rubus fruticosus*, *Pteridium aquilinum*, *Crataegus monogyna* and *Betula pubescens*. This habitat forms a mosaic with Dense Bracken (HD1) along parts of the northern boundary.

**Cutover Bog (PB4)**

This habitat is found around the margins of the site at several locations. Patches of cutover bog within the Bord na Móna 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. And the cutover bog forms a mosaic with other habitats in places such as scrub (WS1) and Birch woodland (WN7), particularly on the west side of the Clongawny More mineral ridge (southwest section).

## Appendix II. Codes used for habitat classification.

### Bord na Moṅa habitat classification scheme

| | General | Habitat [1] | BnM habitat code | Equivalent Heritage Council codes [2] |
|---|---|---|---|---|
| Pioneer habitats of industrial cutaway | Peatland | Bare peat (0-50% cover) | BP | ED2 |
| | | Embryonic bog community (containing *Sphagnum* and Bog Cotton) | PBa | PB |
| | | Embryonic bog community (Calluno-Sphagnion) | PBb | PB |
| | Flush and Fen | Pioneer *Campylopus*-dominated community | pCamp | PF2 |
| | | Pioneer *Juncus effusus*-dominated community (Soft Rush) | pJeff | PF2 |
| | | Pioneer *Eriophorum angustifolium*-dominated community (Bog Cotton) | pEang | PF2 |
| | | Pioneer *Juncus bulbosus*-dominated community (Bulbous Rush) | pJbulb | PF2 |
| | | Pioneer *Triglochin palustris*-dominated community (Marsh Arrowgrass) | pTrig | PF2 |
| | | Pioneer Caricion davallianae-Community with *Cladium* (rich fen) | pCladium | PF1 |
| | Emergent communities | Pioneer *Carex rostrata*-dominated community (Bottle Sedge) | pRos | FS1 |
| | | Pioneer *Phragmites australis*-dominated community (Common Reed) | pPhrag | FS1 |
| | | Pioneer *Typha latifolia*-dominated community (Reedmace) | pTyp | FS1 |
| | | Pioneer *Schoenoplectus lacustris*-dominated community (Bulrush) | pSch | FS1 |
| | Open water | Charaphyte-dominated community | pChar | FL2 |
| | | Permanent pools and lakes | OW | FL2 |
| | | Temporary open water | tOW | |
| | Woodland and scrub | Emergent *Betula*/*Salix*-dominated community (A) (Birch/Willow) | eBir | WS1 |
| | | Open *Betula*/*Salix*-dominated community (B) (Birch/Willow) | oBir | WS1 |
| | | Closed *Betula*/*Salix* scrub community (C) (Birch/Willow) | cBir | WS1 |
| | | *Ulex europaeus*-dominated community (Gorse) | eGor | WS1 |
| | | *Betula*/*Salix*-dominated woodland (Birch/Willow) | BirWD | WN7 |
| | Heathland | Pioneer dry *Calluna vulgaris*-dominated community (Heather) | dHeath | HH1 |
| | | Dense *Pteridium aquilinum* (Bracken) | dPter | HD1 |
| | Grassland | Pioneer dry calcareous and neutral grasssland (Centaureo-Cynosuretum) | gCal | GS1 |
| | | *Dactylis-Anthoxanthum*-dominated community (Cocksfoot-Sweet Vernalgrass) | gCo-An | GS2 |
| | | *Anthoxanthum-Holcus-Equisetum* community (Sweet Vernalgrass-Yorkshire Fog-Horsetail) | gAn-H-Eq | GS |

| | | | | |
|---|---|---|---|---|
| | | *Molinia caerulea*-dominated community (dry) (Purple Moorgrass) | gMol | GS4 |
| | | Marsh (Meadowsweet and other tall herbs) (Filipendulion ulmariae) | Mar | GM1 |
| | Disturbed | *Tussilago farfara*-dominated community (vegetation > 50%) (Colt's Foot) | DisCF | ED3 |
| | | *Epilobium*-dominated community (vegetation > 50%) (Willowherb spp.) | DisWil | ED3 |
| | General | Riparian areas (streams or drain with associated edge habitats (e.g. FW2/4 + WS1, GS2 etc) | Rip | FW2 + |
| | | Silt Ponds (artificial ponds with associated bank habitats (e.g. FL8 + WS1, GS2, ED2, ED3) | Silt | FL8 + |
| | | Access (tracks or railways with associated edge habitats (e.g. BL3 + gCal, gMol, eGor etc) | Acc | BL3 + |
| | | Works areas (predominately built land but can include landscaped and brownfield habitats (e.g. GA2, WS3, WD4, ED2, ED3) | Works | BL3 + |

[1] These are generally pioneer habitats of bare peat and the communities can contain a significant proportion of bare peat. Some habitats are more developed than others. They frequently occur in mosaic with each other.

[2] Not all these communities are equivalent to habitat classes used by The Heritage Council habitat classification scheme (Fossitt 2000) as some are quite rudimentary and undeveloped.

**Heritage Council habitat classification scheme (Fossitt 2000)**

| | General | Habitat | Heritage Council code |
|---|---|---|---|
| Semi-natural and modified habitats | Peatlands | Raised Bog | PB1 |
| | | Lowland Blanket bog | PB3 |
| | | Cutover Bog | PB4 |
| | | Rich fen and flush | PF1 |
| | | Poor fen and flush | PF2 |
| | | Transition mire and quaking bog | PF3 |
| | Woodland and scrub | Oak-Birch-Holly woodland | WN1 |
| | | Oak-Ash-Hazel woodland | WN2 |
| | | Wet Pendunulate Oak-Ash woodland | WN4 |
| | | Riparian Woodland | WN5 |
| | | Wet Willow-Alder-Ash woodland | WN6 |
| | | Bog woodland | WN7 |
| | | Mixed broad-leaved woodland | WD1 |
| | | Mixed broad-leaved/conifer woodland | WD2 |
| | | Conifer plantation | WD4 |
| | | Scrub (Gorse) | WS1 |
| | | Emergent Betula-dominated community | WS1 |
| | | Closed Betula scrub community | WS1 |
| | | Recently-planted woodland | WS2 |
| | | Ornamental scrub | WS3 |
| | | Short-rotation coppice | WS4 |
| | | Recently-felled woodland | WS5 |
| | Linear woodland | Hedgerow | WL1 |
| | | Treeline | WL2 |
| | Grasslands and Marsh | Improved grassland | GA1 |
| | | Amenity grassland | GA2 |
| | | Dry calcareous and neutral grsld | GS1 |
| | | Dry meadows and grassy verges | GS2 |
| | | Dry-humid acid grassland | GS3 |
| | | Wet grassland | GS4 |
| | | Freshwater Marsh | GM1 |
| | Heath and Bracken | Dry Heath | HH1 |
| | | Dry calcareous Heath | HH2 |
| | | Wet Heath | HH3 |
| | | Dense Bracken | HD1 |
| | | Exposed sand,gravel or till | ED1 |

| | | | |
|---|---|---|---|
| | Disturbed ground | Spoil and bare ground | ED2 |
| | | Recolonising bare ground | ED3 |
| | | Active quarry | ED4 |
| | Freshwater | Acid Oligotrophic lakes | FL2 |
| | | Mesotrophic lakes | FW4 |
| | | Artificial ponds (slit ponds) | FL8 |
| | | Depositing rivers | FW2 |
| | | Canals | FW3 |
| | | Drains | FW4 |
| | Cultivated and Built land | Stonewalls and other stonework | BL1 |
| | | Earth Banks | BL2 |
| | | Buildings and artificial surfaces | BL3 |
| | | Arable crops | BC1 |
| | | Horticulture | BC2 |
| | | Tilled land | BC3 |

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

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

## APPENDIX V. BIOSECURITY

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

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

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

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

In addition to the above, Best Practice measures around the prevention and spread of Crayfish plague[6] will be adhered with throughout all rehabilitation measures and activities.

