

# **Bord na Móna**

## **Ballaghurt & Glebe Bogs**

### **Cutaway Bog Decommissioning and Rehabilitation Plan**

#### **2023**

This document seeks to address the requirements of Condition 10.2 of IPC License Ref: P0502-01:

*“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 Ballaghurt and Glebe Bogs upon cessation of peat production and compliments the licence requirement to decommission the site.*

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

*Industrial peat production has now fully ceased at Ballaghurt and Glebe Bogs.*

*In addition, to preparing this document to comply with Condition 10 of IPC Licence Ref. P0502-01, due regard was also given to the Peatlands Climate Action Scheme (PCAS) announced by the Minister. This Scheme will see the Minister support, via the Climate Action Fund and Ireland’s National Recovery and Resilience Plan, Bord na Móna in developing a package of measures, ‘the Scheme’, for enhanced decommissioning, rehabilitation and restoration of cutaway peatlands referred to as, the Peatlands Climate Action Scheme’. However, only the additional costs associated with the additional and enhanced rehabilitation, i.e., measures which go beyond the existing standard mandatory decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support. The additional costs of the Scheme will be supported by Government through the Climate Action Fund and Ireland’s National Recovery and Resilience Plan, administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator.*

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

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

*Any consideration of any other future after-uses for Ballaghurt and Glebe 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.*

### Document Control Sheet

<b>Document Name:</b>	<b>Ballaghurt &amp; Glebe Bogs Decommissioning and Rehabilitation Plan 2023</b>
<b>Document File Path:</b>	<b>Q:\Ecology Team\EPA draft rehab plans 2017 word docs\Allen 503_Clonsast\Ballaghurt</b>
<b>Document Status:</b>	<b>Draft</b>

<b>This document comprises:</b>	<b>DCS</b>	<b>TOC</b>	<b>Text (Body)</b>	<b>References</b>	<b>Maps</b>	<b>No. of Appendices</b>
	<b>1</b>	<b>2</b>	<b>37</b>	<b>4</b>	<b>0</b>	<b>13</b>

<b>Rev.</b>	<b>1.0</b>	<b>Author(s):</b>	<b>Checked By:</b>	<b>Approved By:</b>
<b>Name(s):</b>		<b>SC</b>	<b>MMC</b>	<b>MMC</b>
<b>Date:</b>		<b>29/03/2022</b>		
<b>Rev.</b>	<b>1.1</b>	<b>Author(s):</b>	<b>Checked By:</b>	<b>Approved By:</b>
<b>Name(s):</b>		<b>DMN</b>	<b>CC</b>	
<b>Date:</b>		<b>17/11/2022</b>	<b>29/11/22</b>	
<b>Rev.</b>	<b>1.2</b>	<b>Author(s):</b>	<b>Checked By:</b>	<b>Approved By:</b>
<b>Name(s):</b>		<b>DMN</b>	<b>MMC</b>	<b>MMC</b>
<b>Date:</b>		<b>06/01/2023</b>	<b>06/01/2023</b>	<b>06/01/2023</b>
<b>Rev.</b>	<b>V6</b>	<b>Author(s):</b>	<b>Checked By:</b>	<b>Approved By:</b>
<b>Name(s):</b>		<b>DMN</b>	<b>MMC</b>	<b>MMC</b>
<b>Date:</b>		<b>17/01/2023</b>	<b>17/01/2023</b>	<b>17/01/2023</b>

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## NON-TECHNICAL SUMMARY

- Industrial peat harvesting is now finished at Ballaghurt & Glebe Bogs.
- Bord na Móna is planning to rehabilitate Ballaghurt & Glebe Bogs, located in Co. Offaly in 2023.
- This is happening as Bord na Móna are obliged to carry out peatland rehabilitation via an IPC License issued by the Environmental Protection Agency. In addition, the Government has agreed to support peatland rehabilitation via the establishment of the Peatland Climate Action Scheme (PCAS). This is funded via the Government and by Bord na Móna.
- The key objective of peatland rehabilitation is environmental stabilisation. This means developing habitats and vegetation back onto the bare peat (putting a “skin” back onto the peat), and minimising effects to downstream waterbodies. The Ballaghurt & Glebe Bogs were drained and harvested for peat. Better results for water quality improvements, climate action, the reduction of carbon emissions and biodiversity are achieved when the remaining peat is re-wetted. This means drain-blocking and other measures to raise water levels to the surface of the bog and to encourage the natural colonisation of vegetation.
- In general, soggy ground conditions are preferred. This means the remaining peat is wet and that plants that prefer wetter conditions, like Bog Cotton will thrive.
- Some sections with deeper residual peat have the capacity to regrow *Sphagnum* moss again, where there are suitable hydrological conditions. *Sphagnum* is a key species for restoring naturally functioning raised bog conditions.
- Many parts of Bord na Móna bogs cannot be restored back to raised bog in the short-term, as so much peat has been removed and the environmental conditions have been modified. However other peatland habitats with Heather, Bog Cotton, Rushes, Purple Moor-grass, Bog-mosses and scattered trees will develop, and in time a naturalised peatland can be restored.
- The development of a range of habitats in the Ballaghurt & Glebe Bogs will support biodiversity including plants, insects, birds and mammals. This includes some species that are rare and protected in the wider landscape. It will increase the national area of native woodland. Many wetland habitats in the wider landscape have been reclaimed for agriculture and other uses and peatland rehabilitation is an opportunity to create new peatland and wetland habitats.
- Ballaghurt & Glebe Bogs were utilised for industrial peat production from 1981 until 2020. Much of the former cutaway area currently comprises bare peat.
- Measures proposed for the Ballaghurt & Glebe Bogs include drain blocking and additional measures required to raise water levels to the surface of the peat (cell bunding for example). Some fertiliser will be spread on headlands and other areas (a small part of the overall area) to encourage vegetation growth.
- 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.
- It will take some time for vegetation and habitats to fully develop at the Ballaghurt & Glebe Bogs, and a peatland ecosystem to be restored. However, it is expected that most of the bog will be developing pioneer habitats after 5-10 years.
- This is a peatland rehabilitation plan. This plan does not consider future after-use or development. Bord na Móna continually reviews its land-bank to consider future commercial or industrial developments, such as renewable energy. Any other proposed development will be planned in adherence to relevant planning guidelines and will consider the rehabilitation and the condition of the bog.

- Peatland rehabilitation of this bog will bring a range of benefits to the local community via improvements to the local landscape and is also important for supporting national policies and strategies in relation to reduction of carbon emissions from these peatlands, supporting biodiversity and improvements to water quality.

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## 1. INTRODUCTION

Bord na Móna operates under an IPC Licence issued and administered by the EPA to extract peat within the Blackwater Bog group (Ref. P0502-01). 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. Both Ballaghurt & Glebe bogs are part of the Blackwater Bog group (see Appendix II for details of the bog areas within the Blackwater Bog Group). The bogs are located close to the northern margin of Co. Offaly, 4 km west of Ferbane Town.

This document seeks to address the requirements of Condition 10.2 of IPC Licence Ref. P0502-01:

*“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 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 actions;
- Budget and Costings; and
- Associated aftercare, maintenance and monitoring.

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

It is proposed by Government that Bord na Móna carry out a Peatlands Enhanced Decommissioning, Rehabilitation and Restoration Scheme on its peatlands. Note this proposal is also known colloquially as the ‘Peatlands Climate Action Scheme’ (PCAS). The additional costs of the Scheme will be supported by Government through the Climate Action Fund, and Ireland’s National Recovery and Resilience Plan administered by the Department of Environment, Climate and Communications (DECC), while the National Parks and Wildlife Service (NPWS) will act as the Scheme regulator. Bord na Móna have previously identified a footprint of 33,000 ha as peatlands suitable for this scheme. This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations (Appendix VII & IX) under existing EPA IPC licence conditions. Improvements supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. The Scheme commenced in 2021.

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



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

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

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

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

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

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

Ballaghurt & Glebe Bogs are proposed to be part of this this Scheme (PCAS) and this rehabilitation plan outlines the approach taken.

## 1.1 Constraints and Limitations

This document covers the area of both **Ballaghurt** and **Glebe Bogs**. This rehabilitation plan takes account of the **current land-uses** of both Ballaghurt and Glebe Bog.

The former peat production area of both Ballaghurt and Glebe Bogs is largely bare peat as both were in industrial peat extraction until recently (2020). Peat extraction commenced at Ballaghurt Bog in 1981 and at Glebe in the 1990's.

Currently the cutaway area comprises largely bare peat along with some pioneering cutaway habitats, in addition to marginal<sup>1</sup> habitats.

Rehabilitation in other areas of the bog may also be constrained due to other property issues or issues such as rights of way. There are a small number of “rights of way” routes and third party lands located within both the eastern and western portions of Ballaghurt Bog. Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remain 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.

There are known archaeology records on Ballaghurt Bog but none on Glebe Bog. All rehabilitation measures proposed at Ballaghurt and Glebe Bogs will consider the sensitivity of any archaeology.

Some high bog remnants (within the areas owned and under the control of Bord na Móna) 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 Ballaghurt Bog and Glebe Bog, however where considered appropriate some of these areas are proposed for rehabilitation. Nevertheless where known turbary exists this may constrain the proposed rehabilitation actions, and this rehabilitation plan considered potential impacts of these on the delivery of the stated objectives.

Bord na Móna will continue to review the future after-use of its land-bank. Any consideration of any other future after-uses for both Ballaghurt Bog and Glebe Bog will be conducted in adherence to the relevant planning legislation and consultation with relevant authorities and will be considered within the framework of this rehabilitation plan.

Ballaghurt Bog is under review for inclusion in ‘People and Peatlands’; a project under the European Union’s LIFE Programme. Any area selected for inclusion in the above project may become a constraint in due course.

A solar energy project is proposed for Blackwater Bog, located to the west of Ballaghurt. This proposed project ([Home | Blackwater Solar Farm](#)) has not been submitted for planning yet. A small area of Ballaghurt, which is part of a sub-catchment of Blackwater bog is treated as a constraint.

Glebe Bog overlaps the proposed Natural Heritage Area (pNHA) called ‘Clonllyn Glebe Bog’ (Site Code: 000893). This pNHA was selected as a proposed Natural Heritage Area (Site Code 893)

There are proposals for part of the proposed Shannon Monastic Greenway to utilise the existing railway corridor and some headlands through the two lobes of Ballaghurt Bog. Any proposed enhancement measures (i.e. targeted drain-blocking) will be positively aligned with future planned land-uses and will look to facilitate amenity, where possible. Re-wetting will be planned as to not to rule out potential future amenity.

Bord na Móna are currently monitoring Greenhouse gas (GHG) emissions using a flux-tower and associated chambers and access at Ballaghurt Bog. In order to retain the integrity of this research and associated infrastructure, a small area of the bog in which the tower is located will be constrained.

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<sup>1</sup> 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.

## 2. METHODOLOGY

This rehabilitation plan was developed with a combination of desktop and field surveys, consultations with internal and external stakeholders and cognisance of the Scheme (PCAS). The development of this rehabilitation plan considered **recently published** guidance issued by the EPA in 2020 – **Guidance on the process of preparing and implementing a bog rehabilitation plan**.

The ecological information and site information collected during the Bord na Móna ecological baseline survey, additional confirmatory site visits (covering the period 2011 to 2022 inclusive) and monitoring and desktop analysis forms the basis for the development of the rehabilitation plan for the bog, along with:

- Experience of 40 years of research on the after-use development and rehabilitation of the Bord na Móna cutaway bogs (Clarke, 2010; Bord na Móna, 2016);
- Significant international engagement during this period with other counties in relation to best practice regarding peatland rehabilitation and after-use through the International Peat Society and the Society for Ecological Restoration (Joosten & Clarke, 2002; Clarke & Rieley, 2010; Gann *et al.*, 2019);
- Consultation and engagement with internal and external stakeholders;
- GIS Mapping;
- BNM drainage surveys;
- Bog topography and LiDAR data;
- Hydrological modelling; and
- The development of a Methodology Paper<sup>2</sup> 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 Ballaghurt & Glebe Bogs, 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.
- Bonn *et al.* (2017). Peatland restoration and ecosystem services- science, policy and practice.
- Carroll *et al.* (2009). *Sphagnum* in the Peak District. Current Status and Potential for Restoration. Moors for the Future Report No 16.
- Clark & Rieley (2010). Strategy for responsible peatland management.
- Eades *et al.* (2003). The Wetland Restoration Manual.
- Farrell & Doyle (2003). Rehabilitation of Industrial Cutaway Atlantic Blanket Bog, NW Mayo, Ireland.
- Gann *et al.* (2019). International Principles and Standards for the practice of Ecological Restoration.

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<sup>2</sup> Bord na Móna (2022). *Methodology Paper for the Enhanced Decommissioning, Rehabilitation and Restoration on Bord na Móna Peatlands – Preliminary Study Nov 2022 Version 19*. Bord na Móna. Available online at :

<https://www.bnmpcas.ie/supporting-material/>

- Hinde *et al.* (2010). *Sphagnum* re-introduction project: A report on research into the re-introduction of *Sphagnum* mosses to degraded moorland. Moors for the Future Research Report 18.
- Joosten & Clarke (2002). Wise Use of mires and peatlands – Background and Principles including a framework for Decision-making.
- Lindsay (2010). Peatbogs and Carbon: a Critical Synthesis to Inform Policy Development in Oceanic Peat Bog Conservation and Restoration in the Context of Climate Change.
- Mackin *et al.* (2017). Best practice in raised bog restoration in Ireland. Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service,
- McBride *et al.* (2011). The Fen Management Handbook (2011), Scottish Natural Heritage.
- McDonagh (1996). Drain blocking by machines on Raised Bogs. Unpublished report for National Parks and Wildlife Service.
- NPWS (2017a). National Raised Bog Special Areas of Conservation management plan. Department of Arts, Heritage and the Gaeltacht.
- Pschenyckyj *et al.*, 2021, Optimising Water Quality Returns from Peatland Management while Delivering Co-Benefits for Climate and Biodiversity, Report produced for An Fóram Uisce, Online, Available at: [https://thewaterforum.ie/app/uploads/2021/04/Peatlands\\_Full\\_Report\\_Final\\_March2021b.pdf](https://thewaterforum.ie/app/uploads/2021/04/Peatlands_Full_Report_Final_March2021b.pdf), Accessed 17.08.2021.
- Quinty & Rochefort (2003). Peatland Restoration Guide, second edition. Canadian *Sphagnum* Peat Moss Association and New Brunswick Department of Natural Resources and Energy.
- Regan, *et al.* (2020). Ecohydrology, Greenhouse Gas Dynamics and Restoration Guidelines for Degraded Raised Bogs. EPA Research Report. Prepared for the Environmental Protection Agency by Trinity College Dublin.
- Renou-Wilson *et al.* (2011). BOGLAND - Sustainable Management of Peatlands in Ireland. STRIVE Report No 75 prepared for the Environmental Protection Agency.
- Schouten (2002). Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies. Dúchas - The Heritage Service of the Department of the Environment and Local Government, Ireland;
- Thom (2019). Conserving Bogs – Management Handbook.
- Wheeler & Shaw (1995). Restoration of Damaged Peatlands – with Particular Reference to Lowland Raised Bogs Affected by Peat Extraction.
- Wittram *et al.* (2015). A Practitioners Guide to *Sphagnum* Reintroduction. Moors for the Future Partnership.

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

- Blackwater Integrated Pollution Control Licence;
- Blackwater Annual Environmental Reports;
- Review of the National Biodiversity Data Centre (NBDC) web mapper;
- Inland Fisheries Ireland (IFI) Reports;
- Environmental Protection Agency database ([www.epa.ie](http://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](http://www.birdwatchireland.ie));
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database ([www.gsi.ie](http://www.gsi.ie));
- Historic Environment Viewer at <https://webgis.archaeology.ie/historicenvironment/>

- National Parks & Wildlife Services Public Map Viewer ([www.npws.ie](http://www.npws.ie));
- Water Framework Directive catchments.ie/maps/ Map Viewer ([www.catchments.ie](http://www.catchments.ie));
- OPW Indicative Flood Maps ([www.floodmaps.ie](http://www.floodmaps.ie));
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps ([www.cfram.ie](http://www.cfram.ie));
- River Basin Management Plan for Ireland 2018 – 2021;
- Bord na Móna Annual Report 2020;
- Bord na Móna Annual Report 2021;
- Spatial data in respect of Article 17 reporting, available online at <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17>;
- Bord na Mona Biodiversity Action Plan 2016-2021,
- Review of Raised Bog Natural Heritage Area Network (NPWS, 2014)

## 2.2 Consultation

A number of stakeholders have been identified during the course of Bord na Móna's rehabilitation and Biodiversity Action Plan activities and 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, Ballaghurt Bog was surveyed in 2010, 2013 and 2015. Additional ecological monitoring and visits will be undertaken at Ballaghurt Bog to inform rehabilitation planning, 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 has already been prepared for these sites. This was reviewed and updated where necessary following the 2022 site visit. This followed best practice guidance from Smith *et al.* (2011). Map outputs including all habitat maps and target notes were produced using GIS software application packages (ArcGIS). General marginal habitats and other habitats that had not been modified significantly by industrial peat extraction were classified using Fossitt *et al.* (2000). Plant nomenclature for vascular plants follows Stace (2019), while mosses and liverworts nomenclature follows identification keys published by the British Bryological Society (2010). A more detailed Bord na Móna classification system was developed for classifying pioneer cutaway habitats as Fossitt categories were deemed not to be detailed enough for cutaway bog (much of cutaway bog could be classified as Cutover Bog - PB4). Much of the pioneer cutaway vegetation is still at an early stage of its development and cannot be assigned to Fossitt Level 3 categories yet.

A detailed ecological survey reports for both Ballaghurt Bog and Glebe Bog are contained in Appendix III.

### 3. SITE DESCRIPTION

Ballaghurt Bog and Glebe Bog are located approximately 5.9km south of Ballynahown in County Offaly at their nearest. This group of bogs is contained within three main sections with Ballaghurt Bog divided into an eastern section (or lobe) and western section (or lobe), and Glebe Bog located nearby to the southeast. Glebe Bog is a relatively small bog located 4 km north-west of Ferbane in Co. Offaly. It is separated from the larger bog by a local road and a small band of farmland. Ballaghurt is connected, via rail links, to Blackwater Bog to the west and Lemanaghan Bog to the south east. Several sections of remnant raised bog are located along the margins of these bog parcels. These remnant areas are small in extent and degraded in condition (associated with drainage operations and peat extraction operations) and many are actively managed for the production of domestic turf.

Ballaghurt and Glebe bogs have gravity drainage regimes. Ballaghurt is one of a cluster of bogs that has developed along the floodplains of the River Shannon. The Blackwater River southwards flows through the eastern section of the northernmost lobe of Ballaghurt, continuing southwards to skirt the northern boundary of Glebe Bog before flowing eastwards along the southern boundary of the western section of Ballaghurt Bog.

See figure **BNM-DR-24-04-01**: titled **Ballaghurt & Glebe Bogs: Bog Site Location** and figure **BNM-DR-24-04-24**: titled **Blackwater Bog Group** in the accompanying map book for reference.

#### 3.1 Status and Situation

##### 3.1.1 Site history

Peat production first began on Ballaghurt Bog in 1981.

Glebe Bog was originally developed for production by Bord na Móna in the late 1980s-1990s. The bog was ditched with regular drains and some vegetation was removed. This bog still contains deep residual peat.

##### 3.1.2 Current land-use

###### Ballaghurt bog

Ballaghurt bog began production in 1981 and the majority of the bog was in industrial peat production until recently. The topography of the main production area across both sub-sections or lobes is variable and there are several glacial mounds present under the peat. These are likely to be exposed sooner than the surrounding bog, as there is a thinner layer of peat overlaying them. There is some remnant high bog around the margins that is being utilised for the production of domestic turf.

An isolated section of raised bog is located to the north of the Doon to Clonmacnoise public road. This section of bog has been partially drained and is dominated by Ling Heather (*Calluna vulgaris*). Gorse (*Ulex europaeus*) is colonising this area and turf cutting is active. A block of high fields, close to the works area in the southwest corner of the northern lobe, contains several former production fields that have re-vegetated with Heather.

A mineral Island is located in the southwest of the western lobe and contains scrub, a number of small fields and a broadleaf plantation. A Broadleaf plantation is within the BnM property and was planted in 1987. Areas of Birch woodland and remnant sections of raised bog are located along the margins of the mineral island.

Marginal habitats include remnant sections of raised bog, Birch woodland, scrub and wet grassland.



### Glebe bog

The majority of the bog is regularly ditched with deep drains about 1-2 m deep. The drains are functional with running water and very few have standing water or any developing *Sphagnum* mosses. The fields in between the drains are dominated by bare peat throughout much of the site while a number of fields in the eastern section support some recolonising vegetation. Some of the above, as a result of less intensive ditching, have even shallower drains and the fields have more vegetation cover and taller vegetation.

#### 3.1.3 Socio-Economic conditions

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

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

In respect of Ballaghurt & Glebe Bogs, jobs would have included those to facilitate fuel peat production.

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

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

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 data indicates that the northern lobe of Ballaghurt is underlain by the Ballysteen Formation on its north-westerly side, and Waulsortian Limestone on its south-easterly side. This is similar also the case for the more western lobe of Ballaghurt which is similar but also has a small area underlain with the Navan Beds formation. Glebe Bog is completely underlain with Waulsortian Limestone.

All the units are classified as locally important aquifers as they are moderately productive in local zones only. Several bedrock faults cross through the bog, most of which pass through the southern lobe. Geological Survey of Ireland (GSI) mapping identifies a karst feature (superficial solution feature) in close proximity to Ballaghurt.

### 3.2.2 Peat type and depths

Peat thickness data for Ballaghurt indicates that most of the northern lobe has relatively thick sequences of peat remaining (typically 2-7m), with only one small section of the bog where peat thickness is <1m. This section of the bog is underlain by marl which was found to be exposed in drains in this area during field surveys. In contrast, peat thickness is relatively shallow across most of the western lobe (<1.5m) with large sections of this lobe having peat thickness of <1m.

Peat depths within Glebe bog are generally deeper residual peat and as such has better potential to support deep peat rehabilitation measures.

See the mapbook figure **BNM-DR24-04-04** titled **Ballaghurt and Glebe Bogs: Peat Depths**.

## 3.3 Key Biodiversity Features of Interest

The majority of Ballaghurt Bog within the Bord na Móna boundary now comprise bare peat (although there is some vegetated or re-vegetating cutaway) as this site was harvested for peat until recently. Due to the recent cessation of industrial peat production, there has been little opportunity for post-production cutaway habitats to develop across the entirety of the areas under review, and habitats of biodiversity interest are therefore largely confined to the marginal habitats fringing the cutaway. At Glebe bog, much of the western half of the site comprises of bare peat for the same reasons listed above. However, much of the eastern half of the bog has been out of peat production for some time and is revegetating with Heather and other typical bog plants. There are known records of species of conservation concern such as Red listed bird species, along with mammals such as European Otter. There are a number of designated sites in proximity included European Sites, a Ramsar Site and Glebe Bog itself overlaps a proposed Natural Heritage Area called Clonllyn Glebe pNHA (de-listed).

### 3.3.1 Current habitats

The main habitats are shown in map book drawing no **BNM-DR24-04-17** and are described below. The most common habitats<sup>3</sup> present within the currently proposed rehabilitation area include:

- The majority of the habitats occurring within the rehabilitation footprint at Ballaghurt and Glebe bogs comprise mainly of Bare peat (0-50% cover) (BP)(PB4).
- Cutover Bog (PB4) - occurs along the margins of the high bog associated with peat production and turbary.
- Raised Bog (PB1) – partly drained, high bog remains. The eastern part of Ballaghurt Bog contains a sizable bog remnant within the north of the bog ownership boundary. There has been some historic turbary and associated drainage in the south of this remnant. In 2022, some turf cutting (sod moss extraction) took place within the north-eastern corner of this remnant. Smaller bog remnant parcels occur elsewhere

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<sup>3</sup> Codes refer BnM classification of pioneer habitats of production bog. Note: habitat categories presented are not exhaustive and are meant to indicate the primary habitats of importance which are present. Equivalent Fossitt (2000) (*A Guide to Habitats in Ireland*, The Heritage Council 2000) codes to the habitat descriptions are provided here but we note the referenced figure displays the general BNM habitat layer.



along the margins. Bog remnants also occur around the margins of Glebe Bog, although those on the eastern flank are significantly cutaway due to domestic turbary.

- Scrub (WS1) occurs around margins of the bogs and comprising mainly of emergent *Betula*-dominated community (A) (eBir) and Open *Betula*-dominated community (B) (oBir), with some *Ulex*-dominated community (eGor).
- More established Woodland (*Betula-Salix* woodland (BirWD)) occurs around the margins of the site.
- Built land, including access routes (BL3).
- Drainage Ditches (FW4).
- Mosaics of pioneer dry grassland dominated by Purple moor-grass (*Molinia caerulea*-dominated community (gMol)), Gorse scrub (*Ulex*-dominated community (eGor)) and Birch scrub (eBir/oBir) occur in drier areas along the bog margins.
- Pioneer dry grassland with Cocksfoot grass and Sweet vernal grass (*Dactylis-Arrhenatherum* community (gDact-Arr)) occurs along travel paths.
- Access routes (rail lines and tracks including gravel embankments and associated habitats such as dry grassland communities and scrub).
- Silt-ponds with associated spoil heaps and access tracks.

The most common habitats found around the margins of the bogs under review include:

- Raised bog (PB1) (Codes refer to Heritage Council habitat classification, Fossitt 2000)
- Cutover Bog (PB4)
- Scrub (WS1)
- Wet grassland (GS4)
- Birch woodland (WN7)
- Wet Willow-Alder-Ash woodland (WN6)
- Conifer plantation (WD4)
- Secondary PB4 - dry heath, poor fen, and scrub mosaic (HH1/PF2/WS1)

### 3.3.2 Species of conservation interest

A number of species of conservation concern have been recorded at Ballaghurt. The following is a summary of the records held by Bord na Móna.

Signs or sightings of several mammal species have been recorded during ecological survey work at Ballaghurt including Eurasian Badger (*Meles meles*), European Otter (*Lutra lutra*), Fox (*Vulpes vulpes*), Frog (*Rana temporaria*) and Mink (*Neovison vison*). Bird species of conservation interest recorded during BNM ecology surveys of Ballaghurt Bog include Snipe (*Gallinago gallinago*), Mallard (*Anas platyrhynchos*), Skylark (*Alauda arvensis*) and Teal (*Anas crecca*). Snipe is currently Red listed on the most recent BOCCI list (Gilbert *et al.* 2021).

Surveys undertaken at Glebe bog recorded several species including Irish hare (*Lepus timidus hibernicus*), Fox (*Vulpes vulpes*), Buzzard (*Buteo buteo*), Lapwing (*Vanellus vanellus*), Snipe (*Gallinago gallinago*), Chaffinch (*Fringilla coelebs*), Robin (*Erithacus rubecula*), Reed Bunting (*Emberiza schoeniclus*), Grey Crow (*Corvus cornix*), Rook (*Corvus frugilegus*), Wren (*Troglodytes troglodytes*) and Frog (*Rana temporaria*).

### 3.3.3 Invasive species

No invasive alien species are known to occur at the subject bogs. A broad range of common garden escapes are occasionally present around the margins of Bord na Móna bogs, and although spatial overlap with the PCAS is expected to be limited, these are, where necessary, to be treated in line with Best Practice during PCAS activities.

## 3.4 Statutory Nature Conservation Designations

There are 3 European Sites (SAC's or SPA's) within close proximity (i.e. within a 5 km radius at minimum) to Ballaghurt Bog or Glebe Bog. In addition, a number of NHA's (Natural Heritage Areas) and pNHA's (Proposed Natural Heritage Areas) also occur within 10 km of Ballaghurt Bog, see Table 3.1 below. See map book drawing no: **BNM-DR-24-04-23** titled **Ballaghurt and Glebe Bogs: Proximity to Designated Sites** in the accompanying mapbook.

Table 3.1 Proximity of designated sites in relation to the rehabilitation bog boundaries.

Nationally designated (or proposed) sites		European Designated Sites	
Name	Distance (km)	Name	Distance (km)
Clonydonnin Bog NHA	3.43	Fin Lough (Offaly) SAC	1.32
Clonllyn Glebe Bog pNHA	0	Pilgrim's Road Esker SAC	1.86
Clonfinlough Esker pNHA	0.71	Moyclare Bog SAC	1.94
Doon Esker Wood pNHA	0.84	Mongan Bog SAC	2.01
Fin Lough (Offaly) pNHA	1.34	Ferbane Bog SAC	2.14
Moyclare Bog pNHA	1.94	River Shannon Callows SAC	3.23
Mongan Bog pNHA	2.00	Mongan Bog SPA	2.11
Ferbane Bog pNHA	2.15	Middle Shannon Callows SPA	3.22
Pilgrim's Road Esker pNHA	2.21		
River Shannon Callows pNHA	3.22		
Lough Nanag Esker pNHA	4.32		
Grand Canal pNHA	4.34		

An NPWS survey to select raised bogs for designation as actual National Heritage Areas (NHAs) reviewed the status of Clonllyn Glebe Bog (Derwin et al. 2002). This survey did not recommend its further designation as an NHA "as 80% of the bog had been drained" and it was considered too damaged to be designated at that stage. Clonllyn Glebe Bog pNHA was assessed as part of the 'Review of Raised Bog Natural Heritage Area Network' (DoAHG, 2014). The review used a criteria for detecting the ecological condition of raised bog NHAs and non-designated sites. Clonllyn Glebe Bog was one of 126 undesigned raised bog sites and scored 'low' under the categories; Area, Geographic Range and Habitat Quality. Based on this review, future prospects for the bog were assessed as unfavourable (as it is used for peat extraction at the time). Proposed Natural Heritage Areas have not been statutorily proposed or designated and are not legally recognised the same way as Natural Heritage Areas (NHAs) are. Proposed NHAs were published on a non-statutory basis in 1995.

### 3.4.1 Other Nature Conservation Designations

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

Raheenmore Bog (Ramsar Site No. 417) situated approximately 2 km east of Ballaghurt Bog. As described in the Ramsar Site Information Service *“This classic example of a Midland raised bog developed in a small basin on the catchment divide between two major river systems. The peat, 15m in places, makes it the deepest known raised bog in Ireland. Vegetation is typical, with a good cover of Sphagnum mosses, but the formerly extensive hummock and hollow system is reduced due to conversion to agricultural land”* (Ramsar, 2022<sup>4</sup>).

## 3.5 Hydrology and Hydrogeology

Both Ballaghurt and Glebe form part of the Lower Shannon Catchment (Catchment ID: 25B) as defined by the EPA under the Water Framework Directive (WFD) and are primarily situated within the Shannon[Lower]\_SC\_030 sub-catchment. The bogs contain several drainage pathways and discharge locations, with the majority discharging to the Blackwater (ShannonBridge) River to the South. Both bogs contains several drainage pathways and discharge locations.

Ballaghurt and Glebe Bogs both currently has a gravity-based drainage regime.

GSI data indicates that the north-western section of Ballaghurt Bog is underlain by the Ballysteen Formation, while the south-eastern section is underlain by Waulsortian Limestone and the western corner of the bog is underlain by the Navan Beds formation. Glebe is underlain entirely by Waulsortian Limestone. All the units are classified as locally important aquifers as they are moderately productive in local zones only. Several bedrock faults cross through the bog, most of which pass through the southern lobe. Geological Survey of Ireland (GSI) mapping identifies a karst feature (superficial solution feature) in close proximity to the bog. No data exists concerning depth to bedrock, however, there is a small area of exposed bedrock in close proximity to the bog.

Quaternary Sediment maps show Ballaghurt to be underlain by peat, yet surrounded by inorganic deposits, including till derived from limestone which occurs to the west, south and east of the bog and gravels derived from limestone which occur to the north of the bog. This includes several eskers which trend in an east-west direction. Glebe Bog is also underlain with peat and surrounded largely with till derived from Limestone.

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

## 3.6 Emissions to surface-water and watercourses

Drainage is an important feature of industrial peat production and there were extensive field drains maintained throughout the former peat production area to facilitate industrial peat production. Ballaghurt Bog was initially drained in the 1980's and Glebe Bog in the late 1980's – 1990's, and both are thus a relatively new production bog which still has relatively deep peat reserves.

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<sup>4</sup> Ramsar, 2022, Ramsar Sites Information, Online, Available at:

Service <https://www.arcgis.com/apps/MapTour/index.html?appid=cd6e1a247bdc4179b9dfc0461e950f1e#>, Accessed, 18.11.2022

In accordance with the existing Integrated Pollution Control licence, all drainage water from boglands in a licensed area is discharged via an appropriately designed silt pond treatment arrangement as required in Condition 6.6. of the licence.

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

Ballaghurt bog has nine treated surface water outlets from previously active peat extraction catchments, to the River Blackwater IE\_SH\_25B270110 BLACKWATER (SHANNONBRIDGE)\_010 which is then a tributary of the River Shannon IE\_SH\_25S012000 SHANNON (LOWER)\_010.

The Blackwater River was not listed as being under pressure from peat extraction in the 2nd cycle of the River Basin Management Plan for Ireland, and is indicated as remaining so in the third cycle, which is currently in preparation.

Details of silt ponds, associated surface water emission points and those being monitored and sampled as part of the PCAS scheme are detailed on the accompanying structures map along with water quality map. See Drawing number **BNM-DR-24-04-SP01** titled **Peatlands and Climate Action Scheme Ballaghurt and Glebe Bogs: Sampling Points**, along with Drawing number **BNM-DR-24-04-WQ01** titled **Peatlands and Climate Action Scheme Ballaghurt and Glebe Bogs: Water Quality Map** included in the accompanying Mapbook, which illustrate the various drainage and water quality infrastructure present at Ballaghurt and Glebe Bogs.

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

The main emission limit value associated with this bog is 35mg/l suspended solids, with trigger levels for ammonia of 4.27mg/l and COD 100mg/l. From an analysis of any results over previous five years of the IPC licence environmental monitoring of some of the discharges from this bog, these indicate that results were under the Emission Limit Value for Suspended Solids and Ammonia and broadly under the trigger levels for COD. Ammonia averaged 0.76mg/l and ranged from 0.073 to 3.6 mg/l with Suspended Solids ranging from <2 to 20 mg/l and averaging 9.15, Table 3.1.