[6] https://www.biodiversityireland.ie/projects/invasive-species/crayfish-plague/

# APPENDIX VI. POLICY AND REGULATORY FRAMEWORK

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

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

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

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

## 1 EPA IPC Licence

Bord na Móna operates under IPC Licence issued and administered by the EPA to extract peat within the Boora Bog Group (IPC Licence Ref. P0500-01). As part of Condition 10.2 of this licence, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. This regulatory requirement is the main driver of the development of this rehabilitation plan.

## 2 National Climate Policy

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

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

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

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

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

## 3 National Peatlands Strategy

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

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

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

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

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

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

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

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

The 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 Peatland Climate Action Scheme (PCAS).

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

The Draft River Basin Management Plan for Ireland 2022-2027 (Department of Housing, Local Government and Heritage, 2022) describes how the number of waterbodies impacted by peat, industry and forestry have decreased by 10, 10 and 5 waterbodies, respectively since the second cycle. Impacts on water quality and river habitat arising from peat and peat extraction and associated drainage include the release of ammonium and fine-grained suspended sediments, and physical alteration of aquatic habitats. Drainage of peatlands also results in changes to the hydromorphological condition of rivers.

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

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

## 5 National Biodiversity Action Plan 2016-2021

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

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

## 6 National conservation designations

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

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

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

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

several sites that will contribute to The National Raised Bog Special Areas of Conservation (SACs) Management Plan 2017-2022 targets in relation to the restoration of raised bog habitat.

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

## 8 All-Ireland Pollinator Plan 2021-2025

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

## 9 Land-use planning policies

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

## 10 National Archaeology Code of Practice

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

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

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

## 11 Bord na Móna Biodiversity Action Plan 2016-2021

Rehabilitation of industrial peatlands is a key objective of the Bord na Móna Biodiversity Action Plan 2016-2021. This action plan outlines the main objectives and actions around biodiversity on Bord na Móna lands. The Bord na Móna Biodiversity Action Plan also outlines key International and European policy in relation to biodiversity. This includes the **United Nations Convention on Biodiversity 2011-2020 (CBD)** and **European Biodiversity Strategy to 2020**. Further details of these policies and Bord na Mónas 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.

## 12 Bord na Móna commitments

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

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

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

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

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

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

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

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

# 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 | Clongawney Decommissioning Plan |
|---|---|---|
| 1 | Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices | Where relevant |
| 2 | Cleaning Silt Ponds | Cleaning Silt Ponds |
| 3 | Decommissioning Peat Stockpiles | Where relevant |
| 4 | Decommissioning or Removal of Buildings and Compounds | Where relevant |
| 5 | Decommissioning Fuel Tanks and associated facilities | Where relevant |
| 6 | Decommissioning and Removal of Bog Pump Sites | Where relevant |
| 7 | Decommissioning or Removal of Septic Tanks | Where required |

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

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

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

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

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

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

7.3.3 The ultimate destination of the waste.

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

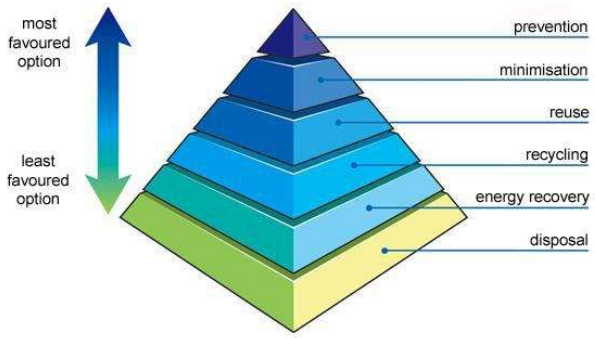
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

7.3.6 Details of any rejected consignments.

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

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

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




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

## APPENDIX VIII. GLOSSARY

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

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

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

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

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

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

**Restoration:** Ecological restoration is 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

**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.

**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 bog group are serviced by 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 P0500-01 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 31st December 2012. The Plan shall be reviewed at least once every five years thereafter in a manner agreeable to the Agency and amended in the event of substantial changes to the operation of a waste facility or to the waste deposited. Any amendments shall be notified to the Agency.
All extractive waste shall be managed in accordance with the Extractive Waste Management Plan. A report on the implementation of the Extractive Waste Management Plan shall be provided in the AER.

**2.2 Condition 7.6 Waste Facility**
(i) No new waste facility may be developed or an existing waste facility modified unless agreed by the Agency.
(ii) The licensee shall ensure that all existing waste facilities are managed and maintained to ensure their physical stability and to prevent pollution or contamination of soil, air, surface water or groundwater.
(iii) The licensee shall ensure that all new waste facilities are constructed, managed and maintained to ensure their physical stability and to prevent pollution or contamination of soil, air, surface water or groundwater.
(iv) Operational measures shall be continuously employed to prevent damage to waste facilities from personnel, plant or equipment.
(v) The licensee shall establish and maintain a system for regular monitoring and inspection of waste facilities.
(vi) All records of monitoring and inspection of waste facilities, as required under the licence, shall be maintained on-site in order to ensure the appropriate handover of information in the event of a change of operator or relevant personnel.

**2.3 Condition 7.7 Excavation Voids**
7.7.1 Unless otherwise agreed by the Agency, only extractive waste shall be placed in excavation voids.
7.7.2 When placing extractive waste into excavation voids for rehabilitation and construction purposes, the licensee shall, in accordance with regulation 10 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009, and the Extractive Waste Management Plan:

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

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

**3.0 Minimisation.**
**3.1 Silt pond excavation material and cleanings.**
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 National 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 IPPC Licence Ref. P0500-01.

## APPENDIX X. MITIGATION MEASURES FOR THE APPLICATION OF FERTILISER

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

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

## APPENDIX XI. CONSULTATION SUMMARIES

[Results to follow]

## 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

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:** |

**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 | | | |
| 2 | | | |

# Archaeological Impact Assessment of Proposed Bog Decommissioning and Rehabilitation at Clongawney Bog, Co. Galway

## 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 at Clongawney bog, Co. Galway 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 Clongawney bog will include:

- Re-assessment of the pumping regime and removing pumps if this is desired and has no significant external impact or impacts on proposed future land-uses. Initial hydrological modelling indicates that part of Clongawney will develop a mosaic of wetland habitats with some permanent deeper water if pumps are decommissioned. 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 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, where possible. More sustainable permanent gravity drainage solutions will be examined. Some targeted bunding may be required. It is expected that a natural seasonal regime of water fluctuation will develop, with water-levels fluctuating in association with levels of surrounding rivers.
- A widespread drain-blocking programme will be implemented across the cutaway, where possible. This will have to be planned in association with the wind farm infrastructure. In general, field drains will be blocked where possible to re-wet cutaway and re-wet to the optimum water-level. More intensive measures will be targeted towards the bare peat.
- There are areas of deeper peat within the southern area of Clongawney, and at the bog margins. These will be targeted for more intensive drain-blocking where suitable.
- Less intensive measures (targeted drain-blocking) will be used in areas where habitats have already established.
- Hydrological measures may include modifying outfalls and managing water levels with overflow pipes.
- The existing silt ponds will be retained and maintained during the rehabilitation phase. During the monitoring and verification phase the silt ponds will be continually inspected and maintained, where appropriate. When it is deemed that the silt ponds are not required, as the bog has been successfully stabilised and there is no silt run-off, the condition of the silt ponds will be reviewed. The silt ponds will either be de-watered (water levels lowered to a level where the silt pond will naturally develop as a small wetland feature), left in situ, or infilled (where discharges do not require silt control).