**Table 3.1 Results of Water Quality Monitoring at Ballaghurt and Glebe Bogs**

Bog	SW	Monitoring	pH	SS mg/l	TS mg/l	Ammonia mg/l	TP mg/l	COD mg/l	Colour
Ballaghurt	SW-20	Q4 21	7.1	<2	208	0.96	<0.05	45	230
Ballaghurt	SW-21	Q4 21	7.1	<2	126	0.964	<0.05	44	227
Ballaghurt	SW-22	Q4 21	7.6	<2	232	0.162	<0.05	47	129
Ballaghurt	SW-28	Q4 21	7.6	<2	152	0.073	<0.05	36	111
Ballaghurt	SW-28	Q1 21	7.7	13	405	0.075	0.11	23	179
Ballaghurt	SW-24	Q4 20	7.5	8	249	0.372	<0.05	59	241
Ballaghurt	SW-26	Q4 20	6.7	11	116	1.31	<0.05	56	327
Ballaghurt	SW-26A	Q4 20	5.2	5	109	3.62	<0.05	58	342
Ballaghurt	SW-98	Q4 20	7.5	8	250	0.553	0.06	58	263
Ballaghurt	SW-20	Q1 20	7	4	194	0.54	<0.05	68	375
Ballaghurt	SW-21	Q1 20	7	13	123	0.672	<0.05	47	375
Ballaghurt	SW-22	Q1 20	7.4	20	185	0.444	0.05	58	381
Ballaghurt	SW-28	Q1 20	7.5	17	187	0.206	<0.05	53	299
Ballaghurt	SW-23	Q3 17	7.6	5	318	0.98	0.05	52	149
Ballaghurt	SW-24	Q3 17	7.7	5	321	0.89	0.05	53	140
Ballaghurt	SW-26	Q3 17	7.8	5	300	0.28	0.05	53	115
Ballaghurt	SW-98	Q3 17	7.6	5	332	0.91	0.05	60	136

Rehabilitation of cutaway peatland is closely linked with control of emissions. One of the criteria for successful rehabilitation is stabilisation through re-vegetation, which will stabilise all substrates and in turn remove the need for further silt control measures. Re-wetted peat also aids the primary objective of stabilizing peat, as when peat is re-wetted it minimises risk to wind erosion. Re-wetted peat and the development of wet peatland habitats can also act as sinks for any silt and mobile peat, and increases additional retention time for solids, and the peatland vegetation can quickly stabilise this material within blocked drains on site (by acting like constructed wetlands).

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

#### **Decommissioning and Rehabilitation Programme Water Quality Monitoring.**

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

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

This new sampling programme commenced in August 2021 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 Ballaghurt and Glebe bogs. These results cover the period from August 2021 to October 2022 and are from two the main surface water outlet from the sections of bog to be rehabilitated in 2023, with additional sampling locations being included from December 2022. Peat extraction ceased in this bog in 2020 and as expected some of the key water quality parameters that can impact water quality from peat extraction activities, remain on a relatively static trajectory, with suspended solids indicating a downward trend. During this period, ammonia did not indicate any changes in concentration during the 27 months of sampling, with all other parameters fluctuated slightly, most likely influenced by normal weather patterns, especially rainfall. Monthly ammonia concentrations from August 2021 to October 2022 had a range of 0.171 to 1.28mg/l with an average of 0.611mg/l, at Glebe Bog. Results for suspended solids for the same period indicate a range of 2 to 23 mg/l with an average of 4.45 mg/l.

In the preparation of this monitoring programme, Bord na Mona have been providing the Local Authority Water Programme (LAWPRO) with details of the surface water emissions points associated with this bog and will be amending some of the proposed monitoring locations on foot of this engagement. LAWPRO have in turn provided details of their 2022 monitoring programme and these are included in the Water Quality Map.

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

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

Monitoring results will be maintained, trended every six months and reported on each year and as required, as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, and will be provided to LAWPRO and the EPA as required to inform progress and national monitoring requirements under the WFD. These results will also be available in April each year as a requirement of the Annual Environmental Report at [www.epa.ie](http://www.epa.ie).

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

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

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

Water will still discharge from designated emission points when rehabilitation at Ballaghurt and Glebe Bogs has been completed. This discharge will have improving water quality and there will be increased wetland attenuation, meaning slower release of water. This is expected to have a positive impact on status of the key water receptors; the Lower Shannon catchment.

### 3.7 Fugitive Emissions to air

None.

The bog is no longer in industrial peat production. Rehabilitation of the peatland will seek to re-wet the dry peat where possible and re-vegetate all areas (whether wet or dry). Collectively, ceasing industrial peat production, re-wetting and re-vegetating will minimise any risk of emission to air from dust.

### 3.8 Carbon emissions

Irish peatlands are a huge carbon store, containing more than 75% of the national soil organic carbon (Renou-Wilson *et al.* 2012). Peatland drainage and extraction transforms a natural peatland which acts as a modest carbon sink into a carbon source (Waddington & McNeil, 2002; Alm *et al.*, 2007; Wilson *et al.*, 2007, Wilson *et al.*, 2015). A natural peatland can take in 0.1 to 1.1 t of carbon as CO<sub>2</sub>-C /ha/yr while drainage and extraction can create large source of carbon dioxide releasing 1.3 to 2.2 t of carbon as CO<sub>2</sub>-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 CO<sub>2</sub>-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 CO<sub>2</sub> emissions from drained peatlands or increased methane (CH<sub>4</sub>) emissions from rewetted industrial peatlands. However, when radiative effects and atmospheric lifetimes of both GHG gases are considered and modelled, postponing rewetting increases the longterm warming effect of continued CO<sub>2</sub> emissions (Gunther *et al.* 2020). This means the increase in methane due to rewetting of dry peatlands is still negated by the CO<sub>2</sub> 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 Ballaghurt & Glebe Bogs will become a reduced carbon source following rehabilitation. The potential of any cutaway site to develop as a carbon sink in the longer-term depends on the success of the rehabilitation measures, the extent of development of *Sphagnum*-rich or other peat-forming habitats, the balance of carbon fluxes from different cutaway habitats and future climatic conditions. Much of this bog is

expected to develop embryonic bog on deep peat areas, and wetland habitats on shallow peat with open water, reed swamp and fen habitats with alkaline emission factors. Birch woodland is expected to develop on the drier mounds and peripheral headlands.

### 3.9 Current ecological rating

(Following NRA (2009) Evaluation Criteria)

The majority of the site can be rated as having **low local ecological value** as it is dominated by bare peat production bog. All cutaway habitats are poorly developed, as are marginal remnant habitats, which have a somewhat higher value **(D)** moderate-high local ecological value.



## 4. CONSULTATION

### 2.1 Consultation to date

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

To inform the current Plan, both national and local stakeholders, including neighbours whose land adjoins Ballaghurt bog & Glebe 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 Ballaghurt & Glebe Bogs.

- General consultation with range of stakeholders at annual Bord na Móna Biodiversity Action Plan review days 2010-2018,
- General consultation with NPWS regarding the status of Clonllyn Glebe pNHA,
- Ongoing consultation with Coillte regarding forestry management (forestry leased to Coillte),
- Consultation with adjacent land-owners regarding access to private forestry,
- Midlands & East Regional WFD Operational Committee (River Basin Management Plans),
- Archaeological Liaison Committee (National Museum of Ireland & Dept of Culture Heritage and the Gaeltacht),
- Ongoing feasibility and development of amenity, greenways and cycle tracks (local groups, Offaly Leader, Offaly County Council and Fáilte Ireland),
- Consultation with Green Offaly regarding a proposed Peatland Biosphere Reserve in Offaly.

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

### 4.2 Issues raised by Consultees

N/A Yet as consultation has not commenced.

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

N/A Yet as consultation has not commenced.

## 5. REHABILITATION GOALS AND OUTCOMES

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

- Meeting conditions of IPC Licence.
- Stabilisation or reduction in water quality parameters of water discharging from the site (e.g. suspended solids).
- Reducing pressure on receiving waterbodies that have been classified as *At Risk* from peatlands and from peat extraction, via stabilization or improving water-quality from this bog, and therefore, reducing pressures.
- Optimising hydrological conditions for **climate action benefits as part of PCAS**.
- Optimising hydrological conditions for the development of embryonic *Sphagnum*-rich vegetation communities on deep peat, or reed swamp and fen on shallow more alkaline peat and other subsoils, where present.
- Optimising hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future.
- Supporting expected future land-uses.
- The main goal and outcome of this plan is the successful rehabilitation (environmental stabilisation) of peatlands used for industrial peat production at the bog in a manner that is acceptable to both external stakeholders and to Bord na Móna and which optimise climate action and other ecosystem service benefits.

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

- It will take some time for stable naturally functioning habitats to fully develop across the entirety of Ballaghurt and Glebe Bogs. This will happen over a longer timeframe than the implementation of this rehabilitation plan.
- Re-wetting residual peat will initially maintain and enhance the carbon storage capacity of the bog. There is scientific consensus that restoration of hydrology in damaged bog can improve carbon storage, water storage and attenuation and help support biodiversity both on the site and in the catchment (See Section 3.8). This will reduce carbon emissions from the site from a larger carbon source to a smaller carbon source. In time, the site has the capacity to develop in part as a carbon sink. PCAS is expected to deliver significant contributions to Ireland's climate action.
- It is not expected that the cutover bog within the site has the potential to develop active raised bog (ARB) analogous to the priority EU Habitats Directive Annex I habitat within the foreseeable future (c.50 years). Furthermore, only a proportion of the bog has potential to develop *Sphagnum*-rich habitats in this timeframe. Nevertheless, re-wetting across the entire bog, as part of the Scheme, will improve habitat conditions of the whole bog. Other peatland habitats will develop in a wider mosaic that reflects underlying conditions.
- There is a large bog remnant located to the north of Ballaghurt, separated from the production area by a public road. Although there are currently some active drains occurring to the south and east, and newly opened drains (2022) within the northeast at the remnant margins; drain blocking on this bog remnant will seek to optimise hydrological conditions. Although only the remnant margins have been subject to drainage and the remainder is uncut high bog, an eco-hydrological model was prepared for this bog remnant. This predicts that there is potential for up to 3.6 ha of active raised bog. Part of this modelled

area can be defined as degraded raised bog capable of regeneration (7120)\* with supporting remnant high bog at the margins, with the assumption that blocking surrounding drains will improve the condition of this bog remnant. There is therefore some potential to develop Active raised bog (7110) in the future should drain blocking result in successful rewetting.

- Rehabilitating former industrial peat production bog will also in the longer-term support other ecosystem services such as the development of new habitat to support biodiversity and local attenuation of water flows from the bog.
- WFD status in receiving water bodies can be affected by peatlands and peat extraction but is also affected by other sources such as agriculture. In addition, receiving water bodies that are assessed as At Risk from peatlands and from peat extraction are likely to have several contributory sources of impacts (private peat extraction and Bord na Móna). Reducing pressures due to former peat extraction activities at Ballaghurt & Glebe Bogs 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 have rehabilitated several bogs in the wider bog group, including the neighbouring bogs Bloomhill, Clooniff and Belmont, with a draft plan also prepared for Blackwater bog located adjacent to the south-west. 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 enhanced rehabilitation plan is to rehabilitate the bog. This is defined by:

- The area of Ballaghurt & Glebe Bogs.
- EPA IPC Licence – Ref. P0502-01. As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. Ballaghurt & Glebe Bogs are part of the Blackwater Bog group.
- The Scheme is designed to exceed the stabilisation requirements as defined by the IPC Licence. This scheme is designed to enhance the ecosystem services of Ballaghurt & Glebe Bogs, 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 Ballaghurt & Glebe Bogs mean that deep peat measures along with wetland creation is the most suitable rehabilitation approach for this site. Ballaghurt & Glebe Bogs have a gravity drainage regime and have residual deep peat along with shallower areas.
- Bord na Móna have defined the key goal and outcome of rehabilitation at Ballaghurt & Glebe Bogs as **environmental stabilisation** of the site via **optimising climate action benefits, where possible**. The re-wetting of residual peat in the area recently out of peat extraction will be optimised, **setting the site on a trajectory towards the development of peat-forming communities on residual deep peat, and the development of wetlands/Reed Swamp and fen on shallow more alkaline peat and other subsoils**.
- Rehabilitation of Ballaghurt & Glebe Bogs will support multiple national strategies of climate action, biodiversity action and other key environmental strategies such as the Water Framework Directive.
- The time frame for the delivery of the planned rehabilitation will be undertaken according to available resources and appropriate constraints.

### 2.1 Key constraints

- **Bog conditions.** Rehabilitation outcomes of sites are constrained by the environmental characteristics of these particular areas. For example, there is potential for raised bog restoration at some sites where there has not been significant industrial peat extraction and the peat body is largely intact (deep peat sites that are drained). At other sites, most of the peat mass has been removed, the environmental characteristics of these areas have therefore changed radically (peat depths, hydrology, water chemistry, substrate type, nutrient status, etc.) and there will therefore be different habitat outcomes (wetlands, fen, heathland, grassland and Birch woodland).
- Peat thickness data for Ballaghurt indicates that most of the northern lobe has relatively thick sequences of peat remaining (typically 2-7m), with only one small section of the bog where peat thickness is <1m. This section of the bog is underlain by marl which was found to be exposed in drains in this area during field surveys. In contrast, peat thickness is relatively shallow across most of the southern lobe of Ballaghurt (<1.5m) with large sections of this lobe having peat thickness of <1m. At Glebe bog, peat depths are likely to be deep due to the limited amount of production previously undertaken at this site.
- **Current/future land-use.** A key future land-use is amenity. There are proposals for part of the proposed Shannon Monastic Greenway to utilise the existing industrial railway corridor and some headlands through the two Ballaghurt bogs. Any proposed enhancement measures (ie. Targeted drain-blocking) can

be positively aligned with future planned land-uses and will look to facilitate amenity, where possible. Re-wetting will be planned as to not to rule out potential future amenity.

- Ballaghurt Bog is under review for inclusion in 'People and Peatlands'; a project under the European Union's LIFE Programme. Any area selected for inclusion in the above project may become a constraint in due course.
- **Renewables:** A solar energy project is proposed for Blackwater Bog, located to the west of Ballaghurt. This proposed project ([Home | Blackwater Solar Farm](#)) has not been submitted for planning yet. A small area of Ballaghurt, which is part of a sub-catchment of Blackwater bog and is herein treated as a constraint.
- **Surrounding landscape and neighbours.** Another key constraint is the interaction between the Bord na Móna sites and the surrounding landscape. Care has to be taken that no active rehabilitation management is carried out that could negatively and knowingly impact on surrounding land. This includes any hydrological management on neighbouring farmland. It is anticipated that the work proposed here (blocking drains and re-wetting cutaway peatlands) will not have any flooding impacts on adjacent land.
- **Archaeology.** There are previously mapped archaeological features present at Ballaghurt and Glebe Bogs including toghers, which may similarly constrain PCAS activities. The discovery of monuments or archaeological objects during peatland rehabilitation may potentially constrain the rehabilitation measures proposed for a particular area. While the rehabilitation will optimise hydrological conditions for the protection of exposed archaeological structures, their retention in situ and preservation into the future, any new archaeology may require rehabilitation measures will be reviewed and adapted. If this occurs, rehabilitation measures will be reviewed and adapted. An Archaeological Impact Assessment (Appendix XII) will be carried out to mitigate against any impact on found archaeology at Ballaghurt and Glebe Bogs. 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 at both the east and western parts of Ballaghurt Bog. Where a public right of way or similar burden exists on Bord na Móna property, consideration will be given to ensuring that this remain 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.
- **Turbary.** Areas of active turbary are excluded as they are currently being used by domestic turf cutters to harvest peat. These areas are ecologically and hydrologically linked to the area owned by Bord na Móna where rehabilitation is planned. It is beyond the scope of this rehabilitation plan to address turf cutting issues on Ballaghurt and Glebe Bogs.
- An area of unauthorised turbary (sod moss) that commenced within a large bog remnant to the north of Ballaghurt in 2022 is being investigated and will be subject to rehabilitation in the form of drain blocking and reinstatement following this investigation regarding the ownership and status of this area.

## 6.2 Key Assumptions

- It is assumed that Bord na Móna will have all resources required to deliver this project. For the avoidance of doubt, should the Scheme and the associated statutory obligation on Bord na Móna not materialise, Bord na Móna will not carry out the enhanced decommissioning, rehabilitation and restoration measures described in this plan. Bord na Móna will instead plan to complete only the 'standard' decommissioning and rehabilitation required under Condition 10, and for which financial provisions have been made, to comply with that element of the Licence.
- 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:

- The longer-term raised bog restoration trajectory of the site. The plan covers the short-term rehabilitation **actions** and a **monitoring and after-care programme** to monitor the rehabilitation during the Scheme and to respond to any needs. It is expected that this rehabilitation plan will set the site on an enhanced and accelerated trajectory towards stabilisation and raised bog restoration. The plan does not set any goals or outcomes, for example, the extent (specific area) of active raised bog habitat (ARB) that may develop at this site in the long-term. This is beyond the scope of this rehabilitation plan.
- This plan is not intended to be an after-use or future land-use plan for Ballaghurt and Glebe Bogs.
- The longer-term management of this site, potentially as a nature conservation site, or for amenity, or for other uses in the future.

## 7. CRITERIA FOR SUCCESSFUL REHABILITATION

This section outlines what criteria will be used to indicate successful rehabilitation and what key criteria/targets will be used to mark the achievement of the rehabilitation goals and outcomes and validate the completion of the rehabilitation.

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

Rehabilitation is generally defined by Bord na Móna as:

- stabilisation of bare peat areas via targeted active management (e.g. drain-blocking/re-wetting) slowing movement of water across the site and encouraging natural colonisation; and
- mitigation of potential key emissions (e.g. suspended solids).