Clongawney Bog is located 3.3km south of Cloghan, Co. Offaly, to the west of the N62 road and east of R438. The bog rehabilitation area occupies the townlands of Balliver, Carrick, Cloneen, Clongawny Beg and More, Cloonacullina, Cranreagh, Dernafanny, Derrinlough, Galros East and West, Guernal, Mullaghakaraun Bog and Timolin on OS 6-inch sheets Offaly Nos. 22 and 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 Clongawney bog. The extent of the rehabilitation area is indicated in Fig. 1. This area was examined using information from:

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

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

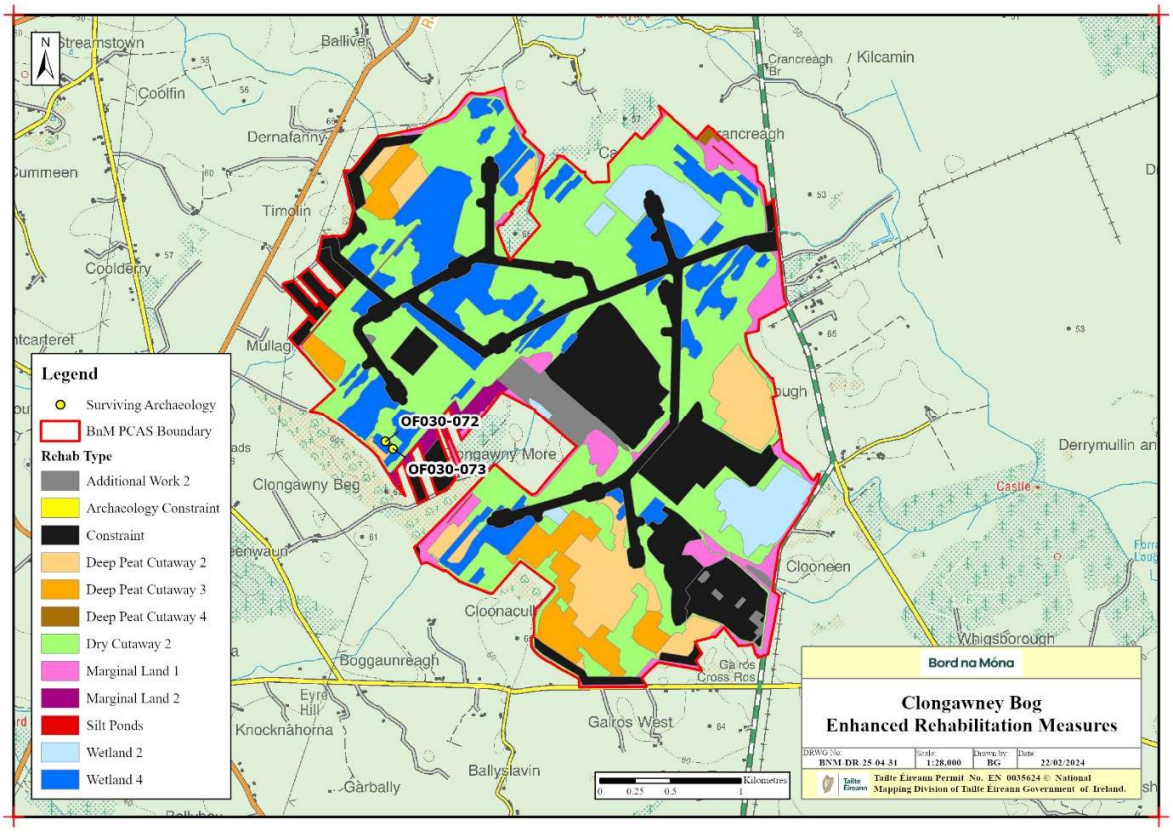



Fig. 1. Clongawney bog, Co. Offaly, the proposed rehabilitation measures and surviving archaeology sightings.

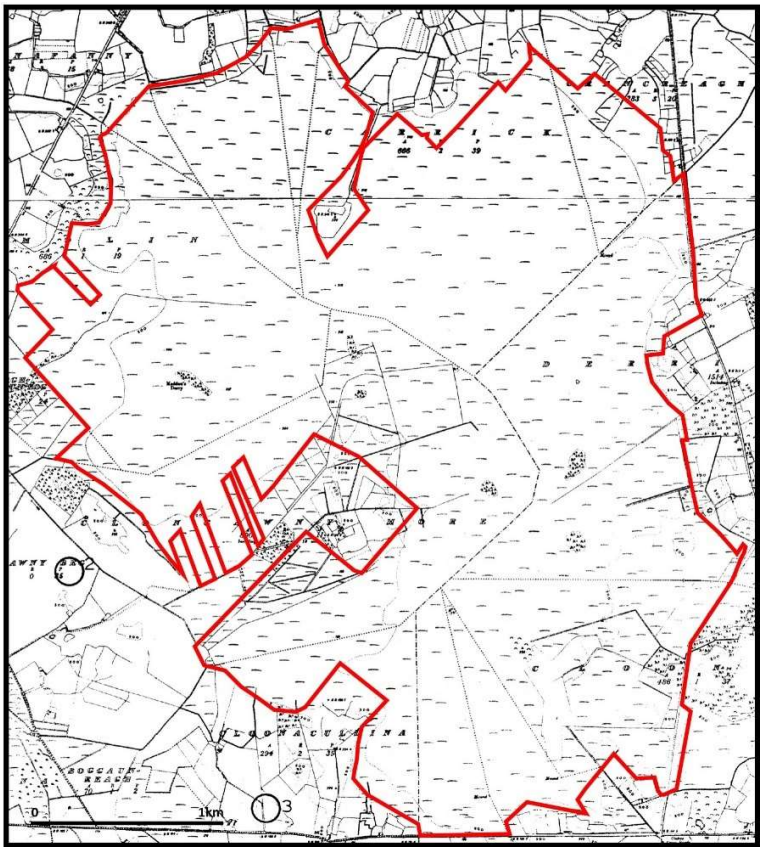



Fig. 2. Clongawney bog, Co. Offaly, detail of the Record of Monuments and Places map sheet Offaly Nos. 22 and 30. The proposed rehabilitation area is outlined with the red line.

## Desktop assessment

### 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 1995). This record was published by the Minister in 1995 and includes sites and monuments that were known in Clongawney bog before that date. This review established that there are no RMPs located in the proposed rehabilitation area (see Fig. 2).

### Peatland Survey

Irish Archaeological Wetland Unit 1997

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

| SMR No. | Catalogue code | IAWU Type | Type | Townland | ITM E | ITM N | IG E | IG N | Max Depth BS m |
|---|---|---|---|---|---|---|---|---|---|
| OF030-070---- | OF-CNM 0001 | TOGH | Road - class 3 togher | Clongawny | 605270 | 713860 | 205321 | 213829 | 0.02 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OF030-071---- | OF-CNM 0002 | PUTO | Road - class 3 togher | Clongawny | 605239 | 713824 | 205290 | 213793 | 0.13 |
| OF030-072---- | OF-CNM 0003 | WWIS | Structure - peatland | Clongawny | 605158 | 713674 | 205208 | 213643 | 0.00 |
| OF030-073---- | OF-CNM 0004 | TOGH | Road - class 3 togher | Clongawny | 605210 | 713623 | 205260 | 213592 | 0.07 |
| OF030-074---- | OF-CNM 0005 | TOGH | Road - class 3 togher | Clongawny | 605322 | 713663 | 205373 | 213632 | 0.01 |
| OF030-075---- | OF-CNM 0006 | TOGH | Road - class 3 togher | Clongawny | 605332 | 713816 | 205385 | 213789 | 0.07 |
| OF030-076---- | OF-CNM 0007 | TOGH | Road - class 3 togher | Clongawny | 605292 | 713889 | 205344 | 213862 | 0.14 |
| OF030-077---- | OF-CNM 0008 | TOGH | Road - class 2 togher | Clongawny | 605310 | 713900 | 205352 | 213860 | 0.04 |
| OF030-078---- | OF-CNM 0009 | WWIS | Structure - peatland | Clongawny | 605426 | 713978 | 205477 | 213947 | 0.08 |
| OF030-079---- | OF-CNM 0009 | TOGH | Road - class 3 togher | Clongawny | 605329 | 713674 | 205380 | 213643 | 0.12 |

Table 1. Sightings of archaeological material made during the IAWU Survey 1997 in the proposed rehabilitation area.

Peatland Survey 2009

There were two additional sightings of archaeological material made during the Peatland Survey 2009 field survey in Clongawney bog (licence 09E0411) (Rohan 2009) (See Table 2). These archaeological sightings were notified to the Archaeological Survey of Ireland. GPS was used to locate the findspots of the 1997 IAWU 1997 sightings. The area of the sightings was covered in scrub and trees and the drains were also overgrown with reeds but the central portion of the fields were clear. The previously recorded sightings were no longer visible, but the survey noted that they might still survive beneath the vegetation.

| SMR No. | Catalogue code | Townland | Type | ITM E | ITM N | IG E | IG N | Max Depth BS m |
|---|---|---|---|---|---|---|---|---|
| - | OF-CNY001 | Timolin | Archaeological Wood | 605242.4954 | 713992.2132 | 205293 | 213961 | 0.10 |
| - | OF-CNY002 | Clongawney More | Platform Possible | 604985.5507 | 713792.2575 | 205036 | 213761 | 0.10 |

Table 2. Sightings of archaeological material made during the Peatland Survey 2009 in the proposed rehabilitation area.

**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 11th of January 2024. This review established that there are 10 SMRs located in the proposed rehabilitation area (see Table 3 and Fig. 3).

| SMR No. | Catalogue code | IAWU Type | Type | Townland | ITM E | ITM N | IG E | IG N | Max Depth BS m |
|---|---|---|---|---|---|---|---|---|---|
| OF030-070---- | OF-CNM 0001 | TOGH | Road - class 3 togher | Clongawny | 605270 | 713860 | 205321 | 213829 | 0.02 |
| OF030-071---- | OF-CNM 0002 | PUTO | Road - class 3 togher | Clongawny | 605239 | 713824 | 205290 | 213793 | 0.13 |
| OF030-072---- | OF-CNM 0003 | WWIS | Structure - peatland | Clongawny | 605158 | 713674 | 205208 | 213643 | 0.00 |
| OF030-073---- | OF-CNM 0004 | TOGH | Road - class 3 togher | Clongawny | 605210 | 713623 | 205260 | 213592 | 0.07 |
| OF030-074---- | OF-CNM 0005 | TOGH | Road - class 3 togher | Clongawny | 605322 | 713663 | 205373 | 213632 | 0.01 |
| OF030-075---- | OF-CNM 0006 | TOGH | Road - class 3 togher | Clongawny | 605332 | 713816 | 205385 | 213789 | 0.07 |
| OF030-076---- | OF-CNM 0007 | TOGH | Road - class 3 togher | Clongawny | 605292 | 713889 | 205344 | 213862 | 0.14 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| OF030-077---- | OF-CNM 0008 | TOGH | Road - class 2 togher | Clongawny | 605310 | 713900 | 205352 | 213860 | 0.04 |
| OF030-078---- | OF-CNM 0009 | WWIS | Structure - peatland | Clongawny | 605426 | 713978 | 205477 | 213947 | 0.08 |
| OF030-079---- | OF-CNM 0009 | TOGH | Road - class 3 togher | Clongawny | 605329 | 713674 | 205380 | 213643 | 0.12 |

Table 3. The SMRs in the proposed rehabilitation area.

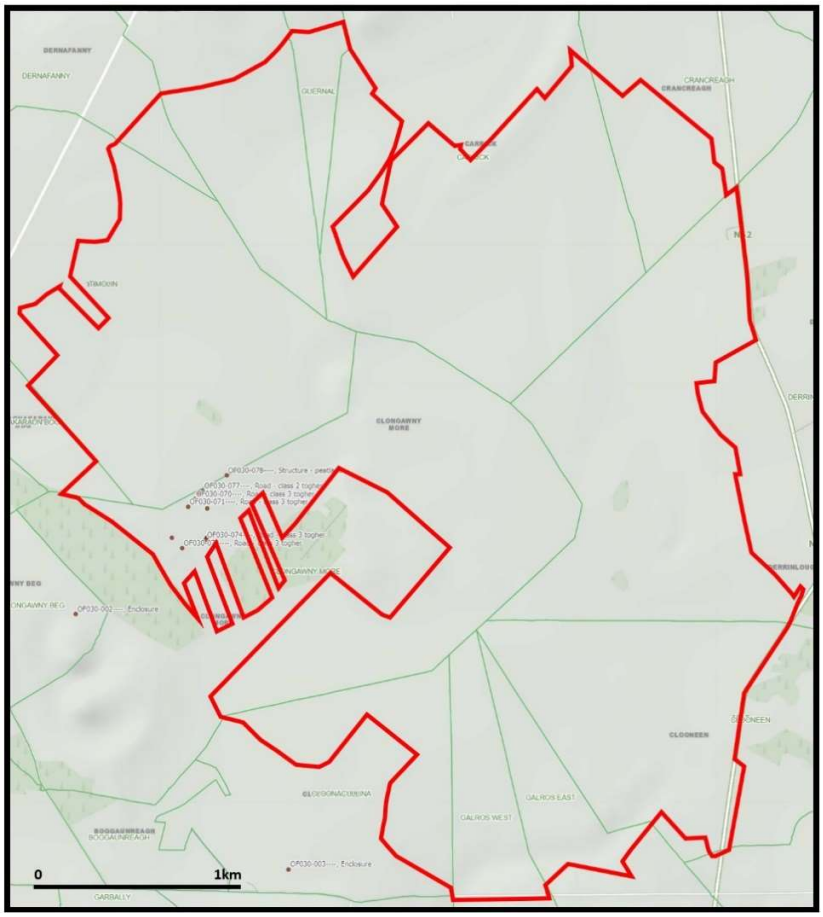



Fig. 3. Clongawney bog, Co. Offaly, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the red line.

**Archaeological Excavations**

A review of the excavations bulletin at excavations.ie indicated that there has been licenced archaeological monitoring carried out in the proposed rehabilitation area (see below).

**Monitoring 19E0095**

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. Several of these pits were excavated in the proposed rehabilitation area in Carrick, Timolin, Clongawney More, Derrinturn, Galros and Cloonacullina townlands. No positively identified archaeological features or structures were uncovered in any of the excavated trial pits. Pieces of wood that were not

identified as of archaeological significance were noted in compounds 2 and 3 in Clongawney Bog at a depth of 0.38m and 2.8m (see Plates 1 and 2). The timbers were preserved *in situ*. However, no coordinates are provided in the monitoring report for these trial pits (Carroll 2020).