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

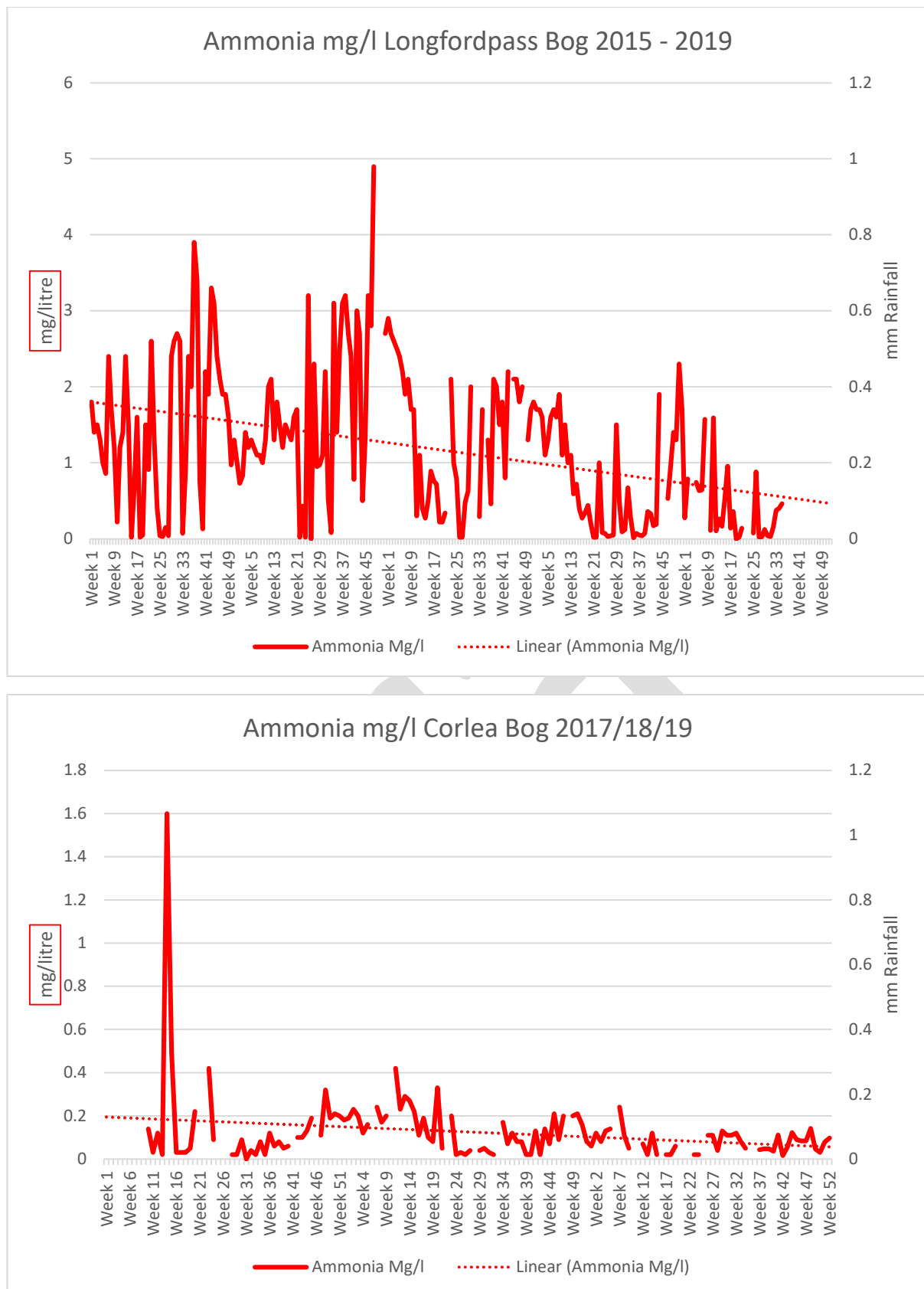
### 7.1. Criteria for successful rehabilitation to meet EPA IPC licence conditions:

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

With regard to predicting and estimating likely trends that might materialize or could be considered as a target, monitoring of surface water ammonia emissions from Longfordpass bog in Littleton over 3 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 Ballaghurt and Glebe continues in 2023 during the rehabilitation works, and data from the 2020 monitoring program is compiled, further trending will be produced to verify any ongoing trends.



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



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

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

**Table 7.1. Summary of Success criteria, targets, how various success criteria will be measured and expected timeframes.**

Criteria type	Criteria	Target	Measured by	Expected Timeframe
IPC validation	Rewetting in the former area of industrial peat production	Delivery of rehabilitation measures  Reduction in bare peat.	Aerial photography after rehabilitation has been completed – to demonstrate measures (drain-blocking)  Establishment of a baseline for future monitoring of bare peat, vegetation establishment and habitat condition.	2023-2025

Criteria type	Criteria	Target	Measured by	Expected Timeframe
IPC validation	Key water quality parameters  Ammonia, Phosphorous, Suspended solids, pH and conductivity	Reduction or stabilisation of key water quality parameters associated with this bog	Water quality monitoring for a period after rehabilitation has been completed	2022-2024
IPC validation	Reducing pressure from peat production on the local water body catchment (WFD)	Where this section of the water body, that this bog drains to, has not been identified as under pressure from peat extraction, that the intervening EPA monitoring programme associated with its Programme of Measures for this water body, confirms that its classification remains at not being at risk from peat extraction associated with activities at this bog.	EPA WFD monitoring programme	WFD schedule
Climate action verification	Optimising the extent of suitable hydrological conditions to optimise climate action	Optimal extent of suitable hydrological conditions	Aerial photography and Habitat mapping to map extent of suitable hydrological conditions.  Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	2023-2025
Climate action verification	Reduction in carbon emissions.	Reduction in carbon emissions	Carbon emissions – estimated using a bog condition assessment and appropriate carbon emission factors.	2023-2025
Climate action verification	Setting the site on a trajectory towards establishment of a	Establishment of compatible cutaway habitats	Habitat map, Cutaway bog condition map	2023-2025

Criteria type	Criteria	Target	Measured by	Expected Timeframe
	mosaic of compatible habitats		Baseline monitoring to be carried out during the scheme when rehabilitation is complete. Sites can be re-monitored in the future and compared against this baseline.	

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

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

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

- **Funding to pay for resources required to deliver the planned rehabilitation (Bord na Móna and external).** Bord na Móna maintains a provision on its balance sheet to pay for these future costs when industrial peat extraction ceases. Bord na Móna is fully committed to meeting its obligations relating to rehabilitation and decommissioning under the Integrated Pollution Control Licence. It is expected that additional costs of enhanced rehabilitation will be supported by Government through the Climate Action Fund and Ireland's National Recovery and Resilience Plan.
- **Bord na Móna to have sufficient resources (staff and training) to deliver the planned rehabilitation with required associated skills and competencies.**
- **Bord na Móna to have sufficient resources (suitable machinery) and staff to maintain this machinery.**
- **Weather conditions to be within normal limits over the rehabilitation plan timeframe.** Long periods of wet weather have the capacity to significantly affect ground conditions and constrain the delivery of rehabilitation. The potential impact of wet weather on ground conditions can be reduced by appropriate planning and management. Bord na Móna have significant experience of managing these issues through 70 years of working in these peatland environments.
- **Rehabilitation measures to be effective.** The rehabilitation measures proposed in this plan are based on 40 years of Bord na Móna experience of peatland management and best practice applied internationally in peatland management. Measures proposed in this plan have already been shown to be effective at other sites. Bord na Móna will apply a flexible and adaptable approach to the more innovative rehabilitation measures proposed in this plan. If measures are not initially effective, Bord na Móna will review any requirement for additional practical rehabilitation.
- **Natural colonisation of vegetation to develop semi-natural habitats at a rate within the normal limits.** The development of naturally functioning semi-natural habitats on degraded bog takes time. It may take 30-50 years for active raised bog vegetation to re-develop on suitable cutaway that was previously bare peat. However, Bord na Móna experience has demonstrated the effectiveness of these type of measures for re-wetting bog and creating carbon sinks (Renou-Wilson et al. 2018).

- Rehabilitation measures have been designed to accelerate and work with natural colonisation and other natural processes. Bord na Móna experience of rehabilitation has shown that re-wetting improves conditions for natural colonisation and that natural colonisation is accelerated where the environmental conditions are most suitable. Rehabilitation measures have been designed to modify the conditions of areas within sites where conditions are less suitable for natural colonisation (modifying hydrology, topography, nutrient status or availability of potential seed sources).
- **Monitoring to be robust and effective.** Rehabilitation Monitoring will be established to validate the success of rehabilitation as required by Condition 10 of the IPC Licence and to verify the benefits of the proposed enhanced measures to optimise climate action. This will focus on a collecting a range of scientific data that can then quickly be adapted and into metrics that can be used to measure changes in various ecosystem services.

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## 8. REHABILITATION ACTIONS AND TIME FRAME

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

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

BNM-DR-24-04-21 titled **Ballaghurt and Glebe Bogs: Aerial Imagery 2020**

BNM-DR-24-04-04 titled **Ballaghurt and Glebe Bogs: Peat Depths**

BNM-DR-24-04-03 titled **Ballaghurt and Glebe Bogs: LiDAR Map**

BNM-DR-24-04-09 titled **Ballaghurt and Glebe Bogs: Depression Analysis**

The rehabilitation actions themselves will be a combination of PCAS measures to re-wet peat. The distribution of these measures is provisionally outlined in drawing **BNM-DR-24-04-05 titled Ballaghurt and Glebe Bogs: Rehabilitation Measures** in the accompanying Mapbook (note that the actual distribution of these measures may be subject to change in response to stakeholder consultation and refinement of the enhanced rehabilitation measures.)

These enhanced measures for Ballaghurt and Glebe bogs will include (see Table 8.1):

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

Table 8-1 Types of and areas for enhanced rehabilitation measures at Ballaghurt and Glebe Bogs.

Type*	Rehab Code	Enhanced Rehabilitation Measure	Extent (Ha)
Deep Peat	DPT 2	More intensive drain blocking (max 7/100 m) + modifying outfalls and managing overflows	68.93
Deep Peat	DPT 3	More intensive drain blocking (max 7/100 m), + field reprofiling + modifying outfalls and managing overflows	79.77
Deep Peat	DPT 4	Berms and field re-profiling (45x60m cell), modifying outfalls and managing overflows & drainage channels for excess water & <i>Sphagnum</i> inoculation	131.30
Dry Cutaway	DCT2	Regular drain blocking (3/100m) +modifying outfalls and managing water levels with overflow pipes + targeted fertiliser treatment	67.93
Wetland	WLT4	More intensive drain blocking (max 7/100 m), + modifying outfalls and managing overflows + transplanting Reeds and other rhizomes	189.46
Marginal land	MLT1	No work required	54.39
Marginal land	MLT2	Drain Blocking on extant high bog	4.49
Silt ponds	Silt pond	Silt ponds	2.08
Additional works	AW2		46.79
Constraint	Constraint	Other Constraints	87.93
<b>Total</b>			<b>733.07</b>

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

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

- Seek formal approval of the enhanced plan, noting the alternative standard plan should funding from the Scheme not materialise, from the EPA.
- Agree an *ex ante* budget of eligible costs (based on the approved enhanced plan) with the Scheme regulator.
- Develop a detailed site plan with engineering drawings outlining how the various rehabilitation methodologies (The Scheme PCAS) will be applied to Ballaghurt & Glebe Bogs. This will take account of peat depths, topography, drainage and hydrological modelling. (See map for an indicative view of the application of different rehabilitation methodologies).
- A drainage management assessment of the proposed enhanced rehabilitation measures will be carried out and any issues identified resolved and the rehabilitation plan adapted.
- A review of known archaeology and an archaeological impact appraisal of the proposed rehabilitation will be carried out. The results of this assessment will be incorporated into the rehabilitation plan to minimise known archaeological disturbance, where possible.
- A review of issues that may constrain rehabilitation such as known rights of way, turbary and existing land agreements is to be carried out.

- A review of remaining milled peat stocks is to be carried out. There are peat stocks remaining on the bog. It is planned to remove all stock from the bogs.
- An ecological appraisal of the potential impacts of the planned rehabilitation on the presence of sensitive ground-nesting bird breeding species (e.g. breeding waders) is to be carried out. The scheduling of rehabilitation operations will be adapted, where required.
- Ensure all activities comply with the environmental protection requirements of the IPC Licence.
- Carry out Appropriate Assessment of the Rehabilitation Plan.
- Track implementation and enforcement of the relevant IPC Licence conditions, the mitigation measures (AA) and other environmental control measures during the implantation of the rehabilitation plan.

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

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

## 8.3 Long-term (>3 years)

- Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- Delivery of a monitoring, aftercare and maintenance programme (See section 10.2 below).
- Decommissioning of silt-ponds will be assessed and carried out, where required.
- Reporting to the EPA will continue until the IPC License is surrendered.

## 8.4 Timeframe

- **2022-2023:** Short-term planning actions.
- **2023-2024:** Short-term practical actions.
- **2024-2025:** Long term practical actions. Evaluate success of short-term rehabilitation measures outlined above and remediate where necessary.
- **2025:** Decommission silt-ponds, if necessary.

## 8.5 Budget and costing

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

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

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

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



## 9. AFTERCARE AND MAINTENANCE

### 9.1 Programme for monitoring, aftercare and maintenance

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

- There will be **initial quarterly monitoring assessments** of the site to determine the general status of the site, the condition of the silt ponds, assess the condition of the rehabilitation work, monitoring of any potential impacts on neighbours land, general land security, boundary management, dumping and littering.
- The number of these site visits will reduce after 2 years to bi-annually and then after 5 years to annual visits.
- These monitoring visits will also consider any requirements for further practical rehabilitation measures.
- The **baseline condition of the site will be established** post-rehabilitation implementation by using an aerial survey to take an up to date aerial photo, when rehabilitation is completed. This will be used to verify completion of rehabilitation measures. The extent of bare peat will be assessed using this baseline data, and habitat maps will be updated, if needed. It is proposed that sites can be monitored against this baseline in the future.
- **Water quality monitoring** at the bog will be established. The main objective of this water quality monitoring will be to establish a baseline and then monitor the impact of peatland rehabilitation on water quality from the bog.
- In order to assist in monitoring surface water quality from this bog, it is planned to increase the existing licence monitoring requirements to sampling for the same parameters to every month during the scheduled activities and for a period up to two years post rehabilitation, depending on the period required to confirm that the main two parameters, suspended solids and ammonia are remaining compliant with the licence emission and trigger limit values and there is an improving trajectory in these two parameters i.e. reduction in concentration.
- Enhanced water quality monitoring will aim to include up to 70% of a bogs drainage catchments.
- Monitoring results will be maintained, trended and reported on each year as part of the requirement to report on Condition 10.1 of the IPC Licence on Bog Rehabilitation in the Annual Environmental Report, which will be available in April each year at [www.epa.ie](http://www.epa.ie).
- The parameters to be included (as per condition 6.2 of the IPC Licence) include monthly monitoring for pH, Suspended Solids, Total Solids, Total Phosphorus, Total Ammonia, Colour, and COD and DOC.
- This monthly sampling regime on a selected number of silt ponds will be carried out over a two-year cycle. The original (licence) requirement was for a quarterly sampling regime, but this has been increased to a monthly regime to appropriately track the changing water chemistry that will occur as part of this enhanced rehabilitation. In addition, DOC will be included as a parameter to try and identify any changes in carbon in the surface water.
- If, after two years, key criteria for successful rehabilitation are being achieved and key targets are being met, then the water quality monitoring will be reviewed, with consideration of potential ongoing research on site. The water quality data, the aerial surveys and the habitat mapping will be collated and will be submitted to the EPA as part of the final validation report.
- If, after two years, key criteria for successful rehabilitation have **not** been achieved and key targets have **not** been met, then the rehabilitation measures and status of the site will be evaluated and enhanced, where required. This evaluation may indicate no requirement for additional enhancement of

rehabilitation measures but may demonstrate that more time is required before key criteria for rehabilitation has been achieved. Monitoring of water quality will then also continue for another period to be defined.

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

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

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

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

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

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

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

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

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

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

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

### Scope of rehabilitation

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

- The area of Ballaghurt and Glebe Bogs (**BNM-DR-04-22** titled **Ballaghurt and Glebe Bogs: Aerial Imagery 2020**)
- EPA IPC Licence - Ref. P0502-01. 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. Ballaghurt and Glebe Bogs are part of the Blackwater bog group.
- The current condition of Ballaghurt and Glebe Bogs. The existing raised bog at both is cutover and has dried out due to drainage, and is mostly bare peat.
- 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 Ballaghurt and Glebe Bogs will be left unblocked as blocking boundary drains could affect adjacent land.

### Rehabilitation goals and outcomes

The key rehabilitation goal and outcome for Ballaghurt and Glebe Bogs is environmental stabilisation of the site via deep peat re-wetting. This is defined as:

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

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

**Criteria for successful rehabilitation:**

- Rewetting of residual peat in the former area of industrial peat production to offset potential run-off of suspended solids and to encourage development of vegetation cover via natural colonisation, and reducing the area of bare exposed peat.
- That there is a stabilising/improving concentration of suspended solids and ammonia associated with the measures undertaken to stabilise the peat surface by the blocking of the internal drainage system and the maximised rewetting of the peat surface. This will be demonstrated by developing a stable or downward trajectory of water quality indicators (suspended solids and ammonia) towards what would be typical of a re-wetted cutaway bog. This will be measured via water quality monitoring (suspended solids and ammonia).

**Rehabilitation indicators**

- 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 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). This will be demonstrated by water quality monitoring results.