Plate 1. Timbers identified during monitoring in Clongawney Bog in 2019 at compound 2.

Plate 2. Timber identified during monitoring in Clongawney Bog in 2019 at compound 3.

**Previous assessments**

Clongawney 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 archaeological objects 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 that there was a high potential for archaeological heritage to be uncovered during the course of any future development works in Clongawney bog.

**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 the nine known archaeological objects from Clongawney bog reported to the National Museum of Ireland up to 2018 (see Table 4).

| Townland | Museum No./ catalogue No. | Description |
|---|---|---|
| Carrick | 1937:2953 | oval stone macehead with a central perforation; |
| Carrick | 1966:151 | large upper stone of a rotary quern |
| Carrick | 1980:32 | roughout for a wooden goblet |
| Carrick | 1980:33 | notched wooden timber |
| Carrick | 1980:34 | cut log |
| Derrinlough | 1960:607 | Lucas type 3 leather shoe |
| Derrinlough | 2002:54 | Lucas type 5 leather shoe |
| Derrinlough | 2014:152 | unfinished yew bow |
| Derrinlough | 2014:230 | handle with wicker lashing |

Table 4. List of archaeological finds from Clongawney bog reported to the National Museum of Ireland.

## Impact assessment

There are 12 known sightings of archaeological material in the rehabilitation area. All of these sightings have LiDAR peat depth data available for 2008 and 2020. This data indicated that all but two sightings, SMR OF030-072---- and SMR OF030-073----, were probably removed by harvesting (see Table 4). There are nine archaeological objects known from the bog that have been removed to the National Museum (see Table 4).

| SMR No. | Catalogue code | Type | Townland | ITM E | ITM N | Max Depth BSm | 2008_Depth | 2020_Depth | Peat Removed (m) | Status |
|---|---|---|---|---|---|---|---|---|---|---|
| OF030-070---- | OF-CNM 0001 | Road - class 3 togher | Clongawny | 605270 | 713860 | 0.02 | 1.74 | 1.47 | 0.27 | Gone |
| OF030-071---- | OF-CNM 0002 | Road - class 3 togher | Clongawny | 605239 | 713824 | 0.13 | 1.60 | 1.36 | 0.23 | Gone |
| OF030-072---- | OF-CNM 0003 | Structure - peatland | Clongawny | 605158 | 713674 | 0.00 | 0.70 | 0.70 | 0.00 | Poss Survives |
| OF030-073---- | OF-CNM 0004 | Road - class 3 togher | Clongawny | 605210 | 713623 | 0.07 | 1.37 | 1.34 | 0.03 | Poss Survives |
| OF030-074---- | OF-CNM 0005 | Road - class 3 togher | Clongawny | 605322 | 713663 | 0.01 | 1.39 | 1.20 | 0.19 | Gone |
| OF030-075---- | OF-CNM 0006 | Road - class 3 togher | Clongawny | 605332 | 713816 | 0.07 | 1.62 | 1.43 | 0.18 | Gone |
| OF030-076---- | OF-CNM 0007 | Road - class 3 togher | Clongawny | 605292 | 713889 | 0.14 | 1.54 | 1.05 | 0.49 | Gone |
| OF030-077---- | OF-CNM 0008 | Road - class 2 togher | Clongawny | 605310 | 713900 | 0.04 | 1.09 | 0.83 | 0.25 | Gone |
| OF030-078---- | OF-CNM 0009 | Structure - peatland | Clongawny | 605426 | 713978 | 0.08 | 0.41 | 0.03 | 0.39 | Gone |
| OF030-079---- | OF-CNM 0009 | Road - class 3 togher | Clongawny | 605329 | 713674 | 0.12 | 1.43 | 1.23 | 0.20 | Gone |
| - | OF-CNY001 | Archaeological Wood | Timolin | 605242 | 713992 | 0.10 | 1.77 | 1.17 | 0.60 | Gone |
| - | OF-CNY002 | Platform Possible | Clongawney More | 604985 | 713792 | 0.10 | 2.20 | 1.28 | 0.92 | Gone |

Table 5. Sightings of archaeological material in the proposed rehabilitation area with depth of bog removed at each location since 2008.

## Recommendations

There are 12 known sightings of archaeological material in the rehabilitation area. Analysis of harvesting data indicated that two sightings, SMR OF030-072---- and SMR OF030-073----, may survive *in situ*. These two sightings should each be protected within a 20m buffer zone (see table 6). There are nine archaeological objects known from the bog that have been removed to the National Museum. Should any previously unknown archaeological heritage be uncovered during the rehabilitation works, it should be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

| SMR No. | Catalogue code | Type | Townland | ITM E | ITM N | Max Depth BSm | 2008_Depth | 2020_Depth | Peat Removed (m) | Status |
|---|---|---|---|---|---|---|---|---|---|---|
| OF030-072---- | OF-CNM 0003 | Structure - peatland | Clongawny | 605158 | 713674 | 0.00 | 0.70 | 0.70 | 0.00 | Poss Survives |
| OF030-073---- | OF-CNM 0004 | Road - class 3 togher | Clongawny | 605210 | 713623 | 0.07 | 1.37 | 1.34 | 0.03 | Poss Survives |

Table 6. Possibly surviving sightings of archaeological material in the proposed rehabilitation area that should be preserved within 20m buffer zones.

## Conclusion

There are 12 known sightings of archaeological material in the rehabilitation area. Analysis of harvesting data indicated that two sightings, SMR OF030-072---- and SMR OF030-073----, may survive *in situ*. These two sightings should each be protected within a 20m buffer zone. There are nine archaeological objects known from the bog that have been removed to the National Museum. Should any previously unknown archaeological heritage be uncovered during the rehabilitation works, it should 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.

DAHGI 1995. Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994. County Offaly.

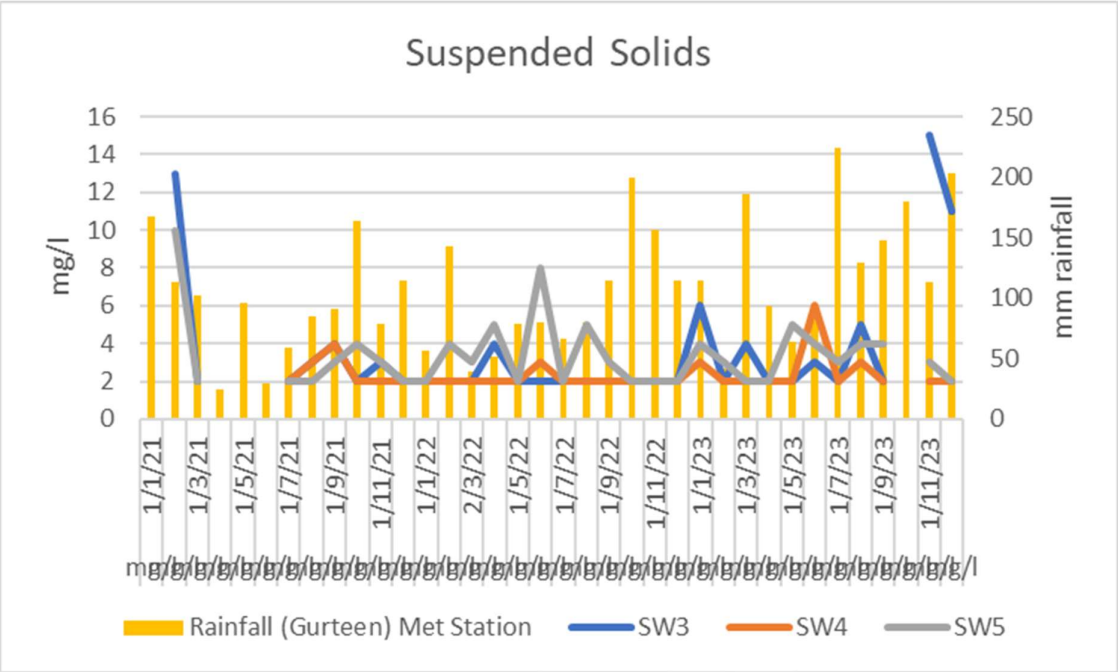
EPA 2020. Guidance on the process of preparing and implementing a bog rehabilitation plan.

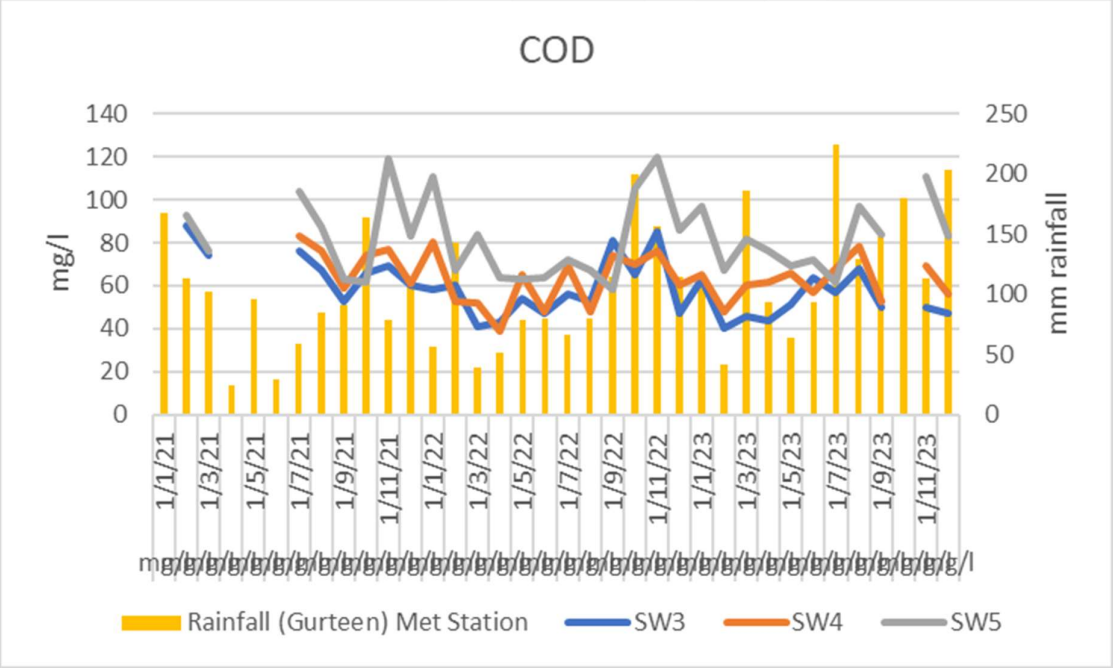
Mackin *et al.* 2017. Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service.

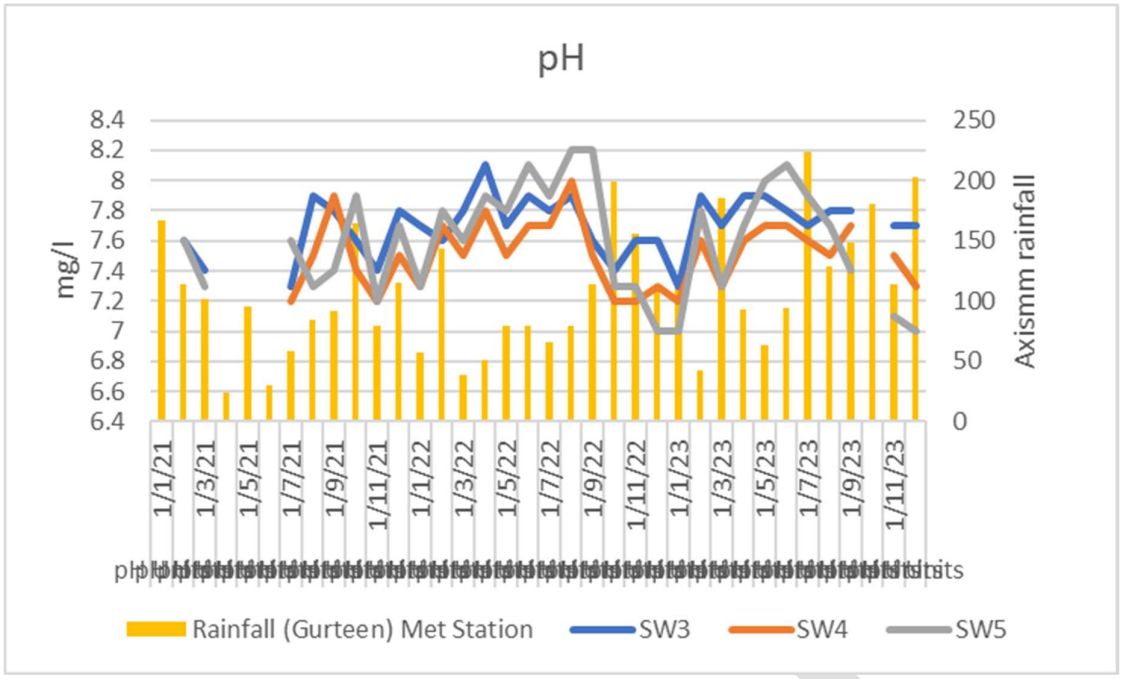
Rohan, N. 2009. Report on 2009 Re-assessment Field Survey Blackwater and Boora Group of bogs, Counties Offaly, Galway, Westmeath and Roscommon. Unpublished report for Bord na Móna.