**Rehabilitation measures: (see Mapbook drawing no. BNM-DR-23-04-20: Standard Rehab Measures)**

- Blocking field drains in the drained raised bog remnant area to create regular peat blockages (three blockages per 100 m) along each field drain;
- No measures are planned for the other surrounding marginal peatland habitats.
- Silt ponds will continue to be maintained during the rehabilitation and decommissioning phase.
- Evaluate success of short-term rehabilitation measures and enhance where necessary.
- Decommissioning of silt-ponds will be assessed and carried out, where required.

**Timeframe:**

- 2023. 1<sup>st</sup> phase of rehabilitation. Field drain blocking and water-level management.
- 2024. 2<sup>nd</sup> phase. Further realignment of piped drainage and other re-wetting measures dependent on success of 1<sup>st</sup> phase re-wetting, 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.
- 2024-2025. 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	DCT2	Regular drain blocking (3/100 m)	67.93
Deep peat	DPT1	Regular drain blocking (3/100 m) + modifying outfalls and managing water levels with overflow pipes	279.9
Marginal Land	MLT1	No work required	105.7
Wetland	WLT1	Water level and outfall management	189.46
Other	Silt Pond	Silt ponds	2.08
Other	Constraint	Rights of Ways and constrained areas/buffers/Archaeology	87.9
<b>Total</b>			<b>733.07</b>

### 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 and silt control measures, 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](http://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 Blackwater Bog Group IPC Licensed area is made up of three sub-groups (Attymon, Blackwater and Derryfadda) and have been in industrial peat production for several decades. The majority of sites are situated alongside the Shannon and Suck Rivers within counties Roscommon, Galway, Westmeath and Offaly and cover an overall area of 15,515 ha. Each bog area further comprises a range of habitats from bare milled peat production areas to re-colonising cutaway to workshops areas and transport infrastructure. Industrial peat extraction from these sites mainly supplied ESB power stations at Shannonbridge (WOP) and Lanesborough (LRP).

Industrial peat extraction in the Blackwater Bog Group has permanently ceased on all sites. Remaining milled peat stocks were supplied to Shannonbridge (WOP) and Lanesborough (LRP) in 2020. Both power stations ceased using peat by the end of 2020. Decommissioning and rehabilitation for the Blackwater Bog Group as part of the PCAS project started in 2021.

A number (6) of bogs were initially drained but have never been used for industrial peat production (three former development bogs (Kellysgrove, Tirrur-Derrymore and Newtown-Loughgore), Clonboley, Killeglan and Derrydoo-Woodlough). The latter three bogs are classed as restored raised bogs, still contain active bog habitat (that qualifies as the Annex I EU Habitats Directive habitat) and now form the core of the Bord na Móna Raised Bog Restoration Project due to their high biodiversity value and bog restoration potential. NPWS have identified the Clonboley bog cluster as having high ecological value within the recent assessment of raised bog SACs, NHAs and non-designated sites (NPWS 2014<sup>5</sup>). Several of these sites have been restored during the period 2011-2020.

Several sections of Tirrur-Derrymore bog have been leased to NPWS for domestic turf cutting as part of the SAC turf-cutting compensation scheme. Turf-cutters from neighbouring SACs have been relocated to this site by NPWS. Several other bogs are being assessed for similar use.

The depth of remnant peat within Blackwater bog units will have a very significant impact on the development of these sites, with deeper peat (Derryfadda milled peat production bogs) having potential for the establishment of embryonic peat-forming (*Sphagnum*-rich) vegetation communities. Milled peat cutaway (such as at Blackwater) develops in a somewhat different way as in places the underlying gravel is exposed, there is significant alkaline influence on the water chemistry and in many of these cutaway bogs will develop fen and wetlands due to the local topography, hydrology and water chemistry.

A breakdown of the component bog areas for the Blackwater Bog Group IPC Licence Ref. PO502-01 is outlined in Tables Ap-2a – Ap2c.

**Table Ap-2a: Blackwater Bog Group names, area and indicative status (Attymon sub-group)**

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Attymon	336	Cutover Bog Industrial peat production commenced at Attymon Bog in 1941	Attymon Bog formerly supplied fuel sod peat. Coillte have developed a portion of the former production area for conifer forestry.	2019	Finalised 2018

<sup>5</sup> <http://www.npws.ie/peatlandsturf-cutting/nationalraisedbogsacmanagementplan/>

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
		and ceased in 2019. Attymon is a deep peat cutover bog.	Some rehabilitation was carried out in 2019/2020.		
Cloonkeen	252	Cutover Bog Industrial peat production commenced at Cloonkeen Bog in 1953 and ceased in 2019. Cloonkeen Bog is a deep peat cutover bog.	Cloonkeen Bog formerly supplied fuel sod peat. Coillte have developed a portion of the former production area for conifer forestry. Some rehabilitation was carried out in 2019/2020.	2019	Finalised 2018
Derrydoo-Woodlough	452	Development Bog Derrydoo-Woodlough Bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place.	Bog restoration was carried out in 2013-2014 Rehabilitation (bog restoration) now complete.	N/A	Finalised 2012
Tirrur-Derrymore	422	Development Bog This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place.	This bog has significant raised bog restoration potential. Section leased to NPWS as a SAC turf-cutting relocation site.	N/A	Updated 2020 To be finalised 2023
Newtown-Loughgore	448	Development Bog This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place.	Some sod turf production Bog restoration was carried out in 2019-2020 Rehabilitation (bog restoration) nearly complete.	2020	Finalised 2012
Killeglan	581	Development Bog This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place.	Bog restoration was carried out in 2013-2014 Rehabilitation (raised bog restoration) complete	N/A	To be finalised 2023
Cloonboley 1	675	Development Bog This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place on the main section.	A small sub-section has been used for sod turf production. Bog restoration was carried out in 2013-2014 Rehabilitation (raised bog restoration) complete across the majority of the site	2020	Finalised 2014
Cloonboley2	203	Development Bog This bog was drained in the 1980s in anticipation of industrial peat production. No industrial peat harvesting ever took place.	Bog restoration was carried out in 2013-2014 Rehabilitation (raised bog restoration) complete	N/A	Finalised 2016

Table Ap-2b: Blackwater Bog Group names, area and indicative status (Blackwater sub-group)

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Ballaghurt	597	Cutaway Bog  Industrial peat production commenced at Ballaghurt Bog in 1981. The majority of the site is cutaway with some residual deeper peat	Ballaghurt Bog formerly supplied a range of commercial functions including horticultural peat and fuel peat.  Pioneer cutaway vegetation communities are naturally developing on some cutaway areas.	2020	To be finalised 2023
Belmont	316	Cutaway Bog  Industrial peat production commenced at Belmont Bog during the 1950's. The majority of the site is cutaway.	There are some areas of pioneer cutaway vegetation communities naturally colonising cutaway sections.  Coilte have developed a portion of the bog for forestry.  Rehabilitation under PCAS completed in 2021	2020	Finalised 2021
Blackwater	2,303	Cutaway Bog  Industrial peat production commenced at Blackwater Bog during the 1950's. The majority of the site is cutaway.	Blackwater Bog formerly supplied milled horticultural peat and fuel peat.  There is extensive development of emergent cutaway vegetation communities across the former production area.  The site has been used for experimental forestry (BOGFOR) and other conifer plantations.  Part of the site was rehabilitated with lake and wetland creation.  An ash facility took ash from Shannonbridge Power station  Partial Rehabilitation under PCAS proposed for 2022	2020	Finalised 2022
Bloomhill	883	Cutover Bog  Industrial peat production commenced at Bloomhill Bog during 1981. The majority of the site still has relatively deep residual peat.	Bloomhill Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former peat production area is bare peat.  Partial Rehabilitation under PCAS proposed for 2022	2020	Finalised 2022
Bunahinly-Kilgarvan	389	Cutover Bog  Industrial peat production commenced at Bunahinly-Kilgarvan Bog during the 1990's. Residual Deep peat remains on these bogs.	Bunahinly-Kilgarvan formerly supplied milled horticultural peat and fuel peat.  Much of the former production area is bare peat.  Part of Bunahinly has been re-wetted in 2022.	2020	Finalised 2022
Glebe	132	Cutover Bog  Industrial peat production commenced at Glebe Bog during the 1990's. Residual deep peat remains on these bogs.	Glebe Bog formerly supplied milled; horticultural peat and fuel peat.  Glebe bog is still listed as a pNHA.  Much of the former production area is bare peat.	2020	Draft 2022 (as part of Ballaghurt bog rehab plan)
Clooniff	523	Cutover & cutaway Bog  Industrial peat production commenced at Clooniff Bog during	Clooniff Bog formerly milled fuel peat.  Much of the former production area is bare peat or wetland.	2020	Finalised 2021

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
		the 1970's. A mosaic of variable peat depths remains on this bog.	Some emergent vegetation communities are naturally colonising cutaway areas. Ceasing pumping has created a large wetland in one area.  Clooniff has been re-wetted in 2022.		
Cornafulla	460	Cutover Bog  Industrial peat production commenced at Cornafulla Bog in 1987. This bog still retains relatively deep residual peat.	Cornafulla Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area or cutaway is bare peat.	2020	Draft 2017
Cornaveagh	492	Cutover Bog  Industrial peat production commenced at Cornaveagh Bog in 1970's and ceased in 2020. This bog still retains relatively deep residual peat.	Cornaveagh Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area footprint or cutaway is bare peat.	2020	Draft 2017
Culliaghmore	442	Cutover Bog  Industrial peat production commenced at Culliaghmore Bog in 1960's and ceased in 2020. Much of this bog is cutaway, with some pockets of deeper residual peat.	Culliaghmore Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area footprint or cutaway is bare peat.  Some pioneer cutaway vegetation communities are naturally colonising cutaway areas.	2020	Draft 2017
Garryduff	970	Cutaway Bog  Industrial peat production commenced at Garryduff Bog in 1960's. The majority of this bog is cutaway.	Much of the former production area footprint or cutaway is bare peat.  Extensive natural development of pioneer cutaway vegetation communities is present on cutaway areas.  Rehabilitation underway at Garryduff	2020	Finalised 2021
Kellysgrove	201	Development Bog  Kellysgrove Bog was drained in the 1980s in anticipation of industrial peat production. No peat harvesting ever took place.	The site retains degraded raised bog vegetation.  Kellysgrove Bog retains significant raised bog restoration potential.  A way-marked walking trail is positioned along the old Ballinasloe Canal.  Kellysgrove has been re-wetted in 2021.	2020	Finalised 2021
Kilmacshane	1,294	Cutaway Bog  Industrial peat production commenced at Kilmacshane Bog in 1960's. The majority of this bog is cutaway with some pockets of deeper peat remaining.	Kilmacshane Bog formerly supplied milled horticultural peat and fuel peat.  Some pioneer cutaway vegetation communities are naturally colonising cutaway areas and water levels have risen as pumping reduced, creating wetlands.  Kilmacshane has been re-wetted in 2021/2022.	2014	Finalised 2021
Lismanny	449	Cutaway Bog  Industrial peat production commenced at Lismanny Bog in 1960's. The majority of this bog is cutaway with some pockets of deeper peat remaining.	Lismanny Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area footprint is bare peat. Some pioneer cutaway vegetation	2020	Draft 2020

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
			communities are naturally colonising cutaway areas.		

**Table Ap-2c: Blackwater Bog Group names, area and indicative status (Derryfadda sub-group)**

Bog Name	Area (ha)	Stage of development	Land-Use and History	Peat Production Cessation	Rehab Plan Status
Derryfadda	610	Cutover bog Industrial peat production commenced at Derryfadda Bog in 1980's. This bog still retains residual deep peat.	Derryfadda Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area is bare peat.  Some pioneer cutaway vegetation communities are naturally colonising cutaway areas.  Derryfadda has been partially rewetted under PCAS in 2022	2020	To be finalised 2022
Boughill	415	Cutover bog Industrial peat production commenced at Boughill Bog in 2008. This bog still retains residual deep peat.	Boughill Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area footprint or cutaway is bare peat.	2020	Draft 2017
Castlegar	517	Cutover bog Industrial peat production commenced at Castlegar Bog in 2001. This bog still retains residual deep peat.	Castlegar Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area is bare peat.  The adjacent Annaghbeg Bog NHA is an intact undrained raised bog.  Castlegar has been rewetted under PCAS in 2021	2019	Finalised 2021
Gowla	650	Cutover bog Industrial peat production by BnM commenced at Gowla Bog in 1970's. Development for sugar production was in place at Gowla since the 1950's. This bog still retains residual deep peat.	Gowla Bog formerly supplied milled horticultural peat and fuel peat.  Much of the former production area footprint is bare peat.	2020	Draft 2017

See Drawing number BNM-DR-23-04-24 titled **Blackwater Bog Group**, included in the accompanying Mapbook which illustrates the location of Ballaghurt and Glebe Bogs and the Blackwater Bog Group in context to the surrounding area.

## APPENDIX III: ECOLOGICAL SURVEY REPORT(S)

<b>Ecological Survey Report</b> <i>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.</i>			
<b>Bog Name:</b>	<b><u>Ballaghurt</u></b>	<b>Area (ha):</b>	738ha
<b>Works Name:</b>	Blackwater	<b>County:</b>	Offaly
<b>Recorder(s):</b>	DF	<b>Survey Date(s):</b>	26 <sup>th</sup> April 2012
<b>Habitats present (in order of dominance)</b> <p>The most common habitats present at this site include:</p> <ul style="list-style-type: none"> <li>• Bare peat (BP) (Codes refer BnM classification of pioneer habitats of production bog. See Appendix II).</li> <li>• Pioneer poor fen communities dominated by Soft Rush (pJeff)</li> <li>• Pioneer dry heath communities (dHeath)</li> <li>• Emerging Birch scrub (eBir)</li> <li>• Mixed broadleaved plantation (WD1)</li> <li>• Silt Ponds (Silt) with associated habitats such as scrub, Bracken, rank grassland (GS2), dry calcareous grassland (gCal) and typical pioneer communities of disturbed areas (disTuss).</li> </ul> <p>The most common habitats present around the margins at this site include:</p> <ul style="list-style-type: none"> <li>• Birch woodland (WN7) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II)</li> <li>• Scrub (WS1) (Gorse scrub and Birch scrub developing of dry high bog around margins)</li> <li>• Raised bog (PB1)</li> <li>• Lowland depositing river (FW2) (Blackwater River)</li> <li>• Cutover bog (PB4) (several small fragments)</li> <li>• Wet grassland (GS4) along the edges of the site</li> </ul>			
<b>Description of site</b> <p>Ballaghurt Bog is located approximately 5.9km south of Ballynahown in County Offaly. The bog is contained within three main sections – eastern section, western section and Clonllyn Glebe pNHA . This report details the findings of the ecological survey on the eastern and western sections of Ballaghurt. Ballaghurt is part of the Blackwater group of bogs and connected, via rail links, to Blackwater Bog to the west and Lemanaghan Bog to the south east. Peat production first began on Ballaghurt Bog in 1981. Several sections of remnant raised bog are located along the margins of the site. These remnant areas are small in extent and degraded in condition (associated with drainage operations and peat extraction operations)) and are actively managed for the production of domestic turf.</p> <p>The eastern section of the site is bisected in half by a minor public road and a small section of farmland (outside BnM boundary) managed for agriculture. There are two sections of raised bog and cutover bog on either side of the public road and these areas are actively managed for peat production and used by domestic turf cutters. Much of this section comprises bare peat in active peat production. The peat resource study shows that peat depths are less than 2m and small mounds and ridges are beginning to appear across this section of the bog. The Blackwater River forms a boundary to the south of the site. Furthermore, raised bog (PB1), wet grassland (GS4) and cutover</p>			

bog (PB4) are located at the southern section of the site. Clonllyn Glebe pNHA is connected to the south eastern corner of the site via an access track.

The eastern section of the site is dominated by bare peat and most of the site is managed for active industrial peat production. The remaining peat resource in this section of the site contains in excess of 2.6 m of peat, however some small areas along the north eastern section of the site contains considerably lower peat reserves. The majority of the remaining peat on this section of the site is “red” or Sphagnum peat and it is considered likely that marl is located beneath the peat layer.

An isolated section of raised bog is located to the north of the Doon to Clonmacnoise public road. This section of bog has been drained and is dominated by Ling Heather (*Calluna vulgaris*). Gorse (*Ulex* sp.) is colonising this area and turf cutting is active.

A section of the site, close to the works area, contains several former production fields that have re-vegetated with Heather. This area appears to have been in production in the past but is now dominated by Ling Heather. The drains are still functioning, however small sections support a range of peat forming mosses including *Sphagnum cuspidatum*, *S. subnitens* and *S. palustre*. Other mosses recorded include, *Aulacomnium palustre*, *Campylopus introflexus* and *Polytrichum commune*. Sections of Bog cotton and Sundews (*Drosera* sp.) were also located in drainage channels. The old peat production fields were dry underfoot and have since recolonised with bog plant communities such as Heather, Bog Cotton (*Eriophorum angustifolium*), Purple Moor Grass (*Molinia caerulea*), Birch (*Betula* sp.), Bog Asphodel (*Narthecium ossifragum*) and *Cladonia* sp. with very little bare peat noted.

The Blackwater River crosses this section of the site and this area also contains numerous silt ponds. A mineral Island is located in this area and contains sections of scrub, three small fields and a broadleaf plantation. There was no grazing management regime of grassland at the time of the ecological survey and the fields may potentially be managed during summer months for grazing or silage crop production. The Broadleaf plantation is approximately 25-30 years old and contains a mix of Beech (*Fagus sylvatica*), Poplar (*Populus* sp.), Ash (*Fraxinus excelsior*), Oak (*Quercus* sp.), Common Alder (*Alnus glutinosa*) and Sycamore (*Acer pseudoplatanus*). The trees were planted in small coupes and some pruning had occurred in the past. Other trees in this area included Horse Chestnut (*Aesculus hippocastanum*), Elder (*Sambucus nigra*), Hazel (*Corylus avellana*) and Birch (*Betula* sp.). The ground flora consisted of Nettle (*Urtica* sp.), Bramble (*Rubus fruticosus* agg.), Ivy (*Hedera helix*), Ash saplings, Herb Robert (*Geranium robertianum*), Primrose (*Primula vulgaris*) and Blackthorn (*Prunus spinosa*). This forestry is marked as being within the BnM property and was planted in 1987. Areas of Birch woodland and remnant sections of raised bog are located along the margins of the mineral island.

Marginal habitats include remnant sections of raised bog, Birch woodland, scrub and wet grassland. The majority of remnant raised bog that remain along marginal sections are small in extent and degraded in condition that the functional capacity (i.e. structures and functions) of remnant bog has been significantly altered with limited potential to carry out restoration work.

#### Adjacent habitats and land-use

Adjacent habitats include wet grassland (GS4), conifer plantation (WD4), scrub (WS1), improved agricultural grassland (GA1), cutaway bog (PB4) and raised bog (PB1).

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

- The Blackwater River flows through the eastern section of the site and along the southern boundary of the eastern section of Ballaghurt Bog.
- The Blackwater River is part of the Shannon catchment.



### Peat type and sub-soils

The eastern section of the site contains in excess of 2.6m of peat in some areas. This peat appears to be “red” or “Sphagnum” peat. The western section of the site contained less peat (1m to 2.5m) and exposed gravel and marl ridges and mounds were being exposed in places.

The bog is underlain with marl and gravel.

### Fauna biodiversity

#### Birds

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

- Willow Warbler
- Snipe
- Mallard
- Skylark
- Teal
- Other more common species included Bull Finch, Rook, Magpie, Grey Crow, Pheasant and Wood Pigeon.

#### Mammals

Signs of several mammal species were noted on the site during the survey.

- Otter
- Badger
- Mink
- Fox

#### Other species

Frog

### References

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### 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. The report outlines potential options for*

<i>biodiversity management after industrial peat production has ceased, (if this is the proposed main land-use for the site).</i>			
<b>Bog Name:</b>	<u>Glebe</u> <u>(Clonlyon Glebe</u> <u>pNHA)</u>	<b>Area (ha):</b>	131.6 ha (325.3 acres)
<b>Works Name:</b>	Blackwater	<b>County:</b>	Offaly
<b>Recorder(s):</b>	Mark McCorry (2011) Barry O'Loughlin (2016)	<b>Survey Date(s):</b>	24/03/2011; 24/11/2016

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

The most common habitats present at this site include:

- Bare Peat (Cutover Bog (PB4)) (Codes refer to Heritage Council habitat classification, Fossitt 2000), See Appendix II.)
- Raised bog (marginal and facebank ecotope) (PB1)
- Bog woodland (WN7)
- Scrub (WS1)
- Wet grassland (GS4)
- Silt Ponds (Other artificial lakes and ponds (FL8))

**Description of site**

Clonlyon Glebe Bog pNHA is a relatively small bog located 4 km north-west of Ferbane in Co. Offaly. It is a sub-site of the larger Ballaghurt Glebe Bord na Móna bog. It is separated from the larger bog by a local road and a small band of farmland. The surrounding landscape is a mixture of flat peatland and farmland overlaying mineral soil, and low hills and eskers that have largely been improved to farmland. Clonlyon Glebe Bog is part of the Blackwater Bord na Móna bog group although it is somewhat on the periphery of the group.

This bog was originally developed for production by Bord na Móna in the late 1980s-1990s. The bog was ditched with regular drains and some vegetation was removed. Other outflow drains were put into the bog. During this time it was also selected as a potential National Heritage Area (pNHA). However, the NPWS site synopsis for the pNHA describes the bog as being drained with much of the bog surface showing severe signs of drying out and a large cover of bare peat ([www.npws.ie](http://www.npws.ie)).

An NPWS survey to select raised bogs for designation as actual National Heritage Areas (NHAs) reviewed the status of Clonlyon Glebe Bog (Derwin *et al.* 2002). This survey did not recommend its further designation as an NHA "as 80% of the bog had been drained" and it was considered too damaged to be designated at that stage. Clonlyon Glebe Bog pNHA was assessed as part of the 'Review of Raised Bog Natural Heritage Area Network' (DoAHG, 2014). The review used a criteria for detecting the ecological condition of raised bog NHAs and non-designated sites. Clonlyon Glebe Bog was one of 126 undesigned raised bog sites and scored 'low' under the categories; Area, Geographic Range and Habitat Quality. Based on this review, future prospects for the bog would appear to be unfavourable. Proposed Natural Heritage Areas have not been statutorily proposed or designated and are not legally recognised the same way as Natural Heritage Areas (NHAs) are. pNHAs were published on a non-statutory basis in 1995.

Clonlyon Glebe Bog is located in a small topographical basin that is surrounded by farmland. It is roughly rectangular in shape and there is a distinct northern aspect and slopes from the southern to the northern side.

The site borders the Blackwater River and includes a narrow riparian zone that flows occasionally during the winter. The river is channelised. The high bog is surrounded by typical marginal peatland habitats with scrub (WS1), active and regenerating cutover bog (PB4) and some bog woodland (WN7). There is active private sod peat cutting along the southern and eastern side of the site. Some of the cutting along the eastern side is quite intensive and there has been sausage peat cut from the surface of the high bog in places. The regenerating cutover bog is typically dominated by Heather and/or Purple Moor-grass-dominated communities with various proportions of Birch-dominated scrub and Gorse.

The majority of the high bog is regularly ditched with deep drains about 1-2 m deep. These drains are regularly spaced and flow from the south to the north of the site. The drains are functional with running water and very few have standing water or any developing *Sphagnum* mosses. As of 2016, the fields in between the drains are dominated by bare peat throughout much of the site while the eastern section supports some colonisation of bog plants such as Ling Heather, Purple Moor-grass, Hare's-tail Cotton-grass, Common Cotton-grass and Bog Asphodel. The surface micro-topography has been destroyed and there are few signs of any remnant bog mosses. There is very little moss or lichen cover other than *Campylopus introflexus* on bare peat where industrial peat production is not being undertaken.

About one quarter of the high bog on the east side has shallower drains and the fields have more vegetation cover and taller vegetation. Ditching has been less intensive in this section. The species assemblage is similar and the vegetation is still dominated by Ling Heather. However, there is more frequent *Hypnum jutlandicum* developing on the peat surface along with the Heather and *Cladonia portentosa* and some other *Cladonia* species are also developing with the Heather.

There is a relatively narrow band of unditched high bog around the margin to the south that still has typical raised bog features not found in the ditched section. The widest sections of relatively intact high bog are to be found around the south-east corner. In 2011, the high bog vegetation was dominated by White Beak-sedge (*Rhynchospora alba*) in places and there were some low hummocks of *Sphagnum capillifolium*, *S. papillosum* and *S. subnitens* still present. In addition, there were some small pockets of *Sphagnum cuspidatum* in hollows. Most of the hollows are dry with bare peat or are infilled but some have open water. The 2011 survey identified a small area of surface water pooling in the south-eastern corner of the site. This area supported *S. magellanicum* along with *S. papillosum* and *S. cuspidatum* in lawns. There was also one hummock of *S. imbricatum*. However, the *Sphagnum* cover was degraded. Conditions were much drier in this part of the site during the 2016 survey, primarily as a result of private turf cutting encroaching onto the high bog from the south. Areas supporting facebank ecotopes were dry underfoot with a notable absence of *Sphagnum* mosses. Frequent cracking and slumping was evident along the bog surface, an indicator of the threats and pressures associated with drainage and peat extraction operations. Facebank ecotopes supported dense stands of Ling Heather. Areas supporting marginal ecotopes were characterised by <10% *Sphagnum* cover (rare occurrences of *Sphagnum capillifolium*, *S. papillosum* and *S. cuspidatum*). Other bog plants included Ling Heather, Bog Asphodel (*Narthecium ossifragum*), Hare's-tail Cotton-grass (*Eriophorum vaginatum*), Common Cotton-grass (*Eriophorum angustifolium*), and Reindeer Lichen (*Cladonia portentosa*).

There is a flushed area along the southern end of the bog. This area contains some Birch. This has largely degraded along with the rest of the bog. However, Heather growth is quite high and there is a significant contrast to the rest of the bog.

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

Clonllyn Glebe pNHA (NPWS Site code 000893)

*"Clonllyn Bog is a small, domed bog situated four kilometres north-west of Ferbane, Co. Offaly. The main feature of the dome at present is the presence of numerous and efficient drains over 80% of the surface. Two areas of good hummock and hollow growth pattern occur, one in the north and one in the south-east. Both show severe*

*signs of drying out and no water occurs in the hollows. Much of the bog surface shows bare peat, a result of burning and drying out.*

*Unless the drains are completely blocked immediately there is no hope for this bog. It is probably too late already”.*

### **Adjacent habitats and land-use**

The surrounding area is largely dominated by farmland with improved agricultural grassland most predominant (GA1). There are also some marginal peatland habitats such as scrub (WS1), bog woodland (WN7) and old cutover bog (PB4). Some of the marginal land in the area has been planted with conifer plantation (WD4).

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

- The Blackwater River flows along the northern boundary of the BNM property.
- Some drains mark the site boundary
- This area is within the mid-Shannon catchment.

### **Peat type and sub-soils**

The surface peat type comprises red acidic *Sphagnum* peat.

- The underlying soils and sub-soils are classed as ‘Raised Bog Cutover Peat’ (EPA Envision, 2017 (<http://gis.epa.ie/Envision>)).

### **Fauna biodiversity**

#### **Birds**

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

- Buzzard
- Lapwing (~25) roosting on site
- Snipe (7)
- Other more common birds recorded on the site include Chaffinch, Robin, Reed Bunting, Grey Crow, Rook and Wren.

#### **Mammals**

Several mammals and signs of mammals were noted on the site during the survey

- Hare (5) including 1 White Hare
- Fox

#### **Other species**

- Frogs (about 100) were breeding in a pool along the main access route into the bog

### **References**

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- NPWS Site Synopsis for Clonllyn Glebe Bog (Site Code: 000893). [www.npws.ie](http://www.npws.ie)
- NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2). National Roads Authority.

## 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 bowzers. Only dedicated trained and competent personnel will carry out refuelling operations.
- Mobile storage such as fuel bowzers will be bunded to 110% capacity to prevent spills. Tanks for bowzers 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

All measures taken to ensure the prevention of spread on invasive species will follow Best Practice.

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

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

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

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

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

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<sup>6</sup> <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 Blackwater bog group (Ref. PO-502-01). As part of Condition 10.2 of this license, a rehabilitation plan must be prepared for permanent rehabilitation of the boglands within the licensed area. The bog is part of the Blackwater group. This regulatory requirement is the main driver of the development of this rehabilitation plan.

### 2 The Peatlands Climate Action Scheme (PCAS)

Bord na Móna (BnM) understand that it is the Minister's (DECC) intention to impose an obligation on Bord na Móna to develop a programme of measures, 'the Scheme', for the enhanced decommissioning, rehabilitation and restoration of boglands previously used to supply peat for electricity generation within the State. The enhanced decommissioning, rehabilitation and restoration of the peatlands funded by the Scheme (PCAS) will deliver benefits across climate action (GHG mitigation through reduced carbon emissions and acceleration towards carbon sequestration), enrich the State's natural capital, increase eco-system services, strengthen biodiversity, improve water quality and storage attenuation as well as developing the amenity potential of the peatlands.

It is envisaged that Bord na Móna carry out an enhanced decommissioning, rehabilitation and restoration, under the Scheme (PCAS), and supported by the Climate Action Fund and Ireland's National Recovery and Resilience Plan across a footprint of 33,000 ha. This scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and measures supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. However, only the additional costs associated with the additional



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

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

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

### **3 National and EU Climate and Biodiversity Policy**

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

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

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

Bord na Móna is following a decarbonisation programme aimed at reducing the carbon emissions from its activities. Industrial peat production has now ceased, and several other decarbonisation measures are being implemented. The company aims to further develop renewable energy and resource recovery markets with a key objective of reducing the carbon intensity of all products. In addition, the carbon emission mitigation benefits associated with the post-peat extraction rehabilitated peatland following re-wetting, revegetation and colonisation of significant areas with native woodland will make a significant contribution to achieving the State's carbon emission reduction targets.

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

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

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

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

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

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

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

#### **4 National Peatlands Strategy**

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

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

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

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

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

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

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

The National River Basin Management Plan (Department of Housing, Planning, Community and Local Government 2017) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). In broad terms, the objectives of the WFD are (1) to prevent the deterioration of water bodies and to protect, enhance and restore them with the aim of achieving at least good status and (2) to achieve compliance with the requirements for designated protected areas.

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

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

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

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

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

## **6 National Biodiversity Action Plan 2016-2021**

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

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

A new National Biodiversity Action Plan is currently being developed.

## **7 National conservation designations**

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

## **8 National Raised Bog Special Area of Conservation Management Plan 2017-2022.**

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

of the EU Habitats Directive, with regard to the regulation of turf cutting on the Special Areas of Conservation (SACs). The then Minister for Arts, Heritage and the Gaeltacht, also published a **Review of Raised Bog Natural Heritage Area Network** in 2014.

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

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

## **9 All-Ireland Pollinator Plan 2021-2025**

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

## **10 Land-use planning policies**

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

## **11 National Archaeology Code of Practice**

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

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

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

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

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

One example of a key CBD target is:

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

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

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

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

## 13 Bord na Móna commitments

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

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

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

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

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

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

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

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

## APPENDIX VII. DECOMMISSIONING

### 1. Condition 10 Decommissioning

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

*10.1 Following termination of use or involvement of all or part of the site in the licensed activity, the licensee shall:*

*10.1.1 Decommission, render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.*

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

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

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

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

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.

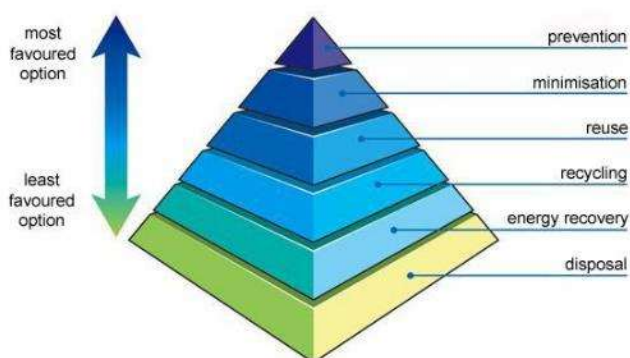
7.3.5 The tonnages and EWC Code for the waste materials listed in *Schedule 2(i) Hazardous Wastes for Disposal/Recovery* and *Schedule 2(ii) Other Wastes for Disposal/Recovery* sent off-site for disposal/recovery.

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.

## 2. Enhanced Decommissioning

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

Item	Enhanced Decommissioning Type	Ballaghurt and Glebe Bogs Decommissioning Plan
1	Removal of Railway Lines	Where applicable
2	Decommissioning Bridges and Underpasses	Not applicable
3	Decommissioning Railway Level Crossing	Not applicable
4	Restricting Access (bogs and silt ponds)	Restricting Access to Bog.
5	Removal of High Voltage Power Lines	Where required

## 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 cutover bog but do grow well in these more acidic conditions where peat has been re-wetted. There is potential to re-develop *Sphagnum*-rich plant communities in these conditions if the peat can be re-wetted. This brings the opportunity of re-developing *Sphagnum*-rich vegetation communities that are considered Carbon sinks or peat-forming habitats and restoring the carbon sequestration function of these sites.

**Dry cutaway bog:** Cutaway bog is categorised as dry cutaway where it is not practical or feasible to re-wet these areas completely. It is inevitable that some areas of cutaway will remain relatively dry due to the heterogeneous 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 heterogeneous topographical mosaic separated by basins. Dry cutaway may have very thin or no residual peat where ridges and mounds have been exposed. The exposed sub-soils are a mix of glacial gravels, muds and tills that can be quite free-draining. Dry cutaway may also have deeper residual peat but in a location (ie. at the margin) where the peat cannot be re-wetted due to boundary constraints. Dry cutaway may also develop in situations where there is a relatively steep slope that inhibits re-wetting. The majority of dry cutaway will develop towards grassland, heath, scrub and dry woodland habitats.

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

**Enhanced rehabilitation:** This is defined as rehabilitation carried out under Scheme, which is proposed to be externally funded. It is proposed by Government that Bord na Móna be obligated to carry out enhanced decommissioning, rehabilitation and restoration on peatlands. This Scheme will significantly go beyond what is required to meet rehabilitation and decommissioning obligations under existing EPA IPC licence conditions. Interventions and activities supported by the Scheme will ensure that environmental stabilisation is achieved (meaning IPC obligations are met), and importantly, significant additional benefits, particularly relating to climate action and other ecosystem services, will also be delivered. However, only the costs associated with the additional, enhanced and accelerated measures, i.e., those interventions which go beyond the existing decommissioning and rehabilitation requirements arising from Condition 10 will be eligible for support under the Scheme.