Dr. Charles Mount
22 February 2024

## APPENDIX XIII. WATER QUALITY MONITORING RESULTS FOR CLONGAWNEY BOG

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8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
6.4
mg/l
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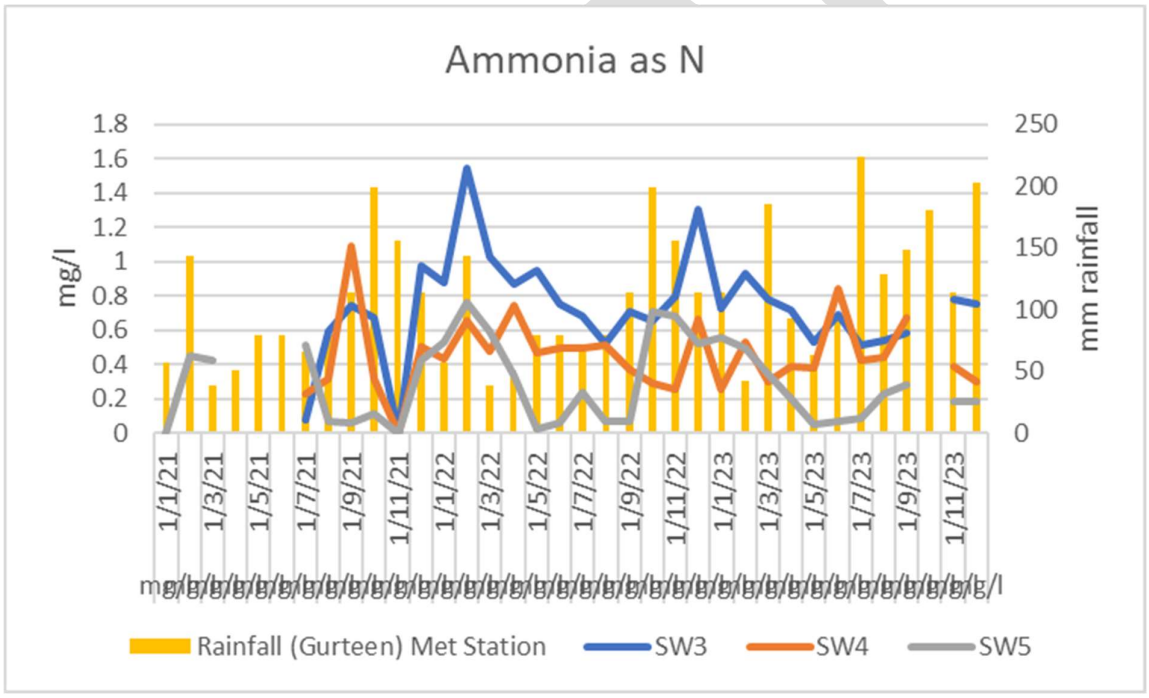
200
150
100
50
0
Axismm rainfall
1/1/21
1/3/21
1/5/21
1/7/21
1/9/21
1/11/21
1/1/22
1/3/22
1/5/22
1/7/22
1/9/22
1/11/22
1/1/23
1/3/23
1/5/23
1/7/23
1/9/23
1/11/23
Rainfall (Gurteen) Met Station
SW3
SW4
SW5


Ammonia as N
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
mg/l
250
200
150
100
50
0
mm rainfall
1/1/21
1/3/21
1/5/21
1/7/21
1/9/21
1/11/21
1/1/22
1/3/22
1/5/22
1/7/22
1/9/22
1/11/22
1/1/23
1/3/23
1/5/23
1/7/23
1/9/23
1/11/23
Rainfall (Gurteen) Met Station
SW3
SW4
SW5

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | 13 | <2 | N/S | N/S | N/S | <2 | 3 | 4 | <2 | 3 | <2 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | <2 | 3 | 4 | <2 | 2 | <2 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | 3 | N/S | 10 | <2 | N/S | <2 | N/S | <2 | <2 | 3 | 4 | 3 | <2 |
| | | | Rainfall (Gurteen) Met Station | | | 167.3 | 113.4 | 102.1 | 23.9 | 95.7 | 29.8 | 58.5 | 84.8 | 91.1 | 164 | 78.9 | 114.7 |

| PCAS SW Sampling Scheme | | | | 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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | 288 | 271 | N/S | N/S | N/S | 308 | 184 | 105 | 213 | 295 | 196 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | 335 | 241 | 134 | 235 | 287 | 190 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | 321 | N/S | 630 | 268 | N/S | 449 | N/S | 289 | 263 | 112 | 153 | 456 | 258 |
| | | | Rainfall (Gurteen) Met Station | | | 167.3 | 113.4 | 102.1 | 23.9 | 95.7 | 29.8 | 58.5 | 84.8 | 91.1 | 164 | 78.9 | 114.7 |

| PCAS SW Sampling Scheme | | | | 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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | 88 | 74 | N/S | N/S | N/S | 76 | 67 | 53 | 66 | 69 | 60 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | 83 | 76 | 59 | 74 | 77 | 61 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | 88 | N/S | 93 | 76 | N/S | 109 | N/S | 104 | 87 | 63 | 62 | 119 | 83 |
| | | | Rainfall (Gurteen) Met Station | | | 167.3 | 113.4 | 102.1 | 23.9 | 95.7 | 29.8 | 58.5 | 84.8 | 91.1 | 164 | 78.9 | 114.7 |

| PCAS SW Sampling Scheme | | | | 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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | 7.6 | 7.4 | N/S | N/S | N/S | 7.3 | 7.9 | 7.8 | 7.6 | 7.4 | 7.8 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | 7.2 | 7.5 | 7.9 | 7.4 | 7.2 | 7.5 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | 7.3 | N/S | 7.6 | 7.3 | N/S | 7.2 | N/S | 7.6 | 7.3 | 7.4 | 7.9 | 7.2 | 7.7 |
| | | | Rainfall (Gurteen) Met Station | | | 167.3 | 113.4 | 102.1 | 23.9 | 95.7 | 29.8 | 58.5 | 84.8 | 91.1 | 164 | 78.9 | 114.7 |

| PCAS SW Sampling Scheme | | | | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | <0.05 | <0.05 | N/S | N/S | N/S | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | <0.05 | N/S | <0.05 | <0.05 | N/S | <0.05 | N/S | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| | | | Rainfall (Gurteen) Met Station | | | 167.3 | 113.4 | 102.1 | 23.9 | 95.7 | 29.8 | 58.5 | 84.8 | 91.1 | 164 | 78.9 | 114.7 |

| PCAS SW Sampling Scheme | | | | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | 397 | 387 | N/S | N/S | N/S | 227 | 271 | 430 | 239 | N/S | 223 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | 206 | 251 | 393 | 147 | N/S | 198 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | 331 | N/S | 315 | 400 | N/S | 231 | N/S | 329 | 200 | 310 | 397 | N/S | 429 |
| | | | Rainfall (Gurteen) Met Station | | | 167.3 | 113.4 | 102.1 | 23.9 | 95.7 | 29.8 | 58.5 | 84.8 | 91.1 | 164 | 78.9 | 114.7 |

| PCAS SW Sampling Scheme | | | | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | N/S | N/S | N/S | 0.448 | N/S | N/S | N/S | N/S | 0.081 | 0.597 | 0.740 | 0.674 | N/S | 0.976 |
| Boora | P0500-01 | Clongawney | SW4 | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | 0.227 | 0.32 | 1.09 | 0.322 | N/S | 0.502 |
| Boora | P0500-01 | Clongawney | SW5 | N/S | 0.627 | N/S | 0.451 | 0.428 | N/S | 0.695 | N/S | 0.512 | 0.066 | 0.061 | 0.112 | N/S | 0.424 |
| | | | Rainfall (Gurteen) Met Station | | | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |

Gurteen Monthly Rainfall (2012, 2022 & 2023) www.met.ie

N/S - No sample due to flooding or drought

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | <2 | <2 | <2 | 4 | <2 | <2 | <2 | <2 | 2 | <2 | <2 | <2 |
| Boora | P0500-01 | Clongawney | SW4 | <2 | <2 | <2 | <2 | <2 | 3 | <2 | <2 | <2 | <2 | <2 | 2 |
| Boora | P0500-01 | Clongawney | SW5 | <2 | 4 | 3 | 5 | <2 | 8 | 2 | 5 | 3 | <2 | <2 | <2 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | 215 | 254 | 174 | 95 | 97.1 | 41.9 | 134 | 103 | 253 | 263 | 285 | 139 |
| Boora | P0500-01 | Clongawney | SW4 | 241 | 156 | 195 | 164 | 167 | 103 | 216 | 105 | 236 | 255 | 334 | 174 |
| Boora | P0500-01 | Clongawney | SW5 | 457 | 246 | 367 | 213 | 141 | 186 | 195 | 144 | 111 | 385 | 513 | 283 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | 58 | 60 | 41 | 43 | 54 | 47 | 56 | 53 | 81 | 65 | 85 | 47 |
| Boora | P0500-01 | Clongawney | SW4 | 80 | 53 | 52 | 39 | 65 | 48 | 69 | 48 | 74 | 70 | 76 | 60 |
| Boora | P0500-01 | Clongawney | SW5 | 111 | 67 | 84 | 64 | 63 | 64 | 72 | 67 | 58 | 105 | 120 | 86 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | 7.7 | 7.6 | 7.8 | 8.1 | 7.7 | 7.9 | 7.8 | 7.9 | 7.6 | 7.4 | 7.6 | 7.6 |
| Boora | P0500-01 | Clongawney | SW4 | 7.3 | 7.7 | 7.5 | 7.8 | 7.5 | 7.7 | 7.7 | 8 | 7.5 | 7.2 | 7.2 | 7.3 |
| Boora | P0500-01 | Clongawney | SW5 | 7.3 | 7.8 | 7.6 | 7.9 | 7.8 | 8.1 | 7.9 | 8.2 | 8.2 | 7.3 | 7.3 | 7 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** | **TP as P** |
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.005 | <0.05 | <0.05 |
| Boora | P0500-01 | Clongawney | SW4 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Boora | P0500-01 | Clongawney | SW5 | <0.05 | 0.06 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** | **TS** |
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | 187 | 210 | 288 | 339 | 372 | 426 | 422 | 529 | 212 | 275 | 301 | 225 |
| Boora | P0500-01 | Clongawney | SW4 | 221 | 296 | 336 | 299 | 328 | 387 | 398 | 410 | 270 | 236 | 220 | 458 |
| Boora | P0500-01 | Clongawney | SW5 | 369 | 462 | 420 | 411 | 480 | 483 | 458 | 502 | 381 | 439 | 350 | 439 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** | **Ammonia as N** |
| **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 |
| | | | | 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 |
| Boora | P0500-01 | Clongawney | SW3 | 0.875 | 1.540 | 1.030 | 0.872 | 0.944 | 0.753 | 0.680 | 0.524 | 0.708 | 0.655 | 0.796 | 1.3 |
| Boora | P0500-01 | Clongawney | SW4 | 0.433 | 0.652 | 0.478 | 0.746 | 0.468 | 0.499 | 0.495 | 0.514 | 0.368 | 0.292 | 0.254 | 0.662 |
| Boora | P0500-01 | Clongawney | SW5 | 0.527 | 0.758 | 0.596 | 0.333 | 0.027 | 0.058 | 0.242 | 0.071 | 0.070 | 0.706 | 0.681 | 0.523 |
| | | | Rainfall (Gurteen) Met Station | 56.9 | 143.1 | 39 | 51.6 | 78.9 | 79.4 | 66 | 79.6 | 114.2 | 199.3 | 156.2 | 114.3 |

Gurteen Monthly Rainfall (2012, 2022 & 2023) www.met.ie

N/S - No sample due to flooding or drought

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/13 |
| Boora | P0500-01 | Clongawney | SW3 | 6 | <2 | 4 | 2 | <2 | 3 | <2 | 5 | 2 | N/S | 15 | 11 |
| Boora | P0500-01 | Clongawney | SW4 | 3 | <2 | <2 | 2 | 2 | 6 | <2 | 3 | 2 | N/S | 2 | <2 |
| Boora | P0500-01 | Clongawney | SW5 | 4 | 3 | 2 | 2 | 5 | 4 | 3 | 4 | 4 | N/S | 3 | <2 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | 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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/23 |
| Boora | P0500-01 | Clongawney | SW3 | 284 | 120 | 200 | 128 | 115 | 137 | 194 | 257 | 141 | N/S | 367 | 326 |
| Boora | P0500-01 | Clongawney | SW4 | 265 | 176 | 258 | 215 | 207 | 180 | 262 | 359 | 175 | N/S | 305 | 267 |
| Boora | P0500-01 | Clongawney | SW5 | 496 | 230 | 318 | 334 | 181 | 167 | 148 | 320 | 251 | N/S | 488 | 396 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | 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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/23 |
| Boora | P0500-01 | Clongawney | SW3 | 63 | 40 | 46 | 44 | 51 | 64 | 57 | 68 | 50 | N/S | 50 | 47 |
| Boora | P0500-01 | Clongawney | SW4 | 65 | 48 | 60 | 62 | 66 | 57 | 68 | 78 | 53 | N/S | 69 | 56 |
| Boora | P0500-01 | Clongawney | SW5 | 97 | 67 | 82 | 76 | 69 | 72 | 62 | 97 | 84 | N/S | 111 | 83 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | 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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/23 |
| Boora | P0500-01 | Clongawney | SW3 | 7.3 | 7.9 | 7.7 | 7.9 | 7.9 | 7.8 | 7.7 | 7.8 | 7.8 | N/S | 7.7 | 7.7 |
| Boora | P0500-01 | Clongawney | SW4 | 7.2 | 7.6 | 7.3 | 7.6 | 7.7 | 7.7 | 7.6 | 7.5 | 7.7 | N/S | 7.5 | 7.3 |
| Boora | P0500-01 | Clongawney | SW5 | 7 | 7.8 | 7.3 | 7.7 | 8 | 8.1 | 7.9 | 7.7 | 7.4 | N/S | 7.1 | 7 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P | TP as P |
| **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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/23 |
| Boora | P0500-01 | Clongawney | SW3 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.05 | 0.09 | N/S | <0.05 | <0.05 |
| Boora | P0500-01 | Clongawney | SW4 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | N/S | <0.05 | <0.05 |
| Boora | P0500-01 | Clongawney | SW5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | N/S | <0.05 | 0.07 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS | TS |
| **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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/23 |
| Boora | P0500-01 | Clongawney | SW3 | 203 | 292 | 116 | 380 | 310 | 422 | 321 | 303 | 539 | N/S | 290 | 280 |
| Boora | P0500-01 | Clongawney | SW4 | 280 | 280 | 224 | 311 | 377 | 487 | 269 | 267 | 232 | N/S | 295 | 243 |
| Boora | P0500-01 | Clongawney | SW5 | 377 | 448 | 335 | 453 | 490 | 531 | 409 | 378 | 322 | N/S | 283 | 175 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **PCAS SW Sampling Scheme** | | | | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N | Ammonia as N |
| **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 |
| | | | | 1/1/23 | 1/2/23 | 1/3/23 | 1/4/23 | 1/5/23 | 1/6/23 | 1/7/23 | 1/8/23 | 1/9/23 | 1/10/23 | 1/11/23 | 1/12/23 |
| Boora | P0500-01 | Clongawney | SW3 | 0.726 | 0.932 | 0.778 | 0.718 | 0.532 | 0.695 | 0.518 | 0.543 | 0.587 | N/S | 0.776 | 0.749 |
| Boora | P0500-01 | Clongawney | SW4 | 0.255 | 0.535 | 0.298 | 0.391 | 0.379 | 0.844 | 0.423 | 0.443 | 0.675 | N/S | 0.392 | 0.304 |
| Boora | P0500-01 | Clongawney | SW5 | 0.559 | 0.494 | 0.345 | 0.206 | 0.049 | 0.07 | 0.09 | 0.234 | 0.282 | N/S | 0.181 | 0.182 |
| | | | Rainfall (Gurteen) Met Station | 113.9 | 42 | 185.9 | 93.4 | 63.5 | 93.8 | 224.1 | 129.1 | 148.2 | 179.9 | 113.5 | 202.9 |

Gurteen Monthly Rainfall (2012, 2022 & 2023) www.met.ie

N/S - No sample due to flooding or drought