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

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

**Restoration:** Ecological restoration 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 is reduced or stopped. The water chemistry of wetland cutaway frequently is strongly influenced by the more alkaline sub-soils that have been exposed during peat production. This means that pioneer vegetation is more typical of fen and wetland, rather than raised bog. Wetland cutaway will have a broad range of hydrological conditions depending on the local topography. In some cases, these wetlands may form deep water (> 0.5 m) whilst other areas may have the water table at or just below the surface of the ground.

## APPENDIX IX. EXTRACTIVE WASTE MANAGEMENT PLAN

### (Minimisation, treatment, recovery and disposal)

#### Objective:

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

#### Scope:

This plan covers IPPC Licence's Ref P0502-01, Blackwater Group of Bogs located in County Offaly.

#### 1.0 Extractive Waste:

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

##### 1.1 Silt Pond excavations and maintenance.

All peat extraction activities in the Blackwater 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 or is levelled out. As required by condition 6.6, these silt lagoons are cleaned twice per annum or more often if inspections dictate. These silt cleanings are also deposited on the same location, adjacent to the silt pond, where they may be levelled periodically to allow room for subsequent cleanings. These mounds of silt pond excavation material and cleanings are generally no higher than 2-3 metres.

##### 1.2 Power Station screenings:

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

##### 1.3 Bog Timbers:

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

#### 2.0 P0502-01 IPPC Licence Extractive Waste Conditions

##### 2.1 Condition 7.5 Extractive Waste Management

The licensee shall draw up a Waste Management Plan (to be known as an Extractive Waste Management Plan) for the minimisation, treatment, recovery and disposal of extractive waste. This Plan shall meet the requirements of regulation 5 of the Waste Management (Management of Waste from the Extractive Industries) Regulations, 2009. The Plan shall be submitted for agreement by the Agency by the 31<sup>st</sup> 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 our Bog Rehabilitation Plan. Storage of these wastes in the interim, open to the elements does not present a change on the nature of these wastes that will threaten the environment or prevent their reuse during the bog rehabilitation process.

**5 (2a)(iii)**

Under Condition 10 of the 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	Classification	Chemical Process treatment	Deposition description	Transport System
Silt Pond Excavations and cleanings	Peat and mineral soils associated with peatlands. Stored for reuse during bog rehabilitation, with no displacement of overburden	01 01 02	None	Excavated from silt ponds by excavator and deposited adjacent to the silt pond.	Excavator
Peat Screenings	Stones, timbers and oversized peat particles, reincorporated into low areas, agreed with the Agency, and 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 Blackwater IPPC Licence Coordinators office.

The location in relation to the silt pond excavations and cleanings are adjacent to the silt ponds, which are considered under the Shannon River Basin Management Plan in accordance with the requirements of Directive 2000/60/EC.

Screenings and bog timbers are all naturally occurring elements of peatland and their placement back to the bog in smaller concentrated designated waste facilities does not constitute a risk to the prevention of water compliance.

The lands under where these materials are deposited are peatlands and are un-effected by the placing of this material.

#### **Review.**

This plan will be reviewed every five years, 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 Blackwater IPC Licence P0502-01.



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

- Any fertiliser used will be Rock Phosphate and will not be applied in the following conditions:
  1. The land is waterlogged;
  2. The land is flooded, or it is likely to flood;
  3. The land is frozen, or covered with snow;
  4. Heavy rain is forecast within 48 hours (forecasts will be checked from Met Éireann).
  5. The ground slopes steeply and there is a risk of water pollution, when factors such as surface run-off pathways, the presence of land drains, the absence of hedgerows to mitigate surface flow, soil condition and ground cover are taken into account.
- Buffer zones in respect of waterbodies, as specified on <https://www.epa.ie/about/faq/name,57156,en.html>, will be adhered with at all times with regard to fertiliser application.
- No fertiliser will be spread within or in proximity to European Sites. Fertiliser will not be spread within 25m of a hydraulic break (where slope indicates runoff potential); 25m of an area subject to annual winter inundation, 25m of a natural watercourse, or 25m of any drains where conveyance is to be retained through the proposed rehabilitation extent.
- Fertiliser will be applied to headlands and bare fields where the surface slope indicates runoff is directed away from the above areas, and to within 2m of internal drainage channels within the cutover high field areas. These drainage channels will be blocked in advance of fertiliser application, restricting potential run-off to downstream drainage channels

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

## **APPENDIX XI. CONSULTATION SUMMARIES**

### **Table APX -1 Consultees contacted**

To follow

### **Table APX -2 Response summary from Consultees contacted**

To follow

Draft

## APPENDIX XII. ARCHAEOLOGY

### Role of the Archaeological Liaison Officer

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



Code of Practice

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# Code of Practice

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



<b>Bord na Móna</b>	<b>Procedure: ENV017</b>	<b>Rev: 1</b>
<b>Title: Archaeological Findings</b>	<b>Approved: EM</b>	<b>Date: 13/10/2020</b>

**1) Purpose**

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

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

**2) Procedure**

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

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

Your Archaeological Liaison Officer is .....

**3) Records**

Revision Index			
Revision	Date	Description of change	Approved
1	13/19/2020	First release	EMcD
2			



# **Archaeological Impact Assessment of Proposed Bog Decommissioning and Rehabilitation at Ballaghurt-Glebe Bog, Co. Offaly**

**Report For**

**Bord Na Móna Energy Ltd.**

**Author**

**Dr. Charles Mount**

**Bord Na Móna Project Archaeologist**



## Introduction

The EPA (2002) *Guidance on the process of preparing and implementing a bog rehabilitation plan* notes that the licensee should characterise the bog prior to embarking on detailed planning and implementation. This characterisation should detail how the land is classified in terms of statutory protections, e.g. as European sites, world heritage sites, RAMSAR sites, National Heritage Areas, national monuments, archaeological heritage, etc. This archaeological impact assessment report was prepared by Dr. Charles Mount for Bord na Móna Energy Ltd to fulfil this characterisation in relation to archaeological heritage. It represents the results of a desk-based assessment of the impact of proposed bog rehabilitation on c.733 hectares at Ballaghurt-Glebe Bog, Co. Offaly on the known archaeological heritage of the bog. The proposed rehabilitation actions will be a combination of measures to create wetlands and re-wet deep peat as outlined in the draft Methodology Paper for the proposed Bord na Móna Decommissioning, Rehabilitation and Restoration Scheme. These enhanced measures for Ballaghurt-Glebe Bog will include:

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

Ballaghurt-Glebe Bog is located c.3.5km north-east of Ferbane and is traversed by the R444 road. The bog rehabilitation area occupies the townlands of Aghafin, Carrowkeel, Castlereagh, Clonadarg, Clonascra, Clonfinlough, Clongawny, Doon Demesne, Endrim and Lackagh Beg/More on OS 6 inch sheets Offaly Nos. 6 and 14.

## 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 Ballaghurt-Glebe Bog. The extent of the rehabilitation area is indicated in Fig. 1. This area was examined using information from:

- The IAWU Peatland Survey
- The 2009 Bord na Móna Re-assessment Survey
- The Record of Monuments and Places
- The Sites and Monuments Record (SMR) that is maintained by the Dept of Housing, Local Government and Heritage
- The Excavations database





- Previous assessments

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

## Desktop assessment

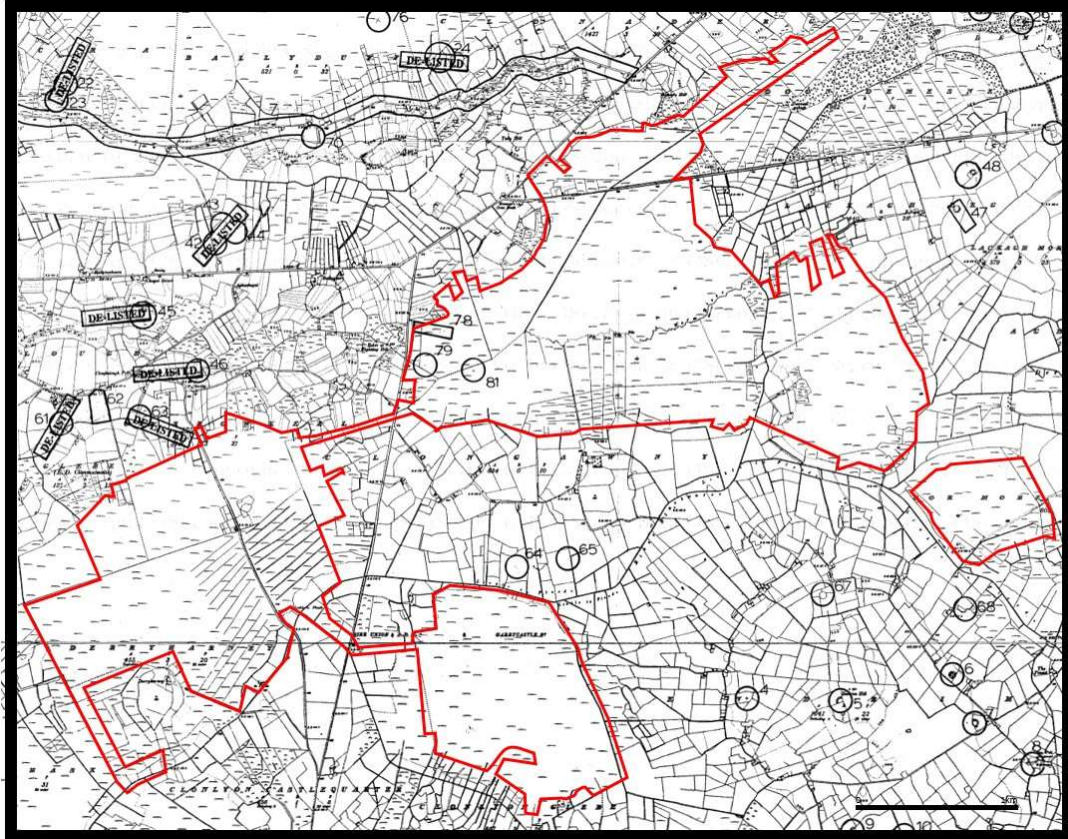


Fig. 1. Ballaghurt-Glebe Bog, Co. Offaly, detail of the Record of Monuments and Places map sheets Nos. 6 and 14. The proposed rehabilitation area is outlined with the red line.

## Peatland survey

Ballaghurt-Glebe Bog was surveyed by the Irish Archaeological Wetland Unit (IAWU) in 1992 as part of the Archaeological Survey of Ireland Peatland Survey (Unlicensed). Twenty-eight 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	SMR Class	IAWU Cat. No.	IAWU Class	Townland	ITM E	ITM N	Depth BS m
OF006-121----	Structure – peatland	OF-CGY 0001	WWIS	Clongawny	207585	229685	0.55
OF006-122----	Structure – peatland	OF-CGY 0002	WWIS	Clongawny	207265	229530	0.00
OF006-123----	Road - class 3 togher	OF-CGY 003a	TOGH	Clongawny	207250	229265	0.00
OF006-081----	Post row - peatland	OF-CGY 003b	PORO	Clongawny	207545	229550	0.00
OF006-124----	Road - class 3 togher	OF-CGY 0004	PUTOGH	Clongawny	207285	229540	0.00
OF006-126----	Structure – peatland	OF-CRK 0001	WWIS	Carrowkeel	207190	229690	0.73
OF006-127----	Structure – peatland	OF-CRK 0002	WWIS	Carrowkeel	207230	229675	0.00
OF006-128----	Structure – peatland	OF-CRK 0003	WWIS	Carrowkeel	207220	229565	0.00





OF006-079004-	Road - class 3 togher	OF-CFL 0007	TOGH	Clonfinlough	207225	229750	0.25
OF006-079005-	Redundant record OF006-110---- repeated	-	-	-	-	-	-
OF006-078----	Structure – peatland	OF-CFL 0008	PORO	Carrowkeel/Clonfinlough	207250	229955	0.00
OF006-109----	Structure – peatland	OF-CFL 0009	WWIS	Carrowkeel/Clonfinlough	207220	229730	0.42
OF006-110----	Road - class 3 togher	OF-CFL 0010	TOGH	Clonfinlough	207225	229750	0.10
OF006-079002-	Post row – peatland	OF-CFL 0011	PORO	Clonfinlough	207210	229750	0.00
OF006-079003-	Road - class 3 togher	OF-CFL 0012	TOGH	Clonfinlough	207210	229745	0.00
OF006-111----	Road - class 3 togher	OF-CFL 0013	PUTOGH	Carrowkeel/Clonfinlough	207220	229720	0.00
OF006-112----	Structure – peatland	OF-CFL 0014	WWIS	Carrowkeel/Clonfinlough	207210	229730	0.00
OF006-079001-	Post row – peatland	OF-CFL 0015	PORO	Clonfinlough	207200	229760	0.00
OF006-113----	Structure – peatland	OF-CFL 0016	WWIS	Clonfinlough	207200	229770	0.00
OF006-114----	Structure – peatland	OF-CFL 0017	WWIS	Clonfinlough	207285	229950	1.00
OF006-115----	Structure – peatland	OF-CFL 0018	WWIS	Clonfinlough	207305	229960	0.00
OF006-116----	Structure – peatland	OF-CFL 0019	PUTOGH	Clonfinlough	207225	229915	0.00
OF006-117----	Structure – peatland	OF-CFL 0020	WWIS	Clonfinlough	207280	229960	0.00
OF006-118----	Structure – peatland	OF-CFL 0021	WWIS	Clonfinlough	207305	229960	1.30
OF006-119----	Structure – peatland	OF-CFL 0022	WWIS	Clonfinlough	207290	229965	0.00
OF006-120----	Structure – peatland	OF-CFL 0023	WWIS	Clonfinlough	207455	229890	0.52
OF006-131----	Structure – peatland	OF-LKB 0001	WWIS	Lackagh Beg	209350	230010	0.00
OF006-132----	Structure – peatland	OF-LKB 0002	WWIS	Lackagh Beg	209510	229910	0.35
OF006-133----	Structure – peatland	OF-LKM 0001	WWIS	Lackagh More	209710	229770	0.00

Table 1. List of sightings in the rehabilitation area made by the IAWU with SMR concordance.

### Recorded Monuments

The Record of Monuments and Places (RMP) for Co. Offaly which was established under Section 12 of the National Monuments (Amendment) Act, 1994 was examined as part of the assessment (DAHGI 1994). This record was published by the Minister in 1994 and includes sites and monuments that were known in Ballaghurt-Glebe Bog before that date. This review established that there are three RMPs located in the proposed rehabilitation area (see Table 2 and Fig. 1). These were notified by the IAWU following the 1992 Peatland Survey.

RMP_NO	RMP Class	SMR Class	Townland	Irish Grid E	Irish Grid N
OF006-078---	Togher		Clonfinlough	20730	22998
OF006-079---	Archaeological Complex		Clonfinlough	20725	22976
OF006-081---	Post Rows (s)		Clongawny	20755	22973

Table 2. Sites in the rehabilitation area entered in the RMP.

### 2009 Bord na Móna Re-assessment Survey

Ballaghurt-Glebe Bog was surveyed by ADS Ltd in 2009 as part of the Bord na Móna re-assessment survey (Licence No. 090403). The survey used GPS to locate the locations of all 28 sightings of archaeological material made by the IAWU in 1992. None of the sightings made in 1992 were found to be extant. The survey made one additional sighting of archaeological wood. This sighting has not been included in the SMR. It also found part of a wooden vessel lid which was retrieved (see Table 3).

SMR_NO	SMR Class	Cat._No.	Class	Townland	ITM	ITM	Depth BS m
-	-	OF-BLT001	Archaeological Wood	Clongawny	607295.1114	729915.7689	0.50
-	-	09E0403:1	Wooden Vessel Lid	Clongawny	607715.0192	729737.8053	0.0021

Table 3. List of sightings in the rehabilitation area made by the 2009 Bord na Móna re-assessment survey.



### Archaeological Excavations

A review of Bord na Mona excavation reports and the excavations bulletin at excavations.ie indicated that there have been no licensed excavations in the 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 13th of December 2022. The SMR consists of records included in the RMP and sightings made the IAWU 1992 Survey notified to the Dept. It does not include the sighting made by the 2009 Bord na Móna Re-assessment Survey. This review established that there are 28 sightings entered in the SMR in the proposed rehabilitation area. The sightings are indicated in Table 1 below and Fig. 2 below. Note that all of these sightings were found to have been removed by the 2009 Bord na Móna Re-assessment Surveys.

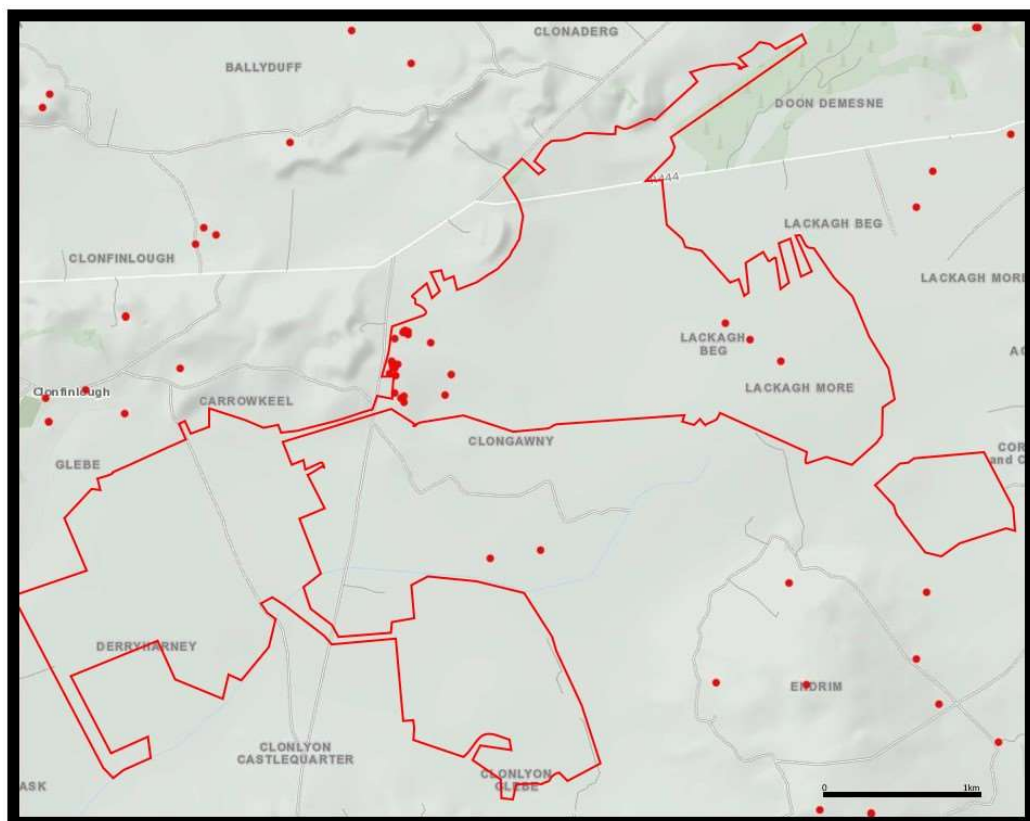
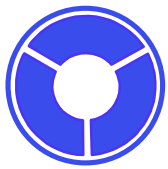


Fig. 2. Ballaghurt-Glebe Bog, Co. Offaly, detail of the Sites and Monuments Record. The proposed rehabilitation area is outlined with the red line.

### Previous assessments

Ballaghurt-Glebe Bog has been the subject of an Environmental Impact Assessment Report (EIAR) carried out by Irish Archaeological Consultancy LTD in 2018 for Bord na Móna Energy Limited in relation to IPC Licence P0500-01. This assessment included a review of the topographical files and finds registers of the National Museum of Ireland intended to identify all finds from the bog reported to the Museum by that date and these are included below in Table 4 (Pers Comm. Jane Whitaker). The assessment noted the archaeological material identified in the three surveys of the bog and noted that there was a moderate to



high potential for archaeological features to be uncovered during the course of any future development works in Ballaghurt-Glebe Bog.

### Reported finds

As noted above the EIAR carried out by Irish Archaeological Consultancy LTD in relation to IPC Licence P0500-01 contains a complete list of known finds from Ballaghurt-Glebe Bog reported to the National Museum of Ireland up to 2018 (see Table 4).

Townland	Museum No.	Description
Clonfinlough	1958:22	Polished stone axehead
Clonfinlough	1974:71	Piece of leather
Clonfinlough	1974:72	Piece of leather
Clonfinlough	2000:9	Wood vessel roughout

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

### Impact assessment

There are 29 known sightings of archaeological material in the rehabilitation area. Twenty-eight of these sightings have been noted as removed by 2009 Bord na Móna Re-assessment Survey. Examination of LIDAR peat depth data for the location of the 2009 sighting indicates that the remaining sighting from the 2009 survey can be shown to have been removed by harvesting (see table 5). There are no known surviving archaeological sightings in the rehabilitation area.

Cat._No.	Class	Townland	ITM E	ITM N	SMR No.	Depth BS m	Peat depth 2008	Peat depth 2020	Peat removed 2008-20	Condition
OF-BLT001	Archaeological Wood	Clongawny	607295.1114	729915.7689	-	0.5	46.87	46.87	46.87	Gone

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

### Recommendations

There are no known surviving archaeological sightings in the rehabilitation area. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should also be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.

### Conclusion

This is a desk-based archaeological assessment and includes a collation of existing written and graphic information to identify the likely archaeological potential of the proposed rehabilitation area. There are no known surviving archaeological sightings in the rehabilitation area. Should any previously unknown archaeological material be uncovered during the rehabilitation works, it should also be avoided and reported to the Bord na Móna Archaeological Liaison Officer and the National Museum of Ireland.



## References

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.

Dr. Charles Mount  
15 December 2022

*Table AP13.1. Water quality data for August 2020 to October 2022 at Glebe bog.*

PCAS SW Sampling Scheme								Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids	Suspended Solids
Bog Group	Licence No	Bog Name	SW Code-GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				2	23	9	2	4				10	2		10	3	2		2	2	
			Monthly rainfall (mm)	100.3	52.7	103.1	79.4	99.7	90.9								58.2	55.8	2	34.3	78.4	46.6	133.6	
PCAS SW Sampling Scheme				Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour	Colour
Bog Group	Licence No	Bog Name	SW Code-GIS	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co	mg/l Pt Co
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				386	453	323	359	443	N/S	443	315	436	N/S	N/S	373	313	327	274	N/S	256	
PCAS SW Sampling Scheme				COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD	COD
Bog Group	Licence No	Bog Name	SW Code-GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				81	99	58	75	86	N/S	86	96	92		95	97	75	67	N/S	64	63	
PCAS SW Sampling Scheme				pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
Bog Group	Licence No	Bog Name	SW Code-GIS	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units	pH Units
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				7	6.9	6.6	7	6.9		6.9	7.4	7.2		7.1	7.1	7	7.1		7.3	7.8	
			Monthly rainfall (mm)	100.3	52.7	103.1	79.4	99.7	90.9	87.8	64.6	13.4	96.5	22	110.4	58.2	55.8	81.1	34.3	78.4	46.6	133.6	47.4	
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	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	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				<0.05	0.08	<0.05	<0.05	<0.05	N/S	<0.05	0.05	<0.05			<0.05	<0.05	<0.05	<0.05	N/S	0.06	
PCAS SW Sampling Scheme				T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5	T5
Bog Group	Licence No	Bog Name	SW Code-GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				192	166	123	185	170		170	238	191		171	160	193	N/R	N/S	204	185	
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	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	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				0.614	0.493	0.338	0.780	0.486	N/S	0.486	0.466	1.160		1.280	0.811	0.875	1.080		0.393	0.171	
			Monthly rainfall (mm)	100.3	52.7	103.1	79.4	99.7	90.9	87.8	64.6	13.4	96.5	22	110.4	58.2	55.8	81.1	34.3	78.4	46.6	133.6	47.4	
PCAS SW Sampling Scheme				DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC	DOC
Bog Group	Licence No	Bog Name	SW Code-GIS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
				1/8/20	1/9/20	1/10/20	1/11/20	1/12/20	1/1/21	1/2/21	1/3/21	1/4/21	1/5/21	1/6/21	1/7/21	1/8/21	1/9/21	1/10/21	1/11/21	1/12/21	1/1/22	1/2/22	1/3/22	
Blackwater	P0502-01	Glebe	SW15				30.8	29.5	22	26.3	32.6	N/S	32.6	27.7	32	N/S		28.7	27.2	29.6	24.2	note 1	25	
Some months had no samples due to either no discharge during Summer months or associated Rivers being in flood during Winter months.																								

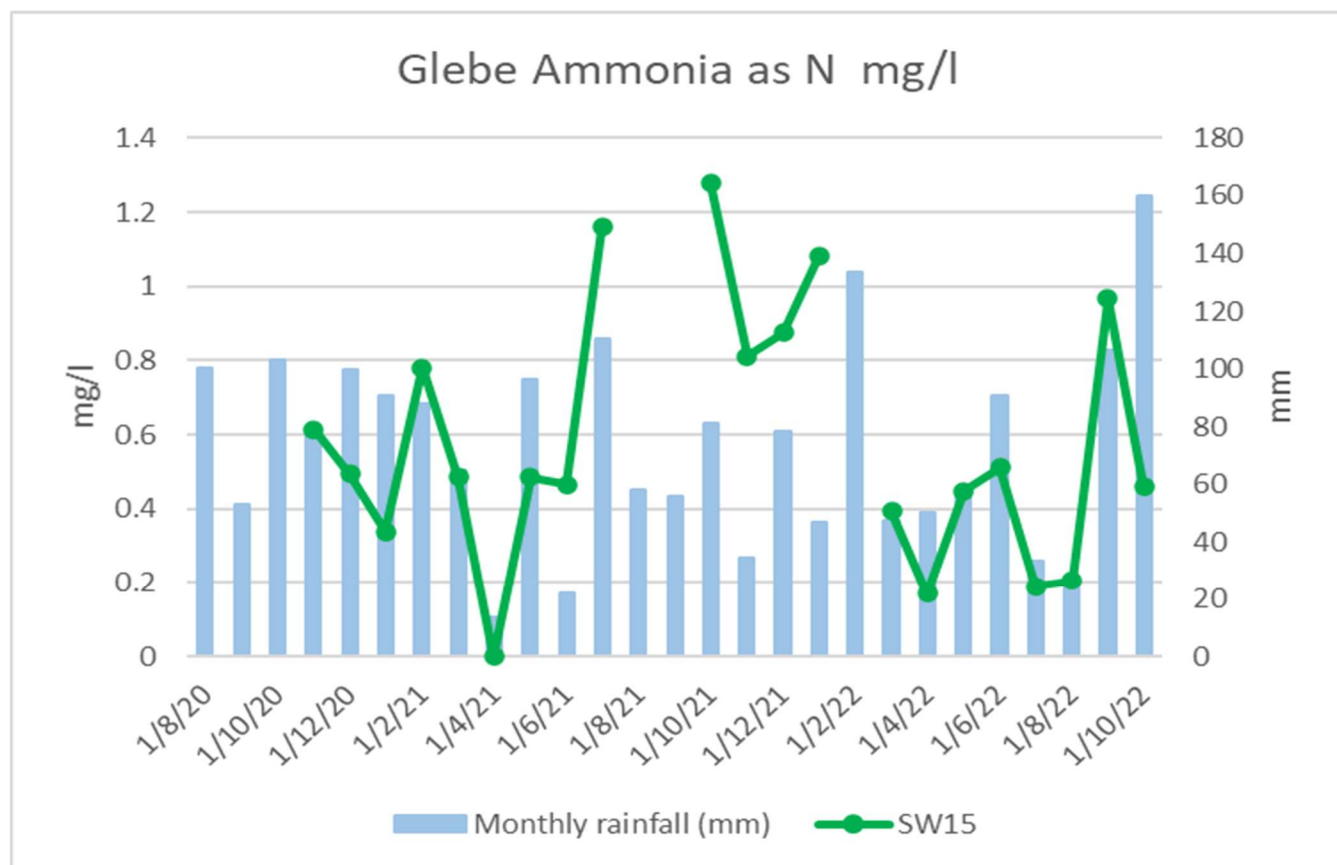


Figure AP13.2. Ammonia concentrations in water sampling from Glebe bog from different discharge points. The main trigger level for ammonia is 1.42mg/l for reporting to EPA.

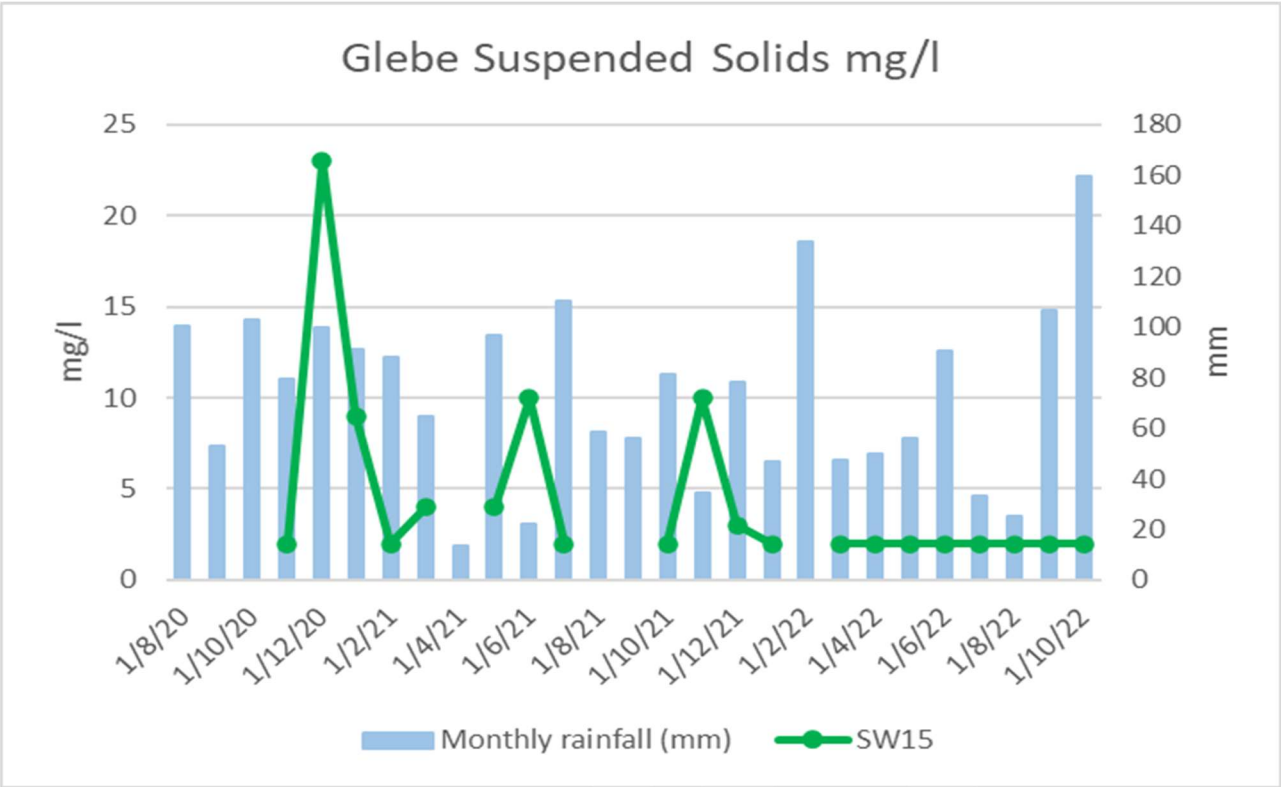


Figure AP13.1. Suspended solids in water sampling at Glebe bog from different discharge points.35 mg/l is the emission limit value.

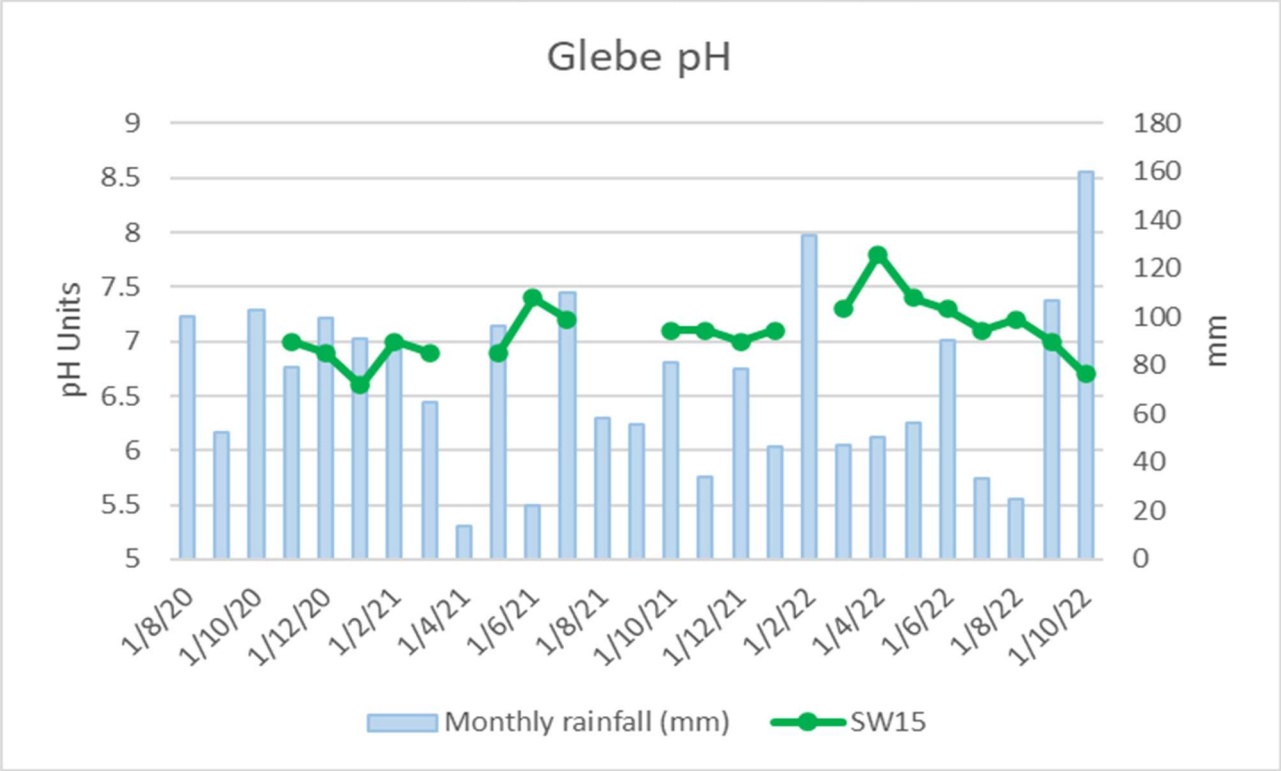


Figure AP13.1. pH in water sampling at Glebe bog from different discharge points